

Encoding of Positive Information in Depressed and Anxious Persons

BY

ERIC SAMUEL WINER

B.A., University of Illinois at Chicago, 2003

M.A., University of Illinois at Chicago, 2008

THESIS

Submitted as partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Psychology
in the Graduate College of the
University of Illinois at Chicago, 2012
Chicago, Illinois

Defense Committee:

Daniel Cervone, Chair and Advisor
Evelyn Behar
Ellen Herbener
Jon Kassel
Cheryl Carmin, Psychiatry

This thesis is dedicated to my brilliant and thoughtful partner, Kate McClellan, who has made my life meaningful; and to my parents, who have allowed me to be my own man.

ACKNOWLEDGEMENTS

I would like to thank my thesis committee members Evelyn Behar, Ellen Herbener, Jon Kassel and Cheryl Carmin for their support and advice throughout the dissertation process. I would also like to especially thank the chair of my thesis committee, my advisor, Daniel Cervone, who has provided a wonderful model of an intellectually sophisticated psychological scientist.

ESW

TABLE OF CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
I. INTRODUCTION.....	1
A. The Importance of Positive Information.....	1
B. Selective Encoding Tasks.....	2
1. The Dot-Probe Task.....	2
2. The Two-Alternative Forced-Choice Identification Task.....	3
3. Strengths and Limits of the Tasks.....	4
a. Dot-Probe.....	4
b. Two-Alternative Forced-Choice Identification.....	5
C. The Selective Encoding of Positive Information.....	6
1. The Dot-Probe Task.....	6
a. Depression and Dysphoria.....	6
b. Social Anxiety.....	7
c. Trait Anxiety.....	9
2. The Two-Alternative Forced-Choice Identification Task	10
a. Anxiety.....	11
b. Summary.....	11
3. Summary of Research to Date.....	11
D. General Overview.....	12
1. Why Anxiety and Depression?	12
II. EXPERIMENT 1.....	14
A. Introduction.....	14
B. Two-Alternative Forced-Choice Method.....	15
1. Participants.....	15
2. Materials.....	16
3. Trial Sequence.....	16
4. Stimuli.....	17
5. Trial Blocks.....	18
C. Results.....	18
D. Discussion.....	20
III. EXPERIMENT 2.....	21
A. Introduction.....	21
B. Method.....	23
1. Participants.....	23
2. Two-Alternative Forced-Choice Method.....	23
a. Stimuli.....	23
b. Trial Blocks.....	24
3. Dot-Probe Method.....	25
a. Materials.....	25
b. Trial Sequence.....	25

	c.	Stimuli.....	25
	d.	Trial Blocks.....	26
	e.	Data Cleaning and Preparation for Analysis.....	26
	4.	Personality Questionnaires.....	27
C.		Results.....	28
	1.	Two-Alternative Forced-Choice Analyses.....	28
	a.	Accuracy, Block Order, and Response Time.....	28
	b.	Accuracy, Anxiety, and Defensiveness.....	29
	c.	Accuracy, Loss of Interest, and Anxiety.....	29
	d.	Accuracy and Trait Anhedonia.....	33
	e.	Accuracy and Dysphoria.....	33
	f.	Accuracy and Specificity of Symptoms.....	34
	2.	Dot-Probe Attentional Bias Analyses.....	35
	a.	Initial Dot-Probe Analysis.....	35
	b.	Block Order.....	36
	c.	Response Time, Anxiety, and Defensiveness.....	36
	d.	Response Time, Loss of Interest, and Anxiety.....	37
	e.	Response Time and Trait Anhedonia.....	37
	f.	Response Time and Dsyphoria.....	37
	g.	Response Time and Specificity of Symptoms.....	38
	3.	Relationship between Two-Alternative Forced-Choice and Dot-Probe.....	39
D.		Discussion.....	40
IV.		GENERAL DISCUSSION.....	44
		REFERENCES.....	50
		FOOTNOTES.....	63
		APPENDICES.....	78
		Appendix A.....	78
		Appendix B.....	79
		Appendix C.....	80
		Appendix D.....	85
		Appendix E.....	88
		Appendix F.....	94
		Appendix G.....	95
		Appendix H.....	98
		INSTITUTIONAL REVIEW BOARD APPROVAL FORM.....	100
		VITA.....	102

LIST OF TABLES

<u>TABLE</u>	<u>PAGE</u>
I. EXPERIMENT 1 DEMOGRAPHIC DATA.....	65
II. BECK DEPRESSION INVENTORY FOR BDI TOTAL, HIGH- AND LOW-DYSPHORIC GROUPS, AND FOR LEVEL OF LOSS OF INTEREST IN EXPERIMENT 1.....	66
III. PERCENTAGE CORRECT OF POSITIVE AND NEGATIVE WORDS BY LEVEL OF LOSS OF INTEREST IN EXPERIMENT 1.....	67
IV. EXPERIMENT 2 DEMOGRAPHIC DATA.....	68
V. PHYSICAL, SOCIAL, AND LIE SCALE SCORES ON THE SPAS BY LEVEL OF LOSS OF INTEREST ON THE BDI.....	69
VI. BECK DEPRESSION INVENTORY FOR BDI TOTAL, HIGH- AND LOW-DYSPHORIC GROUPS, AND FOR LEVEL OF LOSS OF INTEREST IN EXPERIMENT 2.....	70
VII. DESCRIPTIVE STATISTICS OF ANXIETY AND ANHEDONIA MEASURES.....	71
VIII. SPEARMAN’S RHO INTER-CORRELATIONS OF MEASURES OF ANHEDONIA AND ANXIETY.....	72
IX. PERCENTAGE CORRECT OF POSITIVE, NEGATIVE, AND NEUTRAL WORDS IN THE NO LOSS OF INTEREST GROUP BY LEVEL OF ANXIETY IN EXPERIMENT 2.....	73
X. PERCENTAGE CORRECT OF POSITIVE AND NEGATIVE WORDS BY LEVEL OF LOSS OF INTEREST (SCORES OF EITHER 0, 1, OR 2) IN EXPERIMENT 2.....	74

LIST OF FIGURES

<u>FIGURE</u>		<u>PAGE</u>
I.	Emotional word identification by level of loss of interest in Experiment 1	75
II.	Experiment 2 positive word accuracy by anxiety in non-anhedonic persons.....	76
III.	Emotional word identification by level of loss of interest (0,1, or 2) in Experiment 2.....	77

LIST OF ABBREVIATIONS

2AFC	Two-Alternative Forced-Choice Identification Task
ANOVA	Analysis of Variance
ANX	Anxiety
BDI	Beck Depression Inventory
CPU	Central Processing Unit
CRT	Cathode Ray Tube
DP	Dot-Probe Task
DSM	Diagnostic and Statistical Manual of Mental Disorders
GAD	Generalized Anxiety Disorder
HZ	Hertz
IDAS	Inventory of Depression and Anxiety Symptoms
M	Mean
NCS-R	National Comorbidity Survey Replication
NIMH	National Institute of Mental Health
RAM	Random Access Memory
MB	Megabyte
MC	Marlowe Crowne
MS	Milliseconds
SD	Standard Deviation
SPAS	Social and Physical Anhedonia Scale

SUMMARY

Two experiments assessed the extent to which people with symptoms of anxiety and depression differ from others in their selective encoding of positive information. Both experiments used a subliminal two-alternative forced-choice (2AFC) identification task to investigate subchance perception (i.e., below-chance identification) of positive information. Experiment 2 used the dot-probe (DP) in addition to the 2AFC to compare findings from the two tasks. In Experiment 1, anhedonic (i.e., extreme loss of interest in people or things in the last two weeks) individuals were less accurate at identifying subliminally-presented positive words than other groups, and were less accurate than chance (guessing) rates. Thus, they exhibited subchance perception of positive words. Experiment 2 provided further evidence that anhedonic individuals identify positive words less accurately than other groups. Non-anhedonic high-anxious individuals also less accurately identified positive words than other groups, and exhibited subchance perception of positive words. Response times on the DP task were unrelated to these findings, yielding evidence that latency and accuracy tasks may index qualitatively different phenomena. These findings represent further evidence of an inhibitory process occurring unconsciously in anxious and anhedonic persons that results in systematic misidentification of rewarding information. This may be due to a protective motivation to maintain a consistent, albeit negative, sense of self and expectation for the future. By inhibiting positive information, anxious and anhedonic individuals may be unconsciously preparing for the prospective negativity of positive things.

Encoding of Positive Information in Depressed and Anxious Persons

For decades, research in clinical psychology has explored the possibility that people experiencing negative affective states are more attentive to, and accurate in identifying, information that is negative or threatening (for reviews, see Bar-Haim, Lamy, Pergamin, Bekermans-Kranenburg, & van IJzendoorn, 2007; Cisler, Bacon, & Williams, 2009; Cisler & Koster, 2010; De Raedt & Kostner, 2010; Eysenck, 2007; Frewen, Dozois, Joanisse, & Neufeld, 2008; Gotlib & Neubauer, 2000; Joormann, Yoon, & Zetsche, 2007; Mathews & MacLeod, 2005; Mobini & Grant, 2007; Mogg & Bradley, 1998, 2004, 2005; Phaf & Kan, 2007; Riskind & Alloy, 2006; Ruiz-Caballero & Bermudez, 1997; Williams, Matthews, & MacLeod, 1996; Williams, Watts, MacLeod, & Matthews, 1988, 1997; Wilson, MacLeod, & Campbell, 2007; Yiend, 2010). The goal of the present studies is to explore a related, but conceptually opposite possibility: that people experiencing dysphoric and distressed moods are less attentive to, and less accurate in identifying, information that is *positive*.

The Importance of Positive Information

Although advanced understanding of selective encoding biases of depressed and anxious individuals towards negative information has already begun to translate into applied clinical science (e.g., Amir, Beard, Burns, & Bomyea, 2009), comparatively less is understood regarding positive biases. It is likely that biased processing of positive information becomes automatized much as negative information does, and that there are patterns of selective encoding of positive information that may give rise to, covary with, or result from, pathological symptoms (e.g., anhedonia, or loss of interest). In fact, positive affect, occurring with or without conscious awareness, may serve the function of triggering volitional action itself (Kuhl & Koole, 2004).

Examining selective encoding of positive affect, thus, will lead to increased understanding of its relation to symptoms of anxiety and depression, and, ultimately, to interventions that can alter these symptoms at the early behavioral level.

Selective Encoding Tasks

Examples of the tasks used to assess early emotional-processing biases are the dot-probe, i.e., attentional-probe, (DP) task (MacLeod et al., 1986), and accuracy tasks (e.g., Dijksterhuis & Aarts, 2003), such as the two-alternative forced-choice identification (2AFC) task (Snodgrass, Shevrin, & Kopka, 1993). In these tasks, participants' selective encoding of information is investigated by comparing their responses to one class of emotional stimuli to their responses to another class of emotional stimuli. A bias is determined when emotional information elicits a different pattern of responses than other emotional information (i.e., positive vs. negative) or neutral information.

The Dot-Probe Task

In the DP paradigm (MacLeod, Mathews, & Tata, 1986; Posner, Snyder, & Davidson, 1980), emotional stimulus-pairs are presented either vertically, horizontally, or diagonally on opposite sides of a computer screen. The pairs disappear, and are followed by a single dot on one side or the other. The participant's task is to identify the dot as quickly as possible. The stimulus pairs are made up of a valenced (either positive or negative) stimulus and a neutral stimulus. The DP is interpreted as a valid index of attentional bias, because it is assumed that differences in response time to identify the dot are due to participants' attention being drawn to, or away from, the critical stimulus due to its emotional content. Bias scores are calculated by comparing response times when the dot is presented on the side of a neutral stimulus with

response times when the dot is presented on the side of either a positive or negative stimulus, resulting in two attentional bias scores (positive vs. neutral; and negative vs. neutral).

A minor variation of the classic probe task just described (i.e., the probe *position* task) is the probe *classification* task (Bradley et al., 1998). In the probe classification task, instead of simply indicating which position the probe is in, the participant is also asked to classify the type of probe presented (e.g., whether the probe was either three vertical or three horizontal dots). This makes the DP task slightly more difficult and thereby increases the mean response time on the task (Mogg & Bradley, 1999). This minor alteration was made in order to ensure that participants were not simply focusing on the left visual field during probe tasks. The classic DP (both the original position and classification tasks) has been used in a large number of studies on anxious or depressed individuals that examined encoding of positive information.

The Two-Alternative Forced-Choice Identification Task

In the 2AFC, an initial stimulus is presented, followed by two target choices. The choices are comprised of the actual stimulus that was presented, and a distracter stimulus. Unlike attentional latency paradigms, 2AFC tasks use accuracy judgments as their primary dependent measures. The participant is asked to simply choose which stimulus of the target choices was just presented. If the choices are comprised of words from the same valence category (i.e., response bias is controlled), percentage correct is a valid measure of perceptual sensitivity, and is determined by the amount of correct responses. If pairs are comprised of words from different categories, then signal detection analyses are used.

The 2AFC is interpreted as a valid index of facilitation and inhibition, independent of their subjective reports. Participants are thought to have facilitated the initial stimulus if they

identify it at a rate above chance, whereas they are thought to have inhibited it if they identify it at a rate differing from other stimuli or at below chance (guessing) rates (Snodgrass & Shevrin, 2006).

Strengths and Limits of the Tasks

Dot-probe. Because of the indirect nature of the DP (i.e., the participant is being asked to respond to a dot, not the emotional stimulus), early attentional processing can be examined at either subliminal or supraliminal levels. Another great strength of the DP is its ability to disambiguate general interference – a fatal flaw of the other most common attentional task, the emotional Stroop (Stroop, 1935) – in order to examine avoidant or approach tendencies. That is, a dot-probe allows for attention to be directed toward or away from a stimulus, whereas the emotional Stroop task does not allow for directional shifts in attention, due to the emotional stimulus and color judgment being presented simultaneously (see Winer, 2012, for an expanded critique).

The DP has limitations in its interpretability, however. As currently constructed, the DP precludes definitively answering whether avoidance of information (positive or otherwise) is occurring. It is possible that findings showing avoidance of positive information merely indicate weaker versions of the threat-bias effects that have already been documented. In other words, anxious and depressed individuals' purported avoidance of positive information may in fact be caused by an attraction towards the neutral stimulus, due to it being comparatively more negative (Fox et al., 2001; Frewen et al., 2008; Santesso, Meurat, Hofmann, Mueller, Ratner et al., 2008; Winer, Cervone, Newman, & Snodgrass, 2011).

Two-alternative forced-choice identification. 2AFC tasks are limited in that they are so simple and direct that error rates do not occur unless stimuli are rendered unconscious, through the use of very brief presentation durations (<14 ms) and either backward, forward, or sandwich masking. As such, they require specialized apparatus (e.g., computer monitors with >140 Hz refresh rates or tachistoscopes). As long as these rigorous methodological standards are met, however, accuracy tasks address some inherent limitations of latency tasks. Yiend (2010) notes that one limitation of latency paradigms is their inability to assess for accuracy biases, due to participants' low error rates. As such, she calls on "researchers to devise a new experimental method that does not rely on selective impairments...(as) the examination of error rates rather than reaction time may hold promise" (p. 29). 2AFC accuracy rates hover around 50%, depending on stimuli strength, allowing for high enough error rates so that they may be meaningfully assessed. In addition, the 2AFC can be implemented without using target choices from separate valence categories, thus controlling for conscious valence-based response biases. These two strengths allows for the investigation of *subchance perception*, i.e., the systematic inhibition of a particular class of stimuli (Erdelyi, 2004).

Most researchers use this method as a way of assessing awareness of subliminal stimuli (e.g., Mogg, Kentish, & Bradley, 1993). This allows for the interesting technique of regressing accuracy scores onto bias scores to assess the relationship between consciousness and other measures (Greenwald, Klinger, & Schuh, 1995).

The Selective Encoding of Positive Information

The Dot-Probe Task

Although some studies have not found selective encoding of positive information in depression and anxiety using the DP (Donaldson et al., 2007; Mogg & Bradley, 1999, 2002; Mogg, Millar, & Bradley, 2000), many studies have reported either between-subject (compared to non-dysphoric or distressed individuals) or within-subject (compared to neutral) differential encoding of positive information in anxious and depressed individuals.

Depression and dysphoria. Shane and Peterson (2007) examined selective encoding of positive information in dysphoric and non-dysphoric individuals. In two studies using varied durations (Exp. 1: 500 and 1500 ms; Exp. 2: 200 and 1500 ms), dysphoric and nondysphoric participants were shown positive, negative, and neutral pictures (Exp. 1) and words (Exp. 2). In the first study, duration was not significant, but dysphoric and nondysphoric individuals differed in their processing of positive information, with dysphoric individuals showing a trend away from positive information. In the second study, dysphoric individuals avoided positive words in comparison to neutral words, and in comparison to nondysphoric controls. This attentional bias *away* from positive words was exaggerated in the early duration (200 ms). Shane and Peterson interpreted these findings as a demonstration of biases away from positive information in dysphoric individuals – biases driven by an active avoidance of positive information, not a lack of a self-protective bias, because dysphoric individuals' biases drove their effects.

Gotlib, Kasch, Traill, Joormann, Arnow, et al. (2004), investigated dot-probe (1000 ms presentation duration) effects in depressed, socially anxious, and never disordered individuals. Socially anxious individuals did not exhibit differential processing, but symptoms of depression

correlated negatively with positive bias (though see Gotlib, Krasnoperova, et al., 2004, for somewhat conflicting results regarding depressed groups).

A similar study with depressed and control groups was conducted by Donaldson, Lam, Mathews (2007). In it, depressed individuals did not exhibit any positive attentional bias at 1000 ms. In addition, unlike prior findings (e.g., Shane and Peterson, 2007), they found no effect of avoidance at 500 ms. A lack of bias away from positive words at 1000 ms has also been exhibited by depressed individuals (Mogg, Millar, & Bradley, 2000).

In another study, Joormann & Gotlib (2007) demonstrated a biased pattern of processing in both depressed (MDD) and formerly depressed (RMD) individuals, in comparison to controls. Testing three stimulus durations (16, 1000, and 3000 ms), participants were presented with angry-neutral, sad-neutral, and happy-neutral word pairs. Whereas no differences emerged from the subliminal and extended conditions, MDD and RMD individuals were less biased towards positive information than controls. Given that MDD and RMD positive biases did not diverge from zero, it can be inferred that this effect was due to a differential bias in the non-depressed individuals towards positive information.

In two studies examining sub-clinical dysphoric groups biases at 500 ms durations, dysphoric individuals did not show a bias towards positive faces, whereas nondysphoric individuals did. Though this was a trend, it occurred despite a lack of bias exhibited by a separate group of socially anxious individuals.

Social anxiety. Pishyar, Harris, & Menzies (2004) examined individuals high and low in fear of negative evaluation for biases processing positive, negative, and neutral faces (Exps. 1 & 2) and words (Exp. 1). Under 500 ms durations, high fear of evaluation individuals displayed

vigilance toward threatening faces and an opposite avoidant pattern away from positive faces. Mogg, Philippot, and Bradley (2004) also examined socially anxious individuals' biases to angry, happy, and neutral faces presented for 500 ms, including in addition a 1250 ms condition. A similar pattern was obtained at 500 ms as found by Pishyar, Harris & Menzies, with socially anxious individuals showing a vigilance for negative and an avoidance for positive stimuli, and differing in this respect from controls. A similar trend occurred at 1250 ms, but was not significant.

Other work examining socially anxious individuals has shown patterns of avoidance for all emotional words. Using 500 ms happy, neutral and negative faces, Chen et al. (2002) tested individuals diagnosed with generalized social phobia in comparison with controls. Modifying the common procedure, Chen et al. had participants respond to face-object pairs. This allowed for an assessment of whether faces, in general, would be avoided. As predicted, socially anxious individuals avoided all faces more than controls. Mansell et al. 1999, 2003, have also shown that external vs. internal cueing and perceived social-threat moderates socially anxious individuals' avoidance of faces (see also Pineles & Mineka, 2005).

Some conflicting results have emerged, possibly indicating a reverse pattern of vigilance for emotional information in socially anxious individuals (Mogg & Bradley, 2002; Sposari & Rapee, 2007). One possible explanation for this has been proposed by Vassilopoulos (2005). Vassilopoulos has posited a vigilance-avoidance conceptualization of selective encoding in social anxiety. High and low in social anxiety participants, responded to two exposure durations (200 and 500 ms). High socially anxious individuals displayed a vigilant-avoidant response style, such that they first showed a bias towards all emotional words at 200 ms, then showed a bias

away from all emotional words at 500 ms. Because of the lack of studies with positive stimuli examining biases at 200 ms, further evidence is required to follow up this finding.

Trait anxiety. There is evidence that chronically anxious persons avoid positive information (Bradley et al., 1998, Brosschot, de Ruiter, & Kindt, 1999; Fox, 2002; Ioannou, Mogg, & Bradley, 2004; Mogg & Bradley, 1999). In a study examining the interaction of anxiety and defensiveness (i.e., social desirability), Ioannou et al. (2004) presented participants with neutral, happy, and threatening faces for 500 and 1250 ms. Whereas no group differences were uncovered at 1250 ms, at 500 ms, high-anxious individuals showed a bias away from positive words; this bias was not found among the other of the three groups. In another study examining anxiety and defensiveness, high-anxious individuals again showed avoidant biases for 500 ms presented socially-related positive words, in contrast to other groups (Brosschot et al., 1999). Although high-anxious individuals avoided social-positive words, interestingly, no avoidance was found for general positive words.

Bradley et al. (1998) also report avoidance of positive words in high-anxious individuals. Under 500 and 1250 ms presentation durations, high-anxious individuals showed a bias away from positive information, in comparison to low-anxious individuals. Although duration did not interact with response time and valence, there was a trend of a reduction in avoidance by 1250 ms. In a study with very similar methods (the difference being that only a 500 ms duration condition was employed), a similar pattern of avoidance of positive words was found, though it was only a trend (Mogg & Bradley, 1999).

In one study using a child sample, Waters, Kokkoris, Mogg, Bradley, & Pine (2010) examined anxiety at 500 at 1200 ms using angry, happy, and neutral faces. Despite high-anxious

children displaying the standard threat biases in comparison to low-anxious ones, they displayed no bias away from positive words at 500 ms or 1200 ms.

Lastly, Fox (2002) has examined selective encoding of information in normal individuals, who were given a measure of trait anxiety. In both 17 ms (i.e., subliminal, Exp. 2) and 500 ms (Exp. 1) exposures, participants were presented with neutral, happy, and fearful faces. Whereas anxiety was unrelated to bias away from positive words in the subliminal condition, high-anxious individuals showed a bias away from positive words in the 500 ms condition, as indicated by a negative correlation between positive attentional bias and anxiety.

In summary, evidence suggests that anxious individuals are biased away from positive information. A few studies (Bradley et al., 1997; Gotlib, Kasch, et al., 2004; Waters et al., 2010) report null effects in anxious individuals, whereas many show patterns of avoidance for social (e.g., Pishyar, et al., 2004) and trait (e.g., Ioannou et al., 2004) anxiety. These findings have generally emerged at 500 ms durations. Less evidence documents patterns of avoidance in depressed individuals, although there is some support (Gotlib, Kasch, et al., 2004; Shane & Peterson, 2007). Interestingly, a contradictory finding has been shown between depression and social anxiety, with socially anxious individuals exhibiting vigilant biases to positive stimuli at 200 ms (Vassilopoulos, 2005) and dysphoric individuals exhibiting avoidant biases to positive words at 200 ms (Shane & Peterson).

The Two-Alternative Forced-Choice Identification Task

The 2AFC is a well-established measure in cognitive psychology (see Snodgrass & Shevrin, 2006), but has rarely been used in examining clinical phenomena (e.g., Japee, Crocker, Carver, Pessoa, & Ungerleider, 2009). In addition, few studies have compared clinical

symptomatology with positive stimulus accuracy. The following studies have used the 2AFC to examine chronic distressed moods in relation to encoding of positive information.

Anxiety. (Winer et al., 2011) In two 2AFC tasks, participants identified masked positively and negatively valenced words that were presented briefly (6.4 ms.). In study 1, persons high in trait anxiety and low in defensiveness identified positive words at below-chance levels, whereas other groups did not show differential identification. In a second experiment, non-defensive high-anxious participants again exhibited subchance perception of positive words. In this experiment, non-defensive high-anxious participants who responded quickly exhibited exaggerated subchance perception of positive words, lending support to the hypothesis that this information processing bias occurs automatically.

Of crucial importance, these studies both controlled for biased responding. When participants were shown a positive word, they were then given two positive words as response options. Therefore, the subchance findings that were uncovered were due to the content of the positive words themselves, as opposed to an artifact of the paradigm.

Summary. In summary, heightened anxiety predicts subchance perception of positive words. This occurs despite the fact that confounds due to response biases are not possible in the 2AFC paradigm. This suggests that people with severely distressed moods unconsciously avoid positive information.

Summary of Research to Date

A large body of evidence from the DP paradigm suggests that people high in anxiety and depression avoid positive information. In addition, in the few 2AFC studies that have examined

anxious individuals' selective encoding of positive information, a consistent pattern of subchance identification has emerged.

Within 2AFC findings, non-defensive high-anxious individuals exhibit subchance perception. However, whether subchance perception of positive information is also related to symptoms of depression remains an empirical question.

As yet, no comparison of avoidance in the DP and subchance perception in the 2AFC exists. It is possible that the avoidance seen in anxious and depressed individuals in DP is related to subchance perception in 2AFC. Alternatively, they may be indexing different types of processes, as has been suggested of the DP and the emotional Stroop task (Mogg, Bradley, Dixon, Fisher, Twelftree, et al., 2000; Yiend, 2010). If so, distressed individuals' subchance perception of positive words in 2AFC may be unrelated to their avoidance of positive information seen in DP.

General Overview

Two studies assess the relation between information processing biases and symptoms of anxiety and depression. Both experiments incorporate a 2AFC task, and the second experiment incorporates the DP task.

Why Anxiety *and* Depression?

In the two studies, rather than choosing to study either depressed or anxious symptoms in relation to encoding of positive information, I have chosen to examine both. Anxiety and depression often co-occur, with very high lifetime comorbidity prevalence estimates, ranging from 40% to 75% (Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Clark, 1989; Kessler, Nelson, McGonagle, Liu, Swartz, et al., 1996; Shankman & Klein, 2003).

Theoretical advances in networking models (Cramer et al., 2010) based on critiques of latent variable theory (Borsboom, Mellenbergh & van Heerden, 2003) have suggested that comorbidity between certain diagnoses (e.g., generalized anxiety disorder and major depressive disorder) are necessarily inherent to either diagnosis due to common pathways of symptoms. The prevailing approach to clinical research is to find a disordered individual (either diagnosed by the categorical DSM or slightly below diagnosis but with higher-than-average aggregate disordered symptoms) and then see what might be associated with that disorder (e.g., endophenotypes, genes, environment, their interaction). This top-down strategy for investigating psychopathology relies on an assumption that there is, in reality, a “depression” that is causing correlated symptoms, as opposed to simply being comprised of them. As such, diagnostic categories – like personality traits or general intelligence – may have been reified as a result of inferred causal properties of latent variables.

The comorbidity between anxiety and depression is often underplayed by selective encoding researchers, however, when conclusions are drawn from individual studies. Although some studies attempt to partial out anxiety and depression findings (e.g., Bradley, Mogg, Falla, & Hamilton, 1998), in many papers with “anxious” groups (e.g., Fox, 2002; Mogg, Philippot, & Bradley, 2004) much of the theoretical discussion places focus on anxiety alone despite the fact that depression is sometimes not measured, or if it is, anxious participants routinely report significantly higher levels of depressed symptoms than controls (also see Bar-haim et al., 2007).

In some works with “depressed” groups, theoretical implications are limited to depression, despite the fact that the experimental group is comorbid. For example, Gotlib, McLachlan, & Katz (1988), in an oft-cited study, entirely devote their discussion to implications

of findings for depression despite the fact that they state in their results section that “the present results are due as much to self-reported level of state anxiety as they are to level of depression.” (Gotlib, McLachlan, & Katz, 1988, p. 195).

Thus, examining results and theory from both literatures has allowed for an inclusive review of what empirical questions still require investigation. This review has led to the inclusion of both anxious and depressed symptoms as candidate variables to predict positive information-processing biases, as well as word stimuli that is inclusively related to both anxiety and depression.

Experiment 1

In line with Borsboom and colleagues’ network analysis of comorbidity in depression and anxiety (Cramer, Waldrop, van der Mass, & Borsboom’s, 2010), Experiment 1 looked to investigate whether level of loss of interest predicted differential positive word accuracy, and subchance perception of positive words. In contrast to the assumptions of the DSM that diagnoses represent discrete ontological categories, Cramer et al. found that symptoms of MDD and GAD overlap in ways that argue against conceptualizing each diagnosis as a separate construct. In a re-examination of data from the National Comorbidity Survey Replication (NCS-R) (Kessler et al. 2004; 2005a; 2005b), some of the strongest associations between symptoms of the two disorders (i.e., the thickest edges of the network) were between symptoms of anxiety and depression, with one of the strongest links between loss of interest, a symptom of depression, and worrying about multiple events, a symptom of GAD. Thus, loss of interest seems a strong candidate to predict subchance perception of positive words.

Experiment 1 had two aims: (1) to assess the relationship between subchance perception and loss of interest; and (2) to assess the validity of loss of interest, in comparison with amalgamated symptoms of depression, in predicting subchance perception of positive information. The hypotheses were that (a) loss of interest would predict differential responding to positive words, (b) persons with extreme loss of interest would exhibit subchance perception of positive information, and (c) a conglomerate measure of dysphoria would not be sensitive enough to uncover differences seen in (a) and (b).

Two-Alternative Forced-Choice Method

Participants. The participants in the study were 92 University of Illinois at Chicago undergraduates participating in partial fulfillment of their introductory psychology course. See Table I for demographic statistics. Loss of interest was measured by participants endorsing 0, 1, or ≥ 2 on the Loss of Interest item of the BDI (see item 12, “Loss of Interest” in Appendix C). Dysphoric and non-dysphoric participants were identified through examination of BDI scores. Individuals with scores > 9 were classified as dysphoric, and those with score ≤ 6 were classified as non-dysphoric, (Shane and Peterson, 2007). BDI scores were not normally distributed (see Table II). Thus, the construction of a categorical dysphoria variable allowed for mean accuracy differences to be examined in a similar manner as analyses incorporating Loss of Interest. Moreover, the cut-off points used by Shane and Peterson are similar to those that would be used in a median split analysis (see Table II), and have the added benefit of precedence in predicting avoidance of positive information. In addition, they are in line with previous recommendations regarding non-clinical, dysphoric samples (Kendall, Hollon, Beck, Hammen, & Ingram, 1987¹).

Materials. Stimuli were presented on a Viewsonic G225f 156-Hz-capable CRT monitor using a Dell computer equipped with a 64-MB Radeon 7500 Series Graphics card and 512 MB of RAM. This combination of CPU and CRT monitor allows for a refresh rate (i.e., a single stimulus presentation) of 6.4 ms. The stimulus sequence, timing, stimulus randomization, and data collection were controlled by Direct RT software.

Trial sequence. After a consent procedure, seating was adjusted to ensure equivalent visual angles across participants. After a short practice to provide familiarity with the procedure, participants received identification-task instructions.

Each trial featured the following sequence. Participants first focus on a fixation cross. When ready, they press the spacebar to activate the trial, which begins 134.4 ms later. After this interval, a stimulus word (e.g., “snake”) appears at the center of the screen for 6.4 ms. It is followed by a broken-letter mask (a jumble of letter fragments) presented for 51.2 ms; a fixation cross presented for 998.4 ms; and two answer choices (e.g, “snake” and “shark”; or “happy” and “hope”) that remains onscreen until a response is given. Each of these times represents iterations of the refresh rate of 6.4 ms. 134.4 ms allows participants time after the fixation point to anticipate the stimulus. 6.4 ms presentation duration is brief enough so that, with the addition of the mask that follows, the stimuli are rendered outside of the awareness of the perceiver. The mask is presented for 51.2 ms. The mask duration is long enough to replace a stimulus consciously, but not long enough to eliminate activation by the stimulus (Breitmeyer & Ogmen, 2000). Lastly, the 998.4 duration between mask and response allows for enough time for extended semantic processing of the stimulus.

Participants judged which stimulus has been presented by striking the computer's "S" or "K" key. Participants were asked to concentrate throughout, to avoid simply alternating left/right choices, and not merely to indicate the same answer key over and over again (such as choosing "S" five or more times in a row). They were asked to pause to consider the answer choices as fully as possible before continuing if they found themselves disengaging from the experiment.

Stimuli. Stimuli were presented in black 18-point Courier type. The background was the default Direct RT white, except for the stimulus words, for which the background was gray to degrade the stimuli. Word length was controlled; the two answer choices never varied in length by more than three letters. The left/right order of the answer choices (i.e., the presented word and distracter word) vary across trials. Each stimulus served as a presented word and a distracter word (e.g., both "snake" and "shark" were shown as the stimulus preceding the answer choices "snake/shark"). The pool of stimuli included 16 positive and 16 negative words (adapted from Dijksterhuis & Aarts, 2003²; see Appendix F), which have previously been used in studies which produced differential identification of valenced words, and assessed for perceived valence (Winer et al., 2011), with 40 participants ranking each word on a 7-point scale (1 = *negative* and 7 = *positive*). The mean ratings of negative ($M = 2.09$, $SD = .46$) and positive ($M = 5.82$, $SD = .34$) words differed greatly, with no negative word received a mean rating above 3.00, and no positive word received a rating below 5.48 (Winer et al., 2011).

Importantly, the two answer choices in any given trial were always of similar emotional valence. Prospective biases to choose positive or negative stimuli thus are irrelevant to the paradigm and its potential results.

Trial blocks. Two blocks of trials were presented, each consisting of two presentations of the 32 stimulus words, for a total of 128 trials per participant. Stimulus order was randomized within each block by participant.

After each block, participants rated their confidence in identifying the stimuli on 5-point scales (1 = *no confidence* and 5 = *extremely confident*), and by answering a yes/no question regarding whether they thought they could see any of the words. In previous work using these methods, the majority of participants have responded “1,” no confidence, and “no,” that they could not see the words, and variations in confidence ratings were unrelated to accuracy (Winer et al., 2011).

Results

Initially, given the difference in the size of each group, Box’s test of equality of covariance matrices was assessed, to ensure homogeneity of variance. The observed covariance matrices of the dependent variable were equal across groups, $F(6, 18018.03) = 1.41, ns$. Thus, homogeneity of variance could be assumed.

To investigate whether increased endorsement of loss of interest was associated with emotional information-processing, a 3 x 2 (Loss of interest [none, some, extreme] x Valence [negative, positive]) mixed-design ANOVA related loss of interest to accuracy in identifying positive and negative words. Word valence was a repeated-measure factor. There were no significant main effects. This was qualified, however, by a highly significant loss of interest x valence interaction, $F(2, 89) = 6.55, p < .01, \eta_p^2 = .13$ (see Table III).

To follow-up this finding, between-subject ANOVAs were employed at each level of valence. Participants’ level of loss of interest did not predict their identification of negative

words, but it did predict their identification of positive words $F(2, 89) = 6.15, p < .01$. Post-hoc Scheffe comparisons revealed that people who indicated no ($M = .5107, SD = .0587$) or some ($M = .4989, SD = .0586$) loss of interest did not differ in positive word accuracy ($p = .69$).

However, those who endorsed extreme loss of interest ($M = .4469, SD = .0760$) differed from both those who endorsed none ($p < .01$) and some ($p < .05$) loss of interest (see Figure 1).

Lastly, accuracy scores for positive words for those who endorsed extreme loss of interest were compared to chance (guessing) rates using a t-test. This indicated that they scored significantly below chance, i.e., they exhibited subchance perception of positive words, $t(14) = -2.71, p < .05$.

Analyses were also conducted to examine extreme loss of interest, while excluding responses that are indicated by endorsing “3” on item 12 of the BDI (see Appendix C; also see Table II). This may yield a more specific investigation of extreme anhedonia. Whereas a response of “2” indicates a person who is experiencing a recent change in experience of pleasure and interest in people or things (“I have lost most of my interest in other people or things”), a response of “3” (“It’s hard to get interested in anything.”) may indicate either a more persistent experience of anhedonia, or a tendency to exhibit a less-valid response style.

When only examining anhedonic individuals who responded with “2,” all patterns of results were the same as in the previous analysis, including the loss of interest x valence interaction, $F(1, 87) = 3.88, p < .03$; loss of interest predicting positive word accuracy, $F(2, 87) = 5.37, p < .01$; follow up analyses showing differences identifying positive information between no loss and extreme loss of interest ($M_d = .0654, p < .01$) and some loss and extreme loss of

interest ($M_d = .0536, p < .05$); and the subchance perception of positive words by those displaying extreme loss of interest $t(11) = -2.35, p < .05$.

Lastly, to investigate whether a conglomerated dysphoria measure would have similar predictive validity as loss of interest, a 2 x 2 (Dysphoria [high, low] x Valence [negative, positive]) mixed design ANOVA with word valence as a repeated-measure factor related dysphoria to positive and negative word identification accuracy (Shane & Peterson, 2007). There were no main effects of either dysphoria or valence, but a Dysphoria x Valence trend emerged, $F(1, 79) = 3.17, p = .08$. However, follow-up analyses indicated that there was no difference between high- and low-dysphoric groups in their identification of positive words, $t(79) < 1, ns$, or negative words, $t(79) = 1.61, p = .11$ (see Table II).

Discussion

Experiment 1 provided evidence in support of the hypothesis that people's level of loss of interest in other people or things predicts how well they identify subliminally-presented positive information. Persons who had extreme loss of interest were less accurate than those who had lost only some or no interest. Moreover, unlike the other two groups, persons with extreme loss of interest identified positive words at rates below chance. In other words, they exhibited subchance perception of positive words. This means that they were less accurate in identifying positive words than if they had attempted to identify them with their eyes closed.

In contrast to the finding that people with extreme loss of interest identify positive words at below chance rates, dysphoric and non-dysphoric groups did not differ. Thus, using a conglomerate measure that includes many depressive symptoms may forfeit necessary sensitivity when investigating core symptoms of pathology.

Anhedonia also predicted low positive word accuracy, even when parsing out individuals who responded “it’s hard to get interested in anything.” on the Loss of Interest item of the BDI. This distinction may prove vital in future investigations of anhedonia in relation to substance perception of positive words. Unconscious avoidance of positive information, which may indicate a motivated process resulting in less recognition of potentially rewarding information, thus may be predicted by anhedonic individuals who have responded with “2” (I have lost most of my interest in other people or things) but not “3” (it’s hard to get interested in anything”) on Item 12 of the BDI.

Experiment 2

Experiment 2 included a 2AFC and a DP task. No study, as yet, has investigated these tasks together in relation to avoidance or inhibitory processing of positive information. As stated in the introduction, evidence from DP paradigms suggests that distressed and dysphoric individuals avoid positive information. However, the DP paradigm’s flaw is that it is comparative. Any finding that compares two valence categories necessarily has two possible interpretations. For example, when people take longer to respond to dots following positive words in comparison to dots following neutral information, it can be interpreted as indicative of their avoidance of positive information. A second interpretation, however, is that a shift toward neutral information, which is comparatively more negative than positive information (just as negative information is to neutral information), merely indicates weak vigilance toward negative information (e.g., Bar-Haim et al., 2007).

An accuracy task, which controls for response bias due to stimulus valence, can solve this issue. People faced with a 2AFC that has two positive answer choices cannot make a choice

based on valence. There is no prospective bias, as in the DP. As such, if subchance perception is positively related to attentional bias scores for positive words, it would provide the first definitive evidence that those biases are in fact indicative of avoidance of positive information, as opposed to artifactually resulting from vigilance for comparatively negative information. This cannot be assessed in a DP paradigm alone.

Just as documenting a relationship between subchance perception and attentional avoidance would disambiguate interpretations of DP findings, it would also clarify questions regarding the nature of inhibition in accuracy tasks. There are alternative interpretations regarding whether subchance perception is due to an active avoidance of the information that is being systematically misidentified (e.g., Snodgrass, Bernat, & Shevrin, 2004), or merely to an artifact of multiple exposures to unexpected stimuli (e.g., Kihlstrom, 2004). Demonstration of a relationship between attentional avoidance and subchance perception would clearly suggest an active inhibition that occurs unconsciously, whereas a lack of such a relationship would suggest that subchance perception may be more indicative of the parameters of the paradigm.

Therefore, the comparison of the 2AFC and DP will yield, for psychological science, an answer to a key question about information processing among distressed and dysphoric persons that has been raised repeatedly in the recent DP (Frewen et al., 2008; Waters et al., 2010) and 2AFC (Winer et al., 2011) literature; namely, whether such moods are associated with an active avoidance of positive information.

Method

Participants

One hundred and thirty-two participants were selected for Experiment 2. To increase power, a subset of the sample ($n = 61$) was preselected for either high or low anxiety, in combination with low defensiveness scores (Winer et al., 2011). All participants in the study were University of Illinois at Chicago undergraduates participating in partial fulfillment of their introductory psychology course (see Table IV for demographic statistics).

Two-Alternative Forced-Choice Method

The 2AFC apparatus and trial sequence were identical to that outlined in Experiment 1. Stimuli included positive, negative and neutral words.

Stimuli. Experiment 1's stimuli were employed because they had previously produced differential identification of valenced stimuli in accuracy tasks (Dijksterhuis & Aarts, 2003; Winer et al., 2011). Given that elevated anhedonia is associated with both anxiety and depression (see Cramer et al., 2010), changing the candidate personality variable but keeping the stimuli constant allowed for an internally valid examination of this similarity. With Experiment 1 producing findings showing that anhedonia is also related to subchance perception of positive words, examining anhedonia and anxiety with a larger and more rigorously balanced dataset is the next step.

The pool of stimuli included 16 positive, 16 negative, and 16 neutral words. Stimuli were matched for word length, number of syllables, and frequency so that they could be used in the DP task that followed. This was determined by the Affective Norms for English Words (ANEW; Bradley & Lang, 1999; frequency measures taken from Kucera & Francis, 1967), a database of

words maintained by the NIMH Center for Emotion and Attention, that has been rated on a 9-point scale by large numbers of Introductory psychology students in terms of pleasure, arousal, and dominance (see Appendix G). Positive stimuli had mean valence ratings above 7, neutral stimuli between 4.5 and 5.5, and negative stimuli below 3. To avoid including ambiguous or ambivalent words, only words rated with standard deviations for valence below 2 were included.

Words were selected that (a) were semantically similar to those used in Experiment 1 (and in the two studies of Winer et al., 2011), (b) were relevant to both anxiety and depression, and (c) had established norms so that they could be matched by frequency, length, and arousal. These criteria rule out potential alternative explanations that previous subchance perception findings are due to artifacts of previous designs, while allowing for an inclusive investigation of depression-relevant and anxiety-relevant stimuli. The drawback of this design is the lack of power to investigate separate anxiety-specific and depression-specific stimulus-driven findings, if such findings exist.

Importantly, as in Experiment 1, the two answer choices in any given trial were always of similar emotional valence. Prospective biases to choose positive or negative stimuli thus are irrelevant to the paradigm and its potential results.

Trial blocks. Two blocks of trials were presented, each consisting of two presentations of the 48 stimulus words, for a total of 192 trials per participant. Stimulus order was randomized within each block by participant. As in experiment 1, participants rated their confidence in identifying the stimuli after each block on 5-point scales (1 = *no confidence* and 5 = *extremely confident*), and by answering a yes/no question regarding whether they thought they could see any of the words.

Dot-Probe Method

Materials. Stimuli were presented on a Viewsonic G225f 156-Hz-capable CRT monitor using a Dell computer equipped with a 64-MB Radeon 7500 Series Graphics card and 512 MB of RAM. The stimulus sequence, timing, stimulus randomization, and data collection were controlled by Direct RT software.

Trial sequence. After a short practice to provide familiarity with the procedure, participants received dot-probe task instructions. Each trial sequence consisted of a word pair being presented, followed by a dot. Each word pair was presented for 500 ms. That duration was chosen because (1) it is quick enough to index “early” information processes (i.e., early enough that they may be indicative of automatic processing); and (2) because it is the speed at which the majority of evidence for avoidance of positive information has been found. After the probe was presented, participants had up to 10000 ms. to make their choice by striking one of two keys. The inter-trial interval (the amount of time between this choice being made and the next trial beginning) was 1000 ms.

Stimuli. Stimuli preceding the dot-probe were comprised of positive-neutral and negative-neutral words. Eight positive words, 8 negative words, and 16 neutral words balanced for word length, syllables, and frequency, were used. Stimulus words were comprised from a portion of those used in the 2AFC, and included half of the positive, half of the negative, and all of the neutral stimuli (see Appendix H). Stimuli were presented in black 18-point Courier type. The background was the default Direct RT white. As in the 2AFC, words were selected from the Affective Norms for English Words (ANEW; Bradley & Lang, 1999; frequency measures taken from Kucera & Francis, 1967), a database of words maintained by the NIMH Center for Emotion

and Attention that has been rated on a 9-point scale by large numbers of Introductory psychology students in terms of pleasure, arousal, and dominance (see Appendix G). Positive stimuli had mean valence ratings above 7, neutral stimuli between 4.5 and 5.5, and negative stimuli below 3. To avoid including ambiguous or ambivalent words, only words rated with standard deviations for valence below 2 were included. Negative words with both physical and social threat (which relates to both anxiety and depression) were chosen so that the stimuli remained analogous to experiment 1. In addition, positive words were incorporated which related to potential internal threats to anxious and depressed individuals.

Trial blocks. Two blocks of 64 trials each were presented. Each block consisted of 8 positive-neutral word pairs and 8 negative-neutral word pairs, each presented four times. As such, each emotional word was displayed once in each position in each block: once on the left on the side of the dot, once on the left with the dot appearing on the right, once on the right with the dot appearing on the right, and once on the right with the dot appearing on the left. Thus, stimulus presentation controlled for differences that may result from processing information in different visual fields (Fox, 2002).

Data cleaning and preparation for analysis. As is common practice in DP studies (e.g., Bradley et al., 1999; Pishyar et al., 2004), trials in which participants replied before 300 or after 3000 ms., or where response times are ± 2 SDs from the mean latency were removed from analysis. In all, 990 total trials were excluded based on these criteria, amounting to 5.86% of all trials.

An attentional bias score was then calculated for negative and positive words (e.g., MacLeod & Matthews, 1988), as follows:

$$(\text{EL/PrR} - \text{ER/PrR}) + (\text{ER/PrL} - \text{EL/PrL}) / 2,$$

with E = Emotional word, Pr = Probe, L = Left, and R = Right.

With this formula, a positive value represents a shift toward an emotional stimulus in comparison to a neutral one, whereas a negative value represents a shift away from an emotional stimulus to a neutral one.

Personality³ Questionnaires

Lastly, participants completed individual differences measures that allow for more variant responding regarding loss of interest and anxiety (Social and Physical Anhedonia Scale (SPAS), Chapman, Chapman, & Raulin, 1976; Inventory of Depression and Anxiety Symptoms (IDAS), Watson et al., 2007). The SPAS (Chapman et al., 1976) is a measure of trait anhedonia, i.e., a lifelong pattern of lack of interest in or experience of physical or social pleasure. Trait anhedonia is commonly associated with schizophrenia (e.g., Loas et al., 2009). The SPAS yields separate social and physical anhedonia subscales, as well as a lie scale to determine validity of response style. The IDAS yields multiple subscales based on prospective clinical syndromes or states of mind. These subscales have shown good convergent and discriminant validity in relation to other measures of depression and anxiety, and provide both general dimensions of anxiety and depression for comparison, and clinical subscales of specific disorders unavailable in general measures.

In addition, each participant completed the Beck Depression Inventory (Beck et al., 1961; BDI-II), the standard measure used to assess symptoms of depression associated with the DSM-IV, and the shortened versions of the Taylor Manifest Anxiety Scale (MAS; sample item: “I feel anxiety about something or someone almost all the time”; Bendig, 1956). The MAS has been

widely used in examining anxiety and information-processing (see Weinberger, 1990, for review). Lastly, participants completed the shortened version of the Marlowe Crowne Social Desirability Scale (Strahan & Gerbasi, 1972). This accounted for defensive responding, which has been widely shown to interact with anxiety in tasks indexing emotional information processing (e.g., Derakshan, Eysenck, & Myers, 2007, Weinberger, 1990; Winer et al., 2011). Twenty-one items (<1%) were incorrectly left blank on all questionnaires combined, with one participant missing five items and no other participant missing more than three. The majority of missed items occurred on the SPAS, the longest of the questionnaires. All missing items were replaced with the participant mean on each scale or subscale. Please see Table V for BDI, Dysphoria, and Loss of Interest descriptive statistics, Table VI for MAS, MC, IDAS, and SPAS descriptive statistics, and Table VII for correlations among items.

Results

Two-Alternative Forced-Choice Analysis

Accuracy, block order, and response time. To examine potential differences in accuracy due to response time (e.g., Winer et al., 2011), median response time was examined for 66 participants responding slowly, and 66 responding quickly. These two groups significantly differed in median time of response, $t(131) = 18.30, p < 8 \times 10^{-38}$. However, they did not differ in accuracy performance, $t(131) = 1.14, ns$. A 3 x 2 x 2 (Valence [positive, negative, neutral] x Response Time [slow, fast] x Block Order [first, second]) mixed design ANOVA was conducted with valence and block as repeated measures. A marginally significant valence main effect was found, $F(2, 130) = 2.68, p = .07, \eta_p^2 = .05$, such that neutral word accuracy was significantly greater than negative word accuracy, $t(131) = 2.19, p < .04$, and evidenced a trend of being

greater than positive words accuracy, $t(131) = 2.19, p = .10$. No other significant findings emerged. Thus, neither block order nor response time interacted with semantic accuracy.

Accuracy, anxiety, and defensiveness. Because a subset of participants was pre-selected for anxiety and defensiveness, both variable distributions were assessed for normality. Although defensiveness adhered to a normal distribution, anxiety was moderately positively skewed. Thus, anxiety was log + 1 transformed, yielding a normal distribution. To examine the prediction of a significant difference in the accuracy with which anxious and defensive individuals identify emotion words, three separate regression analyses were conducted. In all analyses, anxiety, defensiveness, and their interaction were predictor variables. Positive, negative and neutral word accuracy served as the outcome variables. Anxiety and defensiveness were centered, and their interaction computed (Aiken & West, 1991; Holmbeck, 2002). Anxiety and defensiveness were entered into step 1, with their interaction entered in step 2. No significant differences emerged.

Accuracy, loss of interest, and anxiety. As in Experiment 1, anhedonia, or loss of interest, was predicted to relate to emotional word accuracy. Thus, Experiment 2 served to provide further evidence regarding the reliability of anhedonic individuals' inhibition of positive words.

Initially, given the difference in the size of each group, Box's test of equality of covariance matrices was assessed, to ensure homogeneity of variance. The observed covariance matrices of the dependent variable were not equal across groups, $F(12, 1656.20) = 1.91, p < .03$. Thus, homogeneity of variance could not be assumed.

To examine the hypothesis that positive word accuracy on the 2AFC was associated with loss of interest, a 3 x 3 (Valence [positive, negative, neutral] x Loss of Interest [none, some, extreme]) mixed design ANOVA was conducted with valence as a repeated measure. This yielded a significant valence x loss of interest interaction, $F(4, 129) = 2.67, p < .04, \eta_p^2 = .04$.

To follow up this finding, between-subject ANOVAs were employed at each level of valence. Participants' level of loss of interest did not predict their identification of neutral, $F(2, 129) < 1, ns$, or negative, $F(2, 129) = 2.19, ns$, words. However, it did predict their identification of positive words $F(2, 129) = 3.12, p < .05$. Post-hoc Scheffe comparisons revealed that persons who indicated no ($M = .4859, SD = .0619$) or some ($M = .5194, SD = .0592$) loss of interest differed in positive word accuracy, $M_d = .0335, p = .05$, such that those indicating no loss of interest identified positive words less accurately than those indicating some loss of interest. No significant differences emerged between those responding with extreme loss of interest (2 or 3) and those responding with either 0 or 1.

Lastly, each group's accuracy scores for positive words were compared to chance (guessing) rates using a t-test. Contrary to prediction, participants with no loss of interest were below chance, i.e., they exhibited subchance perception of positive words, $t(94) = -2.23, p < .03$. In addition, those with some loss of interest exhibited a trend of identifying positive words at rates above chance, $t(28) = 1.77, p = .09$. Persons with extreme loss of interest (those endorsing 2 or 3) did not differ from chance rates, $t(7) > -1, ns$.

In an effort to further evaluate participants with no loss of interest's counterintuitive subchance perception of positive information, the composition of this largest group was investigated for possible heterogeneity. Although anxiety and defensiveness did not predict

positive word accuracy as omnibus independent variables, it is possible that within the no loss of interest group anxiety, defensiveness, or their interaction may be interacting to produce subchance perception of positive words. This prospective heterogeneity would account for this surprising finding, as low defensiveness and high anxiety have been shown to predict less accurate identification of positive words in samples that did not account for anhedonia (Winer et al., 2011). Thus, a second regression analyses was conducted within the no loss and some loss of interest groups to evaluate whether defensiveness, anxiety, and their interaction predicted positive word accuracy (the extreme loss of interest group did not yield any participants in the low anxious group). No significant findings emerged in the some loss of interest group, whereas anxiety predicted positive word accuracy in the no loss of interest group, $\beta = -.227, p < .04$, such that higher anxiety was related to less accuracy in identifying positive words.

To further investigate this finding, a median split was performed on anxiety, yielding high anxious ($M = 8.48, n = 42$) and low anxious ($M = 2.06, n = 53$) groups. A 2-way ANOVA was performed with anxiety as a between-subject variable, examining positive word accuracy within the no loss of interest group. This yielded the expected difference between high and low anxious groups, $t(93) = 2.40, p < .02$, such that high anxious individuals were less accurate in identifying positive words than low anxious individuals (see Table IX and Figure 2).

Lastly, the high- and low-anxious group's accuracy scores for positive words were compared to chance (guessing) rates using a t-test. The low anxious group ($M = .4991, SD = .0635$) did not differ from chance, $t(52) < 1, ns$. However, the high anxious group ($M = .4691, SD = .0562$) did differ from chance $t(41) = -3.56, p < .05$, such that positive words were

identified at rates below chance. Thus, only high-anxious individuals who endorsed no loss of interest were exhibiting subchance perception of positive words.

Experiment 1 yielded findings even when restricted to only anhedonic individuals endorsing “2” on item 12. This may be because participants stating "I have lost most of my interest in other people or things" may differ from those who state "it's hard to get interested in anything." To examine this hypothesis, two subjects responding with “3” on item 12 were removed from the following secondary analysis. This resulted in a total N of 130 (no loss of interest: $n = 95$; some loss of interest: $n = 29$; extreme loss of interest: $n = 6$; see Table V).⁴

Box’s test of equality of covariance matrices was again assessed to ensure homogeneity of variance. With participants indicating “3” on the loss of interest item removed from the analysis, the observed covariance matrices of the dependent variable were equal across groups, $F(12, 788.62) = 1.42, ns$.

To examine the hypothesis that positive word accuracy on the 2AFC was associated with loss of interest, a 3 x 3 (Valence [positive, negative, neutral] x Loss of Interest [none, some, extreme]) mixed design ANOVA was conducted with valence as a repeated measure. This yielded a significant valence x loss of interest interaction, $F(4, 127) = 3.30, p < .02, \eta_p^2 = .05$ (see Table X and Figure 3).

In addition to findings from the previous omnibus analysis, persons indicating extreme loss of interest ($M = .4479, SD = .0788$) differed in positive word accuracy from those indicating some loss of interest, $M_d = .0715, p < .05$, such that those indicating extreme loss of interest identified positive words less accurately than those indicating some loss of interest. Although the difference was in the predicted direction, persons indicating extreme loss of interest did not

differ from those indicating no loss of interest, $M_d = .0379$, *ns*. In addition, persons with extreme loss of interest did not differ from chance accuracy rates, $t(5) = -1.62$, $p = .17$.

Accuracy and trait anhedonia. Using the SPAS, trait anhedonia was investigated in relation to accuracy of identifying positive, negative, and neutral words on the 2AFC. The SPAS yields separate social and physical anhedonia subscales, as well as a lie scale to determine validity of response style. The majority of participants scored at or below 2 on the lie scale, whereas 9 participants scored at 3 or above. These participants were selected out of the analysis, leaving a total $N = 123$.

Examination of social and physical anhedonia scores confirmed that each distribution was normal, with the exception of one participant who was an extreme outlier on social anhedonia, with an elevated score beyond +3 SD. This outlier was recoded to be at +3 SD of the mean, and retained.

Social and Physical Anhedonia scales were then correlated with positive, negative, and neutral word accuracy. No significant findings emerged for positive and negative words, whereas a significant negative correlation with neutral word accuracy was found for both Social ($r = -.23$, $p < .02$) and Physical ($r = -.23$, $p < .02$) Anhedonia, such that higher trait anhedonia was associated with lower accuracy in identifying neutral words (see Table VIII).

Accuracy and dysphoria. As in Exp. 1, in order to investigate whether a conglomerated dysphoria measure would have similar predictive validity as did loss of interest, a 2 x 3 (Dysphoria [high, low] x Valence [negative, positive, neutral]) mixed design ANOVA with word valence as a repeated-measure factor was conducted to relate dysphoria to positive, negative, and neutral word identification accuracy. There were no main effects of either depression or valence,

but a marginal Dysphoria x Valence interaction emerged, $F(2, 232) = 2.50, p = .08$. As in Exp. 1, follow-up analyses indicated that there was no difference between high- and low-dysphoric groups in their identification of positive words, $t(116) < 1, ns$, whereas there was a marginal difference between groups in their identification of neutral, $t(116) = 1.69, p = .09$, and negative, $t(116) = 1.91, p = .06$, words. Importantly, the pattern of negative word accuracy was the opposite of what was found in Exp. 1, with high-dysphoric individuals ($M = .4782, SD = .0586$) *less* accurate in their identification of negative words than low-dysphoric individuals ($M = .4977, SD = .0503$).

Accuracy and specificity of symptoms. Participants also completed the IDAS, a measure that yields subscales based on prospective clinical syndromes or states of mind (e.g., Panic, General Depression, Dysphoria, Well-Being, Suicidality). This allowed for further examination of constructs associated with anhedonia (i.e., General Depression, Dysphoria, Well-Being, Suicidality) and anxiety (Panic, Social Anxiety), as well as the investigation of more specific clinical symptoms (i.e., Panic v. Social Anxiety), in relation to emotional identification accuracy on the 2AFC.

Examination of Panic, General Depression, Dysphoria, Well-Being, Social Anxiety, and Suicidality IDAS distributions revealed that only Well-Being conformed to a normal distribution. Thus, each variable was submitted to a log + 1 transformation, with the exception of suicidality, for which a categorical variable was constructed due to the extreme positive skewness of the distribution. This categorical variable was distributed such that the suicidality groups endorsed either no ($n = 102, M = 6, SD = 0$), some ($n = 12, M = 7, SD = 0$), or high ($n = 18, M = 9.39, SD = 2.03$) suicidality.

To examine suicidality in relation to emotional word identification, a 3 x 3 (Valence [positive, negative, neutral] x Suicidality [no, some, high]) mixed design ANOVA was conducted with valence as a repeated measure. In addition, separate correlations compared the other IDAS subscales and positive, negative, and neutral accuracy identification, to examine each independent relationship. Lastly, 3 separate regression analyses were conducted with positive, negative, and neutral word accuracy regressed onto each IDAS continuous measure entered into step one of the model, so as to limit multiple findings due to correlated predictor variables.

Social anxiety correlated negatively with neutral word accuracy ($r = -.18, p < .04$), but this finding was not present when entered into the regression model. Panic was correlated positively with positive word accuracy ($r = .19, p < .03$), and this finding remained when entered into the regression model $\beta = .291, p < .01$. Thus, persons endorsing higher levels of panic were more accurate in identifying positive words. No other significant differences emerged (see Table VIII).

Dot-Probe Attentional Bias Analyses

Initial dot-probe analysis. For DP analyses, separate attentional bias scores were calculated for positive and negative words, as described in the method section. However, after these scores were calculated, examination of attentional bias histograms indicated that block one and two scores did not conform to a normal distribution. Therefore, high and low extreme outliers (those $\pm 3 SD$ from the mean) were recoded to hover at $\pm 3 SD$ from the mean. In addition, one participant had totally invalid responses on positive trials during block one, such

that no attentional bias score could be calculated. Thus, analyses that incorporate positive attentional bias scores from block one have a total $N = 131$.

Block order. A preliminary 2 x 2 (Block Order [1, 2] x Valence [negative, positive]) within-subjects ANOVA was conducted to examine prospective order effects. This analysis was conducted because of (a) a precedent of order effects in block analyses of the DP (e.g., Bradley et al., 1999), (b) the fact that a large number of trials were given to participants, and (c) the possibility of participant fatigue due to the DP being administered after the 2AFC.

The within-subjects ANOVA yielded a significant block order x valence interaction, $F(1, 130) = 6.55, p < .02$. Follow-up analyses indicated that there were no positive and negative attentional bias differences in block one, but there were significant differences in block two, $t(131) = 2.29, p < .03$, such that individuals were more biased toward positive ($M = 14.04, SD = 58.82$) than to negative ($M = -6.24, SD = 85.35$) words. Because of this interaction, subsequent DP analyses were conducted at each level of block order.

Response time, anxiety, and defensiveness. To examine whether anxious and defensive individuals differentially attended to emotional words, four separate regression analyses were conducted. As with the 2AFC analyses, anxiety, defensiveness, and their interaction were predictor variables. Positive and negative attentional biases in block 1 and 2 served as the outcome variables. Anxiety and defensiveness were centered, and their interaction computed (Aiken & West, 1991; Holmbeck, 2002). Anxiety and defensiveness were entered into step 1, with their interaction entered in step 2. One significant difference emerged, with defensiveness predicting negative attentional biases in block 1, $\beta = -.221, p < .04$, such that higher defensiveness predicted bias toward negative information.

Response time, loss of interest, and anxiety. As in the secondary 2AFC analysis, individuals responding “3” on the loss of interest item were not included in the analyses of anhedonia. Given the difference in the size of each group, Box’s test of equality of covariance matrices was assessed to ensure homogeneity of variance. The observed covariance matrices of the dependent variable were equal across groups, $F(20, 671.58) < 1, ns$.

To examine the hypothesis that positive word accuracy on the 2AFC was associated with loss of interest, a 2 x 2 x 3 (Block Order [first, second] x Bias [positive, negative] x Loss of Interest [none, some, extreme]) mixed design ANOVA was conducted with valence as a repeated measure. Unlike the pattern of results obtained with the 2AFC task, no significant differences emerged beyond the aforementioned block x semantic interaction.

Response time and trait anhedonia. As in the 2AFC analyses, participants who scored at or above 3 on the lie scale of the SPAS were selected out of the following analysis, leaving a total $N = 123$.

Social and Physical Anhedonia scales were then correlated with positive and negative attentional biases from blocks one and two. Unlike the pattern with neutral word accuracy in the 2AFC, no significant differences emerged.

Response time and dysphoria. To investigate whether conglomerated dysphoria would predict attentional biases, a 2 x 2 x 2 (Block Order [first, second] x Dysphoria [high, low] x Attentional Bias [negative, positive]) mixed design ANOVA with attentional bias as a repeated-measure factor was conducted. Besides the aforementioned block x attentional bias interaction, a block x dysphoria interaction was revealed, $F(1, 115) = 6.23, p < .02$, indicating that high-

dysphoric individuals showed a bias away from emotional words in block one, whereas they showed a bias toward emotional words in block two.

Response time and specificity of symptoms. As in the 2AFC, DP response time was related to constructs associated with anhedonia (i.e., General Depression, Dysphoria, Well-Being, Suicidality) and anxiety (Panic, Social Anxiety), as well as with more specific clinical symptoms (i.e., Panic v. Social Anxiety). To examine suicidality in relation to emotional word identification, a 2 x 2 x 3 (Block Order [first, second] x Attentional Bias [positive, negative] x Suicidality [no, some, high]) mixed design ANOVA was conducted with attentional bias and block order as repeated measures. This revealed a significant block x suicidality effect, $F(2, 128) = 5.24, p < .01$. Follow-up analyses revealed that individuals with some endorsement of suicidality were biased toward emotional words, whereas other groups did not display this bias.

In addition, separate correlations were conducted between the other IDAS subscales and positive and negative bias scores from blocks one and two, to examine each independent relationship. Lastly, 4 separate analyses regressed positive and negative biases from blocks one and two onto each IDAS continuous measure entered into step one of the model, so as to limit multiple findings due to inter-correlated predictor variables.

Social anxiety was positively related to block 1 attentional bias toward positive words when included in the regression model, $\beta = .266, p < .04$, such that social anxiety, when controlling for the other IDAS continuous measures, predicted higher bias toward positive information in block one. However, this relationship was not present as a bivariate correlation. No other significant findings emerged.

Relationship Between Two-Alternative Forced-Choice and Dot-Probe

In order to examine the relationship between the DP and the 2AFC, participants' positive and negative attentional bias scores on blocks one and two of the DP were compared to their positive and negative percentages correct on the 2AFC. In addition, DP attentional bias scores were compared with differential 2AFC accuracy (i.e., positive – neutral and negative – neutral) so as to yield a comparable 2AFC variable to that indexed by DP attentional bias scores.

Comparing DP and 2AFC scores allows for an evaluation of the two competing hypotheses regarding dysphoric and distressed individuals' avoidance of positive information. If these scores are both indicative of underlying avoidance (e.g., Frewen et al., 2008), positive attentional bias scores should positively correlate with 2AFC positive word accuracy, such that the more individuals avoid positive information in the DP, the less accurate they are at identifying positive words in the 2AFC. However, if the 2AFC is indexing unconscious inhibitory processes which differ from early attentional processing, they will not be related. Five separate analyses regressed negative, neutral, positive, negative – neutral, and positive – neutral word accuracy onto block one and block two positive and negative attentional biases. No significant findings emerged from these comparisons.

A second correlation tested for evidence supporting the competing hypothesis: that attentional avoidant biases exhibited by distressed and dysphoric individuals are merely indicative of neutral words being comparatively more negative. If this is the case, then attentional biases for positive words in the DP should correlate positively with percentage correct of *negative* words in the 2AFC. This is due to the fact that above chance identification of negative words should be the result of qualitatively similar processing as that which results in

attentional vigilance toward negative information (in this case, neutral, comparatively negative information). To assess this, 2AFC positive percentage correct scores were regressed onto positive attentional bias scores, negative attentional bias scores, and their interaction. No significant findings emerged.

Discussion

Experiment 2 yielded evidence that individuals who responded that they have lost most of their interest in other people or things differentially identified positive information in relation to those who expressed only some loss of interest, replicating a finding from Experiment 1. Although there was limited power to examine subchance perception of positive words in high-anxious anhedonic individuals, they identified positive words at similar rates ($M = .4479$) as extreme anhedonic individuals did in Experiment 1 ($M = .4469$). An investigation with increased power can further establish subchance perception of positive words in extreme anhedonic individuals. In addition, those endorsing “2” on item 12 of the BDI exhibited this differential identification of positive information, whereas those endorsing “3” did not. There may be possible benefits to future research that makes a distinction between 2 and 3 on the BDI. For item 12, for example, a response of 3 may indicate either a more persistent experience of anhedonia, or a tendency to exhibit a less-valid response style. However, future research will determine whether this hypothesized distinction is empirically supported.

Persons expressing both no recent loss of interest and high levels of anxiety exhibited subchance perception of positive information. Highly anxious, non-anhedonic individuals’ subchance perception of positive information parallels previous findings from two recently published studies showing that highly anxious non-defensive individuals also displayed

subchance perception of positive information (Winer et al., 2011). Thus, Experiment 2 provides further support both for the existence of unconscious inhibition of positive information, and for previous findings that anxious and anhedonic individuals are more likely to be the persons who inhibit positive information.

Experiment 2 also allowed for a robust investigation of the relationship between the two-alternative forced choice identification task and the dot-probe task. In particular, the study provided an answer to three competing hypotheses. Hypothesis one was that there would be an association between previously seen avoidance of positive information on the DP, and subchance perception findings on the 2AFC. Findings supporting this hypothesis would have provided evidence that these two tasks index similar phenomena. A second hypothesis was that there would be a similar relationship between attentional avoidance away from positive words, attentional approach toward negative information in the DP, and negative word accuracy in the 2AFC. Findings supporting this hypothesis would have provided evidence that attentional avoidance of positive information seen in the DP merely indicates a weak vigilant process. Lastly, there was the null hypothesis, i.e., that the tasks would not relate to each other in a meaningful way. Experiment 2's findings lend support to this hypothesis, as the two tasks were not associated. This is in spite of the fact that there were a number of self-report measures controlling for a wide range of personality factors likely to link up measures of attentional avoidance. This lack of an association stands in contrast to the emergence of inhibitory findings from the interaction of emotional valence and personality variables in the 2AFC alone.

Given that the pattern of inhibitory findings reported here has now been shown in multiple 2AFC studies, the absence of a meaningful correlation between attentional biases on the

DP and accuracy on the 2AFC provides evidence that the two tasks are indexing separate phenomena. There was no relationship despite notable strengths of the experimental design, such as the use of (a) the same stimulus words in each task, (b) stimulus durations that have produced the most reliable findings, and (c) large experimental power to find an association. However, it is possible that Experiment 2's limitations could have contributed to the lack of an association between the two tasks. For example, the 2AFC task was prioritized and thus always presented first to participants. This was done because the task can be un motivating to subjects, and because a primary aim of this experiment was to investigate positive word accuracy in anhedonic and anxious individuals. This may have produced a systematic lack of motivation on the DP task, however, thus causing the block order differences that emerged.

Another limitation is in regard to stimulus construction. In order to control for stimulus content, the same words were used for both the 2AFC and DP tasks. As noted, this has the strength of ensuring no error is introduced due to stimulus content. However, this may have resulted in stimuli becoming less emotionally impactful as the experiment proceeded. This would be disadvantageous to the sensitivity of the DP.

In addition, stimuli used in Experiment 2 (see Appendix H) were, in part, based on precedent set in prior experiments, which used a large number of anxiety- or physical threat-related stimulus words to comprise the negative stimulus set (Dijksterhuis & Aarts, 2003; Winer et al., 2011). Although Experiment 2 included more depression-related negative words than Experiment 1, and still yielded null findings for negative words, there is still a possibility a negative stimulus set comprised entirely of depression-related words would have yielded different results.

The other findings that emerged in Experiment 2 will demand replication before gaining much theoretical focus. On the 2AFC, these included dysphoric individuals exhibiting less accuracy in their identification of negative words than low-dysphoric individuals (running contrary to findings from Experiment 1), and higher levels of panic being associated with more accurately identifying positive words. On the DP, these included dysphoric and suicidal individuals' exhibiting biases toward all emotional words in comparison to non-dysphoric and non-suicidal individuals, and social anxiety showing a positive association with biases toward positive words.

There was, however, one notable finding that merits further explication here. One of the aims of this study was to provide a comparison of trait and state anhedonics' identification of emotional words. A strength of the design was that it included both state and trait anhedonia measures (the Loss of Interest item from the BDI and the Social and Physical Anhedonia Scales) to allow for this comparison. Trait anhedonia, or a lifelong lack interest in or experiencing pleasure from people and things, is classically associated with schizophrenia (Chapman, Chapman, & Raulin, 1976; Herbener & Harrow, 2002; Loas et al., 2009). Conversely, state anhedonia, or the *recent* loss of interest in and pleasure from people and things, is classically associated with depression, and to a lesser extent, anxiety (Kashdan, 2007; Kashdan et al., 2011; McKenzie, Clarke, Forbes, & Sim, 2010; Weeks et al, 2010).

Trait anhedonics did not differentially identify positive words, as did state anhedonics. However, both social and physical anhedonia negatively predicted neutral word accuracy, in contrast to state anhedonia. This novel pattern of results is intriguing, as schizophrenic individuals have been shown to have selective disruptions in automatic inhibitory processes

(Carter, Robertson, & Nordahl, 1992), in comparison to controls. Further investigation of schizophrenic individuals' processing of neutral information will help to determine the reliability of this novel finding.⁴

General Discussion

Two experiments examined symptoms of depression and anxiety in relation to differential emotional accuracy on a subliminal two-alternative forced-choice identification task (Experiments 1 and 2) and attentional-probe latency task (Experiment 2). The subliminal two-alternative forced-choice identification task yielded evidence of personality variables predicting differential identification of positive words, as opposed to negative (Experiments 1 and 2) and neutral (Experiment 2) words. Findings from both experiments suggest that individuals who have recently experienced an extreme loss of interest (i.e., extreme anhedonics) differentially identify positive words. In Experiment 1, extreme anhedonics systematically inhibited positive information, as indicated by their displaying subchance perception. Experiment 2 revealed that high anxious individuals who express no recent loss of interest also display subchance perception, paralleling previous studies (Winer et al., 2011). There was no evidence to suggest that the attentional probe and two-alternative forced-choice task are indexing similar phenomena, as no meaningful findings emerged from the attentional-probe task, in contrast to the pattern of findings that emerged from the 2AFC.

As noted briefly in Winer et al. (2011), the inhibition of positive information by anxious and anhedonic individuals may be associated with their perception of the world, themselves, and others as chronically negative and unchanging (e.g., Giesler, Josephs, & Swann, 1996). Importantly, while this viewpoint may lead these individuals to experience a chronically negative

existence, it at least allows for their internal and external environment to be predictable (Swann, 1997). Thus, positive information may counterintuitively represent an internal threat for these individuals, when processed subliminally. That is, if an anhedonic or anxious individual is chronically anticipating that a negative outcome will result after an internally activated positive concept, it may result in a twinge of negative, not positive, affect, in response to a positively-valenced stimulus (Kuhl & Koole, 2004).

For example, if an anhedonic or anxious person has a self-schema of “hope:heartache,” then that person may unconsciously consider hope a threat when it is presented subliminally, and processed internally. This activation of positive content differs from a chronic negative understanding of self and internally threatens this consistent, albeit depressing, self-understanding. This results in the avoidance of hope, which in turn results in the selection of the distracter word with which hope is paired. In this sense, by inhibiting positive information, anxious and anhedonic individuals may be unconsciously preparing for the prospective negativity of positive things.

Importantly, this distinguishes anhedonic individuals from those experiencing mere sadness. Sadness is evolutionary adaptive, in that it increases the desire for social connections which, in turn, can promote survival and reproduction (Gray, Ishi, & Ambady, 2011).

Anhedonia, however, may be the result of a pattern of information-processing initiated with the goal of protecting oneself from disappointment by decreasing engaging in social behaviors and eliminating social thoughts. An absence of pleasure, as opposed to a presence of sadness, thus has less evolutionary value, and may be related to an underlying pathological process.

Developmentally, this process may have initially served to protect a person from disappointment,

and the negative affect that became associated with hopeful information. However, if it now relates to overarching anxiety or anhedonia, the process has tipped to being more destructive than protective.

Future directions will include examining the interaction of anxious symptoms, depressed symptoms, and defensiveness, in relation to the identification of positive information. For example, subchance perception of positive words, while established in non-defensive high-anxious individuals, continues to demand further evidence in persons with state anhedonia. Experiment 1's findings suggest that anhedonic individuals unconsciously inhibit positive information, as demonstrated by their subchance perception of positive words. However, in Experiment 2, anhedonic individuals' identification of positive information did not reach below chance levels. A promising pattern did emerge, such that individuals who responded "I have lost most of my interest in other people or things" identified positive information with the least accuracy of any group; thus, further sampling of these individuals may result in similar subchance perception of positive words as seen in Experiment 1. However, this remains an empirical question.

A second further direction will be to consider Experiment 2's finding that high-anxious individuals who do not endorse recent loss of interest displayed subchance perception of positive words. This finding may be analogous to non-defensive high-anxious individuals exhibiting subchance perception of positive words (Winer et al., 2011). Taken together with these prior studies, anxiety, loss of interest, and defensiveness may interact to predict inhibition of positive information. However, as Winer et al. did not account for symptoms of depression, and

defensiveness was not found to interact with anxiety or loss of interest in Experiment 2, this too remains an empirical question.

A limitation of both studies was the reliance on a single-item measure as an indicator of loss of interest (i.e., item 12 of the BDI). This was due, in large part, to the limitation of extant state anhedonia measures. In response to this, there is a measure currently under development (the State Loss of Interest and Pleasure Scale, Winer, Veilleux, & Ginger, 2011) that will hopefully allow for a more sensitive and specific evaluation of state anhedonia in relation to substance perception of positive words.

In summary, extreme anhedonic and non-anhedonic high-anxious individuals differentially identified positive words. Anhedonia (Experiment 1) and anxiety (Experiment 2, Winer et al., 2011) have now been shown, in four studies, to predict below-chance identification of positive words. This means that these individuals are less accurate at identifying positive words than if they were attempting the task with their eyes closed.

The implications of these findings are wide-ranging. They may inform current processing models – of mind, in general, and of anxiety and depression, specifically – which often primarily focus only on speed of information-processing (e.g., Ouimet et al., 2009). For example, Ouimet Gawronski, and Dozois (2009) have posited a model of information processing in anxious individuals in which attention is thought to emerge in four conceptually distinct stages: (1) orientation of attention toward a given stimulus; (2) attentional engagement with that stimulus; (3) disengagement from attending to the stimulus; and (4) avoidance of attention to the stimulus (see also Posner, 1980). In this model, attentional avoidance occurs as the result of a fairly slow process (running through these four stages takes 500-700 ms), and that avoidance

should not be possible when participants are given less than 500 ms to process information. However, the findings presented here suggest that anhedonic and non-anhedonic high-anxious individuals may avoid subliminally presented positive words (6.4 ms presentation) while not avoiding positive words presented supraliminally (500 ms presentation). There are two non-independent reasons why this may be occurring. First, as there is a 1000 ms. delay following the presentation of the stimulus in the 2AFC, this extra time may allow further semantic processing, thus producing semantically-driven findings. Second, given that the 6.4 ms stimulus is subliminal, this may disallow the influence of more rule-based processing systems, and limit processing to associative systems (Evans, 2008; Ouimet et al., 2009). Associative processing is denoted by spreading activation that occurs rapidly. If the associative system is unconsciously engaged by anhedonic or anxious individuals in the 2AFC, without the interference produced by rule-based processing that may be occurring in the DP, then subchance perception is the result of emotional information being processed in a manner that allows it to rapidly activate the surrounding network (i.e., hope:heartache). Bolstering this explanation, data has related associative processing to other cognitive vulnerability to depression (Beavers, 2005).

Subchance perception suggests that associative process models of anxiety and anhedonia may benefit from incorporating cognitive errors into a more important theoretical role. There may not only be a rapid association between positive and negative information in anxious and anhedonic individuals, but this processing may also result in systematic inhibition of information that is internally threatening because it is prospectively rewarding.

The 2AFC paradigm represents a novel way to measure perceptual avoidance in the clinical literature. Whether anxious and anhedonic individuals avoid positive information has, as

yet, been an open question because of the limitations of latency paradigms (e.g., Frewen, 2008). However, these findings are the first to demonstrate, through an accuracy paradigm, that unconscious avoidance of positive information occurs.

These findings thus suggest the need for increased research focus to be placed on the *inhibition* of positive emotion in anxiety and depression, instead of the facilitation of negative information (e.g., Mogg & Bradley, 2005), or the lack of a protective bias toward positive information (Gotlib & Neubauer, 2000).

Subchance perception may eventually be applied to evaluate individuals at risk for low levels of positivity in their lives, and to help evaluate therapeutic effectiveness. Thus, as this method (which takes 30 minutes to complete and relatively little training to learn to administer) is further refined, it is a strong candidate for translation to clinical and community settings. Indeed, an ultimate aim of the program of research within which these findings are couched is to help clinicians more effectively recognize, conceptualize, and treat psychopathology.

References

- Amir, N., Beard, C., Burns, M., & Bomyea, J. (2009). Attention modification program in individuals with Generalized Anxiety Disorder. *Journal of Abnormal Psychology, 118*, 28-33.
- Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & van Ijzendoorn, M. H. (2007). Threat-related attentional bias in anxious and nonanxious individuals: A meta-analytic study. *Psychological Bulletin, 133*, 1-24.
- Beck, A.T., Ward, C.H., Mendelson, M., Mock, J. and Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4*, 561-571.
- Beevers, C. G. (2005). Cognitive vulnerability to depression: A dual process model. *Clinical Psychology Review, 25*, 975–1002.
- Bendig, A. W. (1956). The development of a short form of the Manifest Anxiety Scale. *Journal of Consulting Psychology, 20*, 384.
- Borsboom, D., Mellenbergh, G. J., & van Heerden, J. (2003). The theoretical status of latent variables. *Psychological Review, 110*, 203–219.
- Bradley, M.M., & Lang, P.J. (1999). *Affective norms for English words (ANEW): Stimuli, instruction manual and affective ratings*. Technical report C-1, Gainesville, FL. The Center for Research in Psychophysiology, University of Florida.
- Bradley, P. B. , Mogg, K. , Falla, S. J., & Hamilton, L. R. (1998). Attentional bias for threatening facial expressions in anxiety: Manipulation of stimulus duration. *Cognition and Emotion 12*, 737-753.

- Bradley, P. B. , Mogg, K. , Millar, N. , Bonham-Carter, C. , Fergusson, E., Jenkins, J. et al. (1997) Attentional biases for emotional faces. *Cognition and Emotion* 11 , 25-42
- Breitmeyer, B. G. & Ogmen, H. (2000). Recent models and findings in visual backward masking: A comparison, review, and update. *Perception & Psychophysics*, 62, 1572-1595.
- Brosschot, J. F., de Ruiter, C., & Kindt, M. (1999). Processing bias in anxious subjects and repressors, measured by emotional Stroop interference and attentional allocation. *Personality and Individual Differences*, 26, 777-793.
- Brown, T. A., Campbell, L. A., Lehman, Grisham, J. R., & Mancill, R. B. (2001). Current and lifetime co-morbidity of DSM-IV anxiety and mood disorders in a large clinical sample. *Journal of Abnormal Psychology*, 110, 585–599.
- Chapman, L. J., Chapman, J. P. & Raulin, M. L. (1976). Scales for physical and social anhedonia. *Journal of Abnormal Psychology*, 85, 374-382
- Chen, Y. P., Ehlers, A., Clark, D. M., & Mansell, W. (2002). Patients with generalized social phobia direct their attention away from faces. *Behaviour Research and Therapy*, 40, 677 – 687.
- Cisler, J. M., Bacon, A. K., Williams, N. L. (2009). Phenomonological characteristics of attentional biases towards threat: A critical review. *Cognitive Therapy and Research*, 33, 221-234.
- Cisler, J. M. & Koster, E. H. W. (2010). Mechanisms of attentional biases towards threat in anxiety disorders: An integrative review. *Clinical Psychology Review*, 30, 203-216.

- Clark, L. A. (1989). The anxiety and depressive disorders: Descriptive psychopathology and differential diagnosis. In P. C. Kendall, & D. Watson (Eds.), *Anxiety and depression: Distinctive and overlapping features* (pp. 83–129). San Diego, CA: Academic Press.
- Cramer, A. O. J., Waldrop, L. J., van der Maas, H. L. J., & Borsboom, D. (2010). Comorbidity: A network perspective. *Behavioral and Brain Sciences*, *33*, 137-193.
- Crowne, D., & Marlowe, D. (1964). *The approval motive*. New York: Wiley.
- de Raet, R. & Koster, E. H. W. (2010). Understanding vulnerability for depression from a cognitive neuroscience perspective: A reappraisal of attentional factors and a new conceptual framework. *Cognitive, Affective, & Behavioral Neuroscience*, *10*, 50-70.
- Donaldson, C., Lam, D., & Mathews, A. (2007). Rumination and attention in major depression. *Behaviour Research and Therapy*, *45*, 2664-2678.
- Dozois, D. J. A. & Dobson, K.s. (2001). Information processing and cognitive organization in unipolar depression: Specificity and comorbidity issues, *Journal of Abnormal Psychology* *110*, 236–246.
- Erdelyi, M. H. (2004). Subliminal perception and its cognates: Theory, indeterminacy, and time. *Consciousness and Cognition*, *13*, 73–91.
- Eysenck, M. (1997). *Anxiety and Cognition: A Unified Theory*. Hove, East Sussex, UK: Psychology Press.
- Evans, J.St.B.T. (2008). Dual-processing accounts of reasoning, judgement and social cognition. *Annual Review of Psychology*, *59*, 255-278.
- First, M. B., Spitzer, R. L., Gibbon, M. S. W., & Williams, J. B. W. (1996). *Structured Clinical Interview for DSM-IV Axis I Disorders*. New York: New York State Institute Publication

- Fox, E. (2002). Processing emotional facial expressions: The role of anxiety and awareness. *Cognitive, Affective, & Behavioural Neuroscience*, 2, 52-63.
- Fox, E., Russo, R., Bowels, R., & Dutton, K. (2001). Do threatening stimuli draw or hold visual attention in subclinical anxiety? *Journal of Experimental Psychology: General*, 130, 681–700.
- Fox, E., Russo, R., & Dutton, K. (2002). Attentional bias for threat: Evidence for delayed disengagement from emotional faces. *Cognition & Emotion*, 16, 355-379.
- Frewen, P. A., Dozois, D. J. A., Joanisse, M. F., & Neufeld, R. W. J. (2008). Selective attention to threat versus reward: Meta-analysis and neural-network modeling of the dot-probe task. *Clinical Psychology Review*, 28, 307-337.
- Giesler, R. B., Josephs, R. A. & Swann, W. B., Jr. (1996). Self-verification in clinical depression. *Journal of Abnormal Psychology*, 105, 358-368.
- Gotlib, I. H., Kasch, K. L., Traill, S., Joomann, J, Arnow, B. A., & Johnson, S. L. (2004). Coherence and specificity of information-processing biases in depression and social phobia. *Journal of Abnormal Psychology*, 113, 386-398.
- Gotlib, I. H., Krasnoperova, E., Yue, D. N., & Joormann, J. (2004). Attentional biases for negative interpersonal stimuli in clinical depression. *Journal of Abnormal Psychology*, 113, 127-135.
- Gotlib, I. H., McLachlan, A. L., & Katz, A. N. (1988). Biases in visual attention in depressed and nondepressed individuals. *Cognition & Emotion Special Issue: Information Processing and the Emotional Disorders*, 2, 185-200.

- Gotlib, I. H. & Neubauer, D. L. (2000). Information-processing approaches to the study of cognitive biases in depression. In S. L. Johnson, A. M. Hayes, T. M. Field, N. Schneiderman, & P. M. McCabe (Eds.). *Stress, coping, and depression*. (pp. 117-142). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Gray, H. M., Ishii, K., & Ambady, N. (2011). Misery loves company: When sadness increases the desire for social connectedness. *Personality and Social Psychological Bulletin*, *37*, 1438-1448
- Greenwald, A. G., Klinger, M. R., & Schuh, E. S. (1995). Activation by marginally perceptible ("subliminal") stimuli: Dissociation of unconscious from conscious cognition. *Journal of Experimental Psychology: General*, *124*, 22-42.
- Herbener, E. S. & Harrow, M. (2002). The course of anhedonia during 10 years of schizophrenic illness. *Journal of Abnormal Psychology*, *111*, 237-248.
- Holmbeck, G. N. (2002). Post-hoc probing of significant moderational and mediational effects in studies of pediatric populations. *Journal of Pediatric Psychology*, *27*, 87-96.
- Ioannou, M. C., Mogg, K., & Bradley, B. P. (2004). Vigilance for threat: Effects of anxiety and defensiveness. *Personality and Individual Differences*, *36*, 1879-1891.
- Joormann, J. & Gotlib, I. H. (2006). Is this happiness I see? Biases in the identification of emotional facial expressions in depression and social phobia. *Journal of Abnormal Psychology*, *115*, 705-714.
- Joormann, J. & Gotlib, I. H. (2007). Selective attention to emotional faces following recovery from depression. *Journal of Abnormal Psychology*, *116*, 80-85.

- Kashdan, T.B. (2007). Social anxiety spectrum and diminished positive experiences: Theoretical synthesis and meta-analysis. *Clinical Psychology Review, 27*, 348-365.
- Kashdan, T.B., Weeks, J.W., & Savostyanova, A.A. (2011). Whether, how, and when social anxiety shapes positive experiences and events: A self-regulatory framework and treatment implications. *Clinical Psychology Review, 31*, 786-799.
- Kaspi, S. P., McNally R.. J. , & Amir, N. (1995). Cognitive processing of emotional information in posttraumatic stress disorder, *Cognitive Therapy and Research 19*, 319–330.
- Kendall, P. C., Hollon, S. D., Beck, A. T., Hammen, C. L., & Ingram, R. E. (1987). Issues and recommendations regarding use of the Beck Depression Inventory. *Cognitive Therapy & Research, 11*, 289-299.
- Kessler, R. C., Nelson, C. B., McGonagle, K. A., Liu, J., Swartz, M., & Blazer, D. G. (1996). Comorbidity of DSM-III-R major depressive disorder in the general population: Results from the US National Comorbidity Survey. *British Journal of Psychiatry, 168*, 17–30.
- Kihlstrom, J. F. (2004). Availability, accessibility, and subliminal perception [Commentary on “Subliminal perception and its cognates: Theory, indeterminacy, and time” by M.H. Erdelyi]. *Consciousness & Cognition, 13*, 92-100.
- Koster, E. H. W., Fox, E., & MacLeod, C. (2009). Introduction. In the special section on cognitive bias modification in emotional disorders. *Journal of Abnormal Psychology, 118*, 1-4.
- Kucera, H., & Francis, W. N. (1967). *Computational analysis of present-day American English*. Providence, RI: Brown University Press.

- Lavy, E. H., van Oppen, P., & van den Hout, M. A. (1994). Selective processing of emotional information in obsessive compulsive disorder. *Behaviour Research and Therapy*, 32, 243–246.
- Loas, G. Monestes, J. L., Ingelaere, A., Noisette, C., & Herbener, E. S. (2009). Stability and relationships between trait or state anhedonia and schizophrenic symptoms in schizophrenia: a 13-year follow-up study. *Psychiatry Research*, 166, 132-140.
- MacLeod, C. (1991). Half a century of research on the Stroop effect: An integrative review. *Psychological Bulletin*, 109, 163-203.
- MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology*, 95, 15-20.
- MacLeod, C., Rutherford, E. M., Campbell, L., Ebsworthy, G., & Holker, L. (2002). Selective attention and emotional vulnerability: Assessing the causal basis of their association through the experimental manipulation of attentional bias. *Journal of Abnormal Psychology*, 111, 107-123.
- Mansell, W., Clark, D. M., & Ehlers, A. (2003). Internal versus external attention in social anxiety: An investigation using a novel paradigm. *Behaviour Research and Therapy*, 41, 555 – 572.
- Mansell, W., Clark, D. M., Ehlers, A., & Chen, Y. (1999). Social anxiety and attention away from emotional faces. *Cognition and Emotion*, 13, 673 – 690.
- Mathews, A., & Mackintosh, B. (1998). A cognitive model of selective processing in anxiety. *Cognitive Therapy and Research*, 22, 539 –560.

- Mathews, A., & MacLeod, C. (1985). Selective processing of threat cues in anxiety states. *Behaviour Research and Therapy*, *23*, 563–569.
- Mathews, A., & MacLeod, C. (2005). Cognitive vulnerability to emotional disorders. *Annual Review of Clinical Psychology*, *1*, 167-195.
- Mathews, A., Mogg, K., Kentish, J., & Eysenck, M. (1995). Effect of psychological treatment on cognitive bias in generalized anxiety disorder. *Behaviour Research and Therapy*, *33*, 293–303.
- McClelland, G., & Judd, C. (1993). Statistical difficulties of detecting interactions and moderator effects. *Quantitative methods in psychology*, *114*, 376-390.
- McKenzie, D.P., Clarke, D.M., Forbes, A.B., & Sim, M.R. (2010). Pessimism, worthlessness, anhedonia, and thoughts of death identify DSM-IV major depression in hospitalized, medically ill patients, *Psychosomatics*, *51*, 302-311.
- Mobini, S. & Grant, A. (2007). Clinical implications of attentional bias in anxiety disorders: An integrative literature review. *Psychotherapy: Theory, Research, Practice, Training*, *44*, 450-462.
- Mogg, K., & Bradley, B. P. (1998). A cognitive-motivational analysis of anxiety. *Behaviour Research and Therapy*, *36*, 809-848.
- Mogg, K. & Bradley, B. P. (1999). Some methodological issues in assessing attentional biases for threatening faces in anxiety A replication study using a modified version of the probe detection task. *Behaviour Research and Therapy*, *37*, 595-604.
- Mogg, K., & Bradley, B. P. (2002). Selective orienting of attention to masked threat faces in social anxiety. *Behaviour Research and Therapy*, *40*, 1403–1414.

- Mogg, K., & Bradley, B. P. (2004). A cognitive-motivational perspective on the processing of threat information and anxiety. In J. Yiend (Ed.), *Cognition, emotion and psychopathology: Theoretical, empirical and clinical directions*. (pp. 68-85). New York, NY, US: Cambridge University Press.
- Mogg, K., & Bradley, B. P. (2005). Attentional bias in generalized anxiety disorder versus depressive disorder. *Cognitive Therapy and Research*, 29, 29-45.
- Mogg, K., Bradley, B. P., Dixon, C., Fisher, S., Twelftree, H., & McWilliams, A. (2000). Trait anxiety, defensiveness, and selective processing of threat: an investigation using two measures of attentional bias. *Personality and Individual Differences*, 28, 1063-1077.
- Mogg, K., Bradley, B. P., Williams, R., & Mathews, A. (1993). Subliminal processing of emotional information in anxiety and depression. *Journal of Abnormal Psychology*, 102, 304–311.
- Mogg, K., Holmes, A., Garner, M., Bradley, B. P. (2008). Effects of threat cues on attentional shifting, disengagement and response slowing in anxious individuals. *Behaviour Research & Therapy*, 46, 656-667.
- Mogg, K., Kentish, J., & Bradley, B. P. (1993). Effects of anxiety and awareness on colour-identification latencies for emotional words. *Behaviour Research and Therapy*, 31, 559 – 567.
- Mogg, K., Millar, N., & Bradley, B. P. (2000). Biases in eye movements to threatening facial expressions in generalized anxiety disorder and depressive disorder. *Journal of Abnormal Psychology*, 109, 695–704.

- Mogg, K., Philippot, P., & Bradley, B. P. (2004). Selective attention to angry faces in clinical social phobia. *Journal of Abnormal Psychology, 113*, 160–165.
- Ouimet, A. J., Gawronski, B., & Dozois, D. J. A. (2009). Cognitive vulnerability to anxiety: A review and integrative model. *Clinical Psychology Review, 29*, 459-470.
- Paunovic, N., Lundh, L. G., & Oest, L. G. (2002). Attentional and memory bias for emotional information in crime victims with acute posttraumatic stress disorder (PTSD). *Journal of Anxiety Disorders, 16*, 675– 692.
- Phaf, R. H. & Kan, K.-J. (2007). The automaticity of emotional Stroop: A meta-analysis. *Journal of Behavior Therapy and Experimental Psychiatry, 38*, 184-199.
- Pineles, S. L., & Mineka, S. (2005). Attentional biases to internal and external sources of potential threat in social anxiety. *Journal of Abnormal Psychology, 114*, 314-318.
- Pishyar, R. P., Harris, L. M., & Menzies, R. G. (2004). Attentional bias for words and faces in social anxiety. *Anxiety, Stress, and Coping, 17*, 23-36.
- Posner, M. I. (1980). Orienting of attention. *Quarterly Journal of Experimental Psychology, 32*, 3-25.
- Posner, M. I., Inhoff, A. W., Friedrich, F. J. & Cohen, A. (1987). Isolating attentional systems: A cognitive-anatomical analysis. *Psychobiology, 15*, 107-121.
- Posner, M. I., Snyder, C. R., & Davidson, B. J. (1980). Attention and the detection of signals. *Journal of Experimental Psychology: General, 109*, 160–174.
- Riskind, J. H., & Alloy, L. B. (2006). Cognitive vulnerability to emotional disorders: Theory and research Design/Methodology. In L. B. Alloy, & J. H. Riskind (Eds.), *Cognitive*

- vulnerability to emotional disorders.* (pp. 1-29). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.
- Ruiz-Caballero, J.A., & Bermúdez, J. (1997). Anxiety and attention: is there an attentional bias for positive emotional stimuli? *Journal of General Psychology, 124*, 194-210.
- Santesso, D. L., Meuret, A. E., Hofmann, S. G., Mueller, E. M., Ratner, K. G., Roesch, E. B., & Pizzagalli, D. A. (2008). Electrophysiological correlates of spatial orienting towards angry faces: A source localization study. *Neuropsychologia, 46*, 1338-1348.
- Shane, M. S., & Peterson, J. B. (2007). An evaluation of early and late stage attentional processing of positive and negative information in dysphoria. *Cognition & Emotion, 21*, 789-815.
- Shankman, S. A., & Klein, D. N. (2003). The relation between depression and anxiety: An evaluation of the tripartite, approach-withdrawal and valence-arousal models. *Clinical Psychology Review, 23*, 605-637.
- Snodgrass, M. & Shevrin, H. (2006). Unconscious inhibition and facilitation at the objective detection threshold: Replicable and qualitatively different unconscious perceptual effects. *Cognition, 101*, 43-79.
- Sposari, J. A., & Rapee, R. M. (2007). Attentional bias toward facial stimuli under conditions of social threat in socially phobic and nonclinical participants. *Cognitive Therapy & Research, 31*, 23-37.
- Strahan, R. & Gerbasi, K. C. (1972). Short, homogenous versions of the Marlowe-Crowne Social Desirability Scale. *Journal of Clinical Psychology, 28*, 191-193.

- Stroop, J. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, 18, 643-662.
- Taghavi, M. R., Dalgleish, T., Moradi, A. R., Neshat-Doost, H. T., & Yule, W. (2003). Selective processing of negative emotional information in children and adolescents with generalized anxiety disorder. *British Journal of Clinical Psychology*, 42, 221–230.
- Teachman, B. A., Smith-Janik, S. B., & Saporito, J. (2007). Information processing biases and panic disorder: Relationships among cognitive and symptom measures. *Behaviour Research and Therapy*, 45, 1791-1811.
- Verkuil, B., Brosschot, J. F., Putman, P., & Thayer, J. F. (2009). Interacting effects of worry and anxiety on attentional disengagement from threat. *Behaviour Research & Therapy*, 47, 146-152.
- Waters, A. M., Kokkoris, L. L., Mogg, K., Bradley, B. P., & Pine, D. S. (2010). The time course of attentional bias for emotional faces in anxious children. *Cognition & Emotion*, 24, 1173-1181.
- Watson, D., O'Hara, M. W., Simms, L. J., Kotov, R., Chmielewski, M. & McDade-Montez, E. A. (2007). Development and validation of the inventory of depression and anxiety symptoms (IDAS). *Psychological Assessment*, 19, 253-268
- Weeks, J. W., Jakatdar, T. A., & Heimberg, R. G. (2010). Comparing and contrasting fears of positive and negative evaluation as facets of social anxiety. *Journal of Social and Clinical Psychology*, 29, 68–94.
- Williams, J. M. G., Mathews, A., & MacLeod, C. (1996). The emotional stroop task and psychopathology. *Psychological Bulletin*, 120, 3-24.

- Williams, J. M. G., Watts, F. N., MacLeod, C., & Matthews, A. (1988). *Cognitive psychology and emotional disorders*. Chichester, England: Wiley.
- Williams, J. M. G., Watts, F. N., MacLeod, C., & Mathews, A. (1997). *Cognitive psychology and emotional disorders* (2nd ed.). Chichester, England: Wiley.
- Williams, J. M., & Nulty, D. D. (1986). Construct accessibility, depression and the emotional stroop task: Transient mood or stable structure? *Personality and Individual Differences*, *7*, 485-491.
- Wilson, E., MacLeod, C., & Campbell, L. (2007). The information-processing approach to emotion research. In J. A. Coan, & J. J. B. Allen (Eds.), *Handbook of emotion elicitation and assessment*. (pp. 184-202). New York, NY, US: Oxford University Press.
- Winer, E. S. (2012). *A review of the selective encoding of positive information in depressed and anxious persons*. Manuscript in preparation.
- Winer, E. S., Cervone, D., Newman, L. S., & Snodgrass, M. (2011). Subchance perception: High-anxious individuals automatically identify subliminally-presented positive words at below-chance levels. *Personality and Individual Differences*, *51*, 996-1001.
- Winer, E. S., Veilleux, J. C., Ginger, E. J. (2011, September). *Development and validation of the State Loss of Interest and Pleasure Scale (SLIPS)*. Poster presented at the 25th annual meeting of the Society for Research in Psychopathology, Boston, MA.
- Yiend, J. (2010). The effects of emotion on attention: A review of attentional processing of emotional information. *Cognition and Emotion*, *24*, 3-47.

Footnotes

¹“Large sample psychometrics for the BDI typically evidence a skewed distribution with a mean in the area of 4 to 6. The range of scores from 0 to 9 may be viewed as normal, but it must be noted that selecting subjects whose scores are at the extremely low end may produce a comparison group with other real abnormalities unrepresentative of true normalcy. Mild levels of depression are associated with BDI scores of 10 to 20, with 10 to 17 suggesting dysphoria and greater than 17 more closely associated with depressive states.” (Kendall et al., 1987, p. 295)

²An additional two words were included as stimuli along with Dijksterhuis and Aarts’s (2003) original 30. One word, “polio” was replaced with the word “agony” due to it being revealed during pilot testing that participants were often unaware of the meaning of polio.

³Personality is used inclusively here to indicate both underlying trait constructs and symptoms of psychopathology.

⁴The term “trait” is used here in line with traditional usage of the SPAS as a measure of trait anhedonia (Herbener & Harrow, 2002). Likewise, “state” refers to the loss of interest item of the BDI, as its instructions are asking about recent anhedonic changes. However, because of the cross-sectional nature of the current experiments, neither measure can definitively rule out state or trait anhedonia. A person could of course have had a lengthy bout of anhedonia, but interpret a question about losing most of his interest in people or things in the last two weeks as indicative of a lifelong pattern (i.e., these last two weeks in comparison to eight years ago). In addition, a person could respond that “although I know I should have affection for certain people, I don’t really feel it” despite only feeling this way very recently. Thus, these terms are used merely to indicate the prospect of trait and state differences, and in reference to previous

work that has shown that state and trait anhedonia differentially predict depression and schizophrenia (Loas et al., 2009).

Table I
EXPERIMENT 1 DEMOGRAPHIC DATA

Race	<i>Male</i>	<i>Female</i>	<i>Total</i>	<i>% of Total</i>
Asian or Pacific Islander	9	16	25	27.2%
African American	1	2	3	3.3%
Hispanic/Latino	3	18	21	22.8%
White	14	20	34	37.0%
Other	4	5	9	9.8%
	31	61	92	100%
<i>Age (Mean)</i>	19.97	19.43	19.61	
<i>Age, (SD)</i>	2.02	1.68	1.81	

Table II

BECK DEPRESSION INVENTORY FOR BDI TOTAL, HIGH- AND LOW-DYSPHORIC GROUPS, AND FOR LEVEL OF LOSS OF INTEREST IN EXPERIMENT 1.

	<i>Mean</i>	<i>Median</i>	<i>Mode</i>	<i>SD</i>	<i>n</i>
BDI Total	7.83	5.5	0	7.86	130
High Dysphoric Group	18.79	16.5	10	8.32	52
Low Dysphoric Group	3.55	3	3/6	1.91	29
No Loss of Interest	7.10	6	3	5.56	48
Some Loss of Interest	14.90	14	12	6.55	29
Extreme Loss of Interest	26.50	28.5	15/20/ 25/30	8.36	12
Hard to Get Interested in Anything	40.67	42	N/A	3.21	3

Note. There were two modes for the No Loss of Interest group, four for the Extreme Loss of Interest group, and no multiple data points for participants answering “3.”

Table III

PERCENTAGE CORRECT OF POSITIVE AND NEGATIVE WORDS BY LEVEL OF LOSS OF INTEREST IN EXPERIMENT 1.

Valence	Loss of Interest		
	No	Some	Extreme
Positive	51.07 (5.87)	49.89 (5.86)	44.69 (7.60)
Negative	49.09 (5.81)	50.38 (5.63)	51.88 (7.95)
<i>N</i>	48	29	15

Note. Standard deviations in parenthesis

Table IV

EXPERIMENT 2 DEMOGRAPHIC DATA

Race	<i>Male</i>	<i>Female</i>	<i>Total</i>	<i>% of Total</i>
Asian or Pacific Islander	21	17	38	29.2%
African American	3	7	10	7.7%
Hispanic/Latino	7	17	24	18.5%
White	16	30	46	35.4%
Other	6	6	12	9.2%
	53	77	130	100%
<i>Age (Mean)</i>	19.41	18.86	19.08	
<i>Age, (SD)</i>	1.96	1.80	1.64	

Table V

BECK DEPRESSION INVENTORY FOR BDI TOTAL, HIGH- AND LOW-DYSPHORIC GROUPS, AND FOR LEVEL OF LOSS OF INTEREST IN EXPERIMENT 2.

	<i>Mean</i>	<i>Median</i>	<i>Mode</i>	<i>SD</i>	<i>n</i>
BDI Total	8.34	6	0	8.90	132
High Dysphoric Group	17.46	16	16	6.69	41
Low Dysphoric Group	2.60	3	0	6.69	75
No Loss of Interest	4.74	3	0	4.80	95
Some Loss of Interest	14.10	14	6/16	6.85	29
Extreme Loss of Interest	26.50	28.5	34	8.36	6
Hard to Get Interested in Anything	41.50	41.5	41.5	N/A	2

Note. There were two modes for the Some Loss of Interest group.

Table VI

DESCRIPTIVE STATISTICS OF ANXIETY AND ANHEDONIA MEASURES

	<i>Mean</i>	<i>Median</i>	<i>Mode</i>	<i>SD</i>	<i>n</i>
Taylor Manifest Anxiety	6.41	5	1/3	5.10	132
MC Social Desirability	11.03	12	14	3.91	132
Physical Anhedonia SPAS Subscale	2.60	3	0	6.69	123
Social Anhedonia SPAS Subscale	4.74	3	0	4.80	123
IDAS General Depression	43.61	40	36	11.59	132
IDAS Dysphoria	19.92	18	16	7.55	132
IDAS Well-being	27.94	27	24/ 26/33	5.73	132
IDAS Suicidality	6.55	6	6	1.38	132
IDAS Panic	10.90	10	8	3.76	132
IDAS Social Anxiety	8.22	7	5	3.72	132

Note. There were three modes for IDAS Well-being.

Table VII

SPEARMAN'S RHO INTER-CORRELATIONS OF MEASURES OF ANHEDONIA AND ANXIETY

	1	2	3	4	5	6	7	8	9	10	11	12
BDI Item 12, Loss of Interest (1)	1											
Beck Depression Inventory (2)	.62**	1										
Taylor Manifest Anxiety (3)	.44**	.72**	1									
MC Social Desirability (4)	-.32**	-.45**	-.48**	1								
Physical Anhedonia SPAS Subscale (5)	.16	.11	.08	-.12	1							
Social Anhedonia SPAS Subscale (6)	.45**	.41**	.38**	-.33**	.35**	1						
IDAS General Depression (7)	.46**	.82**	.70**	-.48**	.06	.35**	1					
IDAS Dysphoria (8)	.47**	.80**	.75**	-.50**	.03	.40**	.94**	1				
IDAS Well-being (9)	-.43**	-.60**	-.50**	.32**	-.16	-.42**	-.52**	-.55	1			
IDAS Suicidality (10)	.45**	.43**	.40**	-.22 ⁺	.07	.37**	.33**	.32**	-.29**	1		
IDAS Panic (11)	.30**	.39**	.40**	-.37**	.02	.22 ⁺	.51**	.47**	-.23*	.20 ⁺	1	
IDAS Social Anxiety (12)	.34**	.41**	.47**	-.30**	.09	.29**	.50**	.53**	-.43**	.22 ⁺	.41**	1

Note. ** $p < .001$; * $p < .01$; ⁺ $p < .05$

Table VIII

PEARSON CORRELATIONS BETWEEN MEASURES OF ANHEDONIA, ANXIETY, AND DEFENSIVENESS AND VALENCE WORD ACCURACY

	<i>Positive Accuracy</i>	<i>Negative Accuracy</i>	<i>Neutral Accuracy</i>	<i>n</i>
Physical Anhedonia SPAS Subscale (5)	.03	-.02	-.23*	123
Social Anhedonia SPAS Subscale (6)	-.08	-.11	-.23*	123
IDAS General Depression (7)	-.03	-.08	-.11	132
IDAS Dysphoria (8)	-.06	-.10	-.12	132
IDAS Well-being (9)	-.01	-.01	.11	132
IDAS Panic (11)	.19*	-.08	-.14	132
IDAS Social Anxiety (12)	.06	-.04	-.18*	132

Note. * $p < .05$

Table IX

PERCENTAGE CORRECT OF POSITIVE, NEGATIVE, AND NEUTRAL WORDS IN THE NO LOSS OF INTEREST GROUP BY LEVEL OF ANXIETY IN EXPERIMENT 2

Valence	Level of Anxiety	
	High	Low
Positive	46.91 (5.62)	49.91 (6.35)
Negative	49.48 (4.80)	49.94 (4.93)
Neutral	49.48 (6.60)	51.98 (5.71)
<i>N</i>	42	53

Note. Standard deviations in parenthesis.

Table X

PERCENTAGE CORRECT OF POSITIVE AND NEGATIVE WORDS BY LEVEL OF LOSS OF INTEREST (SCORES OF EITHER 0, 1, OR 2) IN EXPERIMENT 2

	<i>Positive Words</i>	<i>Negative Words</i>	<i>Neutral Words</i>
No Loss of Interest (0)	48.59 (6.20)	49.74 (4.85)	50.87 (6.21)
Some Loss of Interest (1)	51.94 (5.92)	47.52 (6.30)	50.11 (8.85)
Extreme Loss of Interest (2)	44.79 (7.89)	48.44 (6.92)	51.56 (4.08)

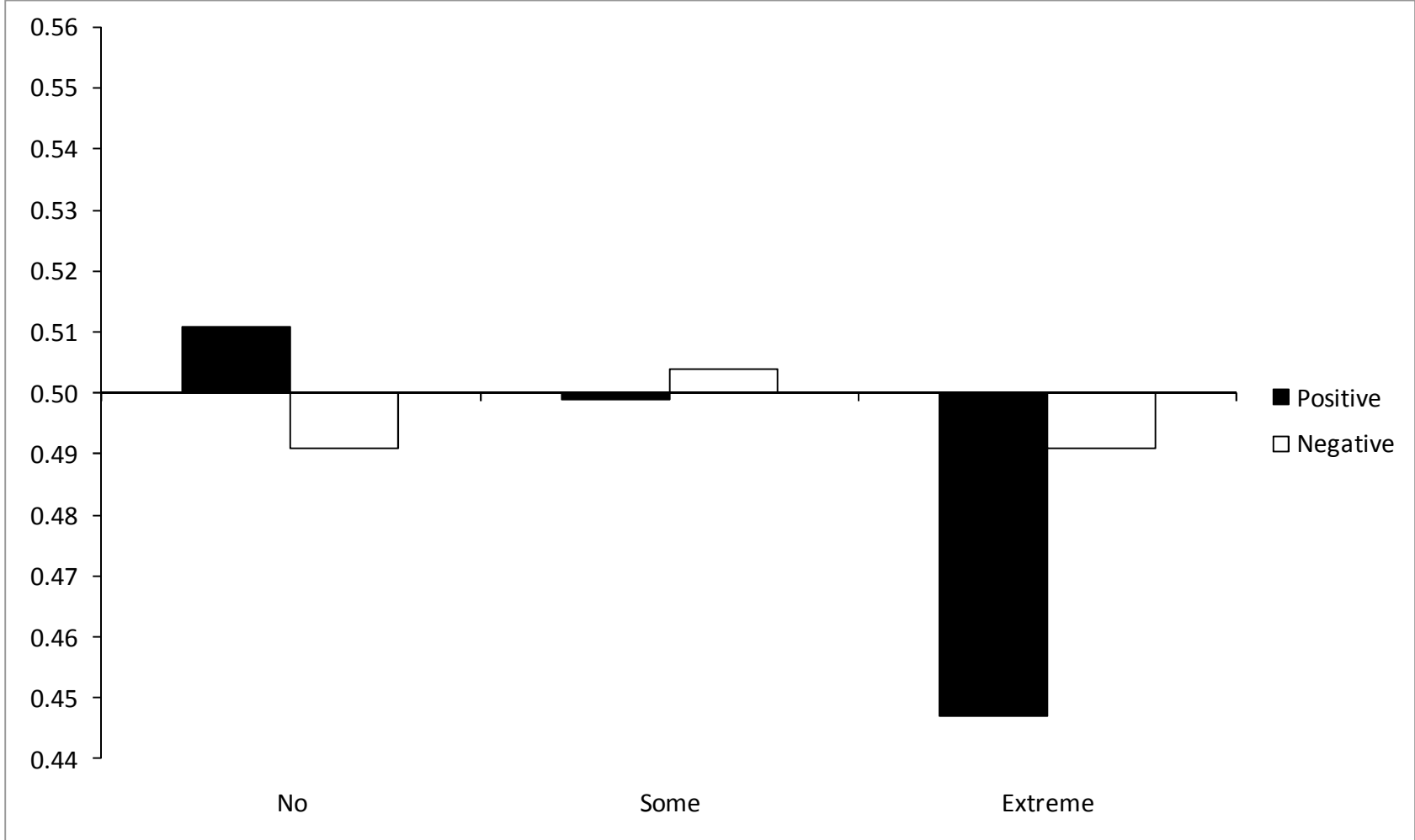


Figure 1. Emotional word identification by level of loss of interest in Experiment 1

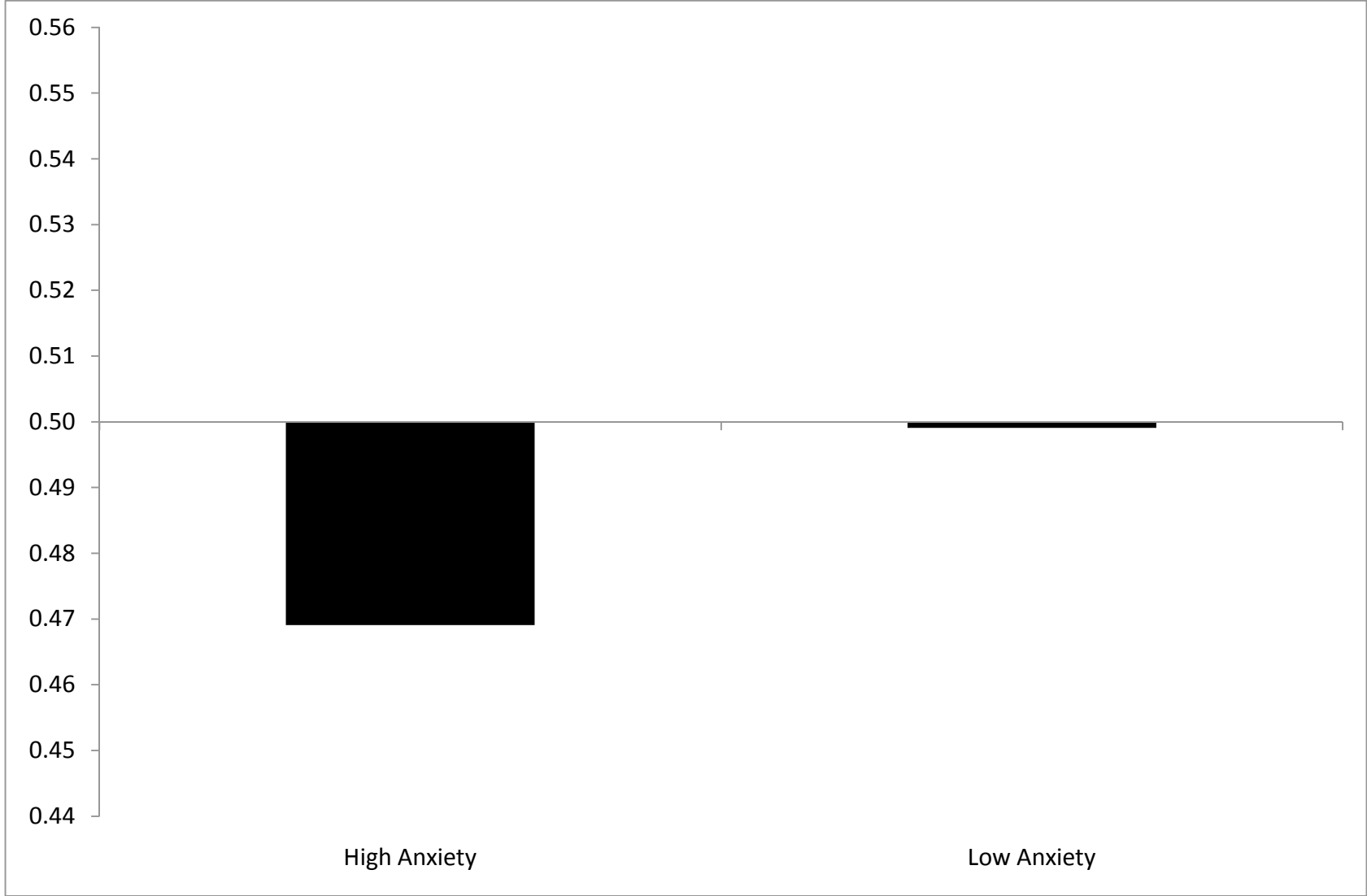


Figure 2. Positive word accuracy by anxiety in No Loss of Interest participants in Experiment 2

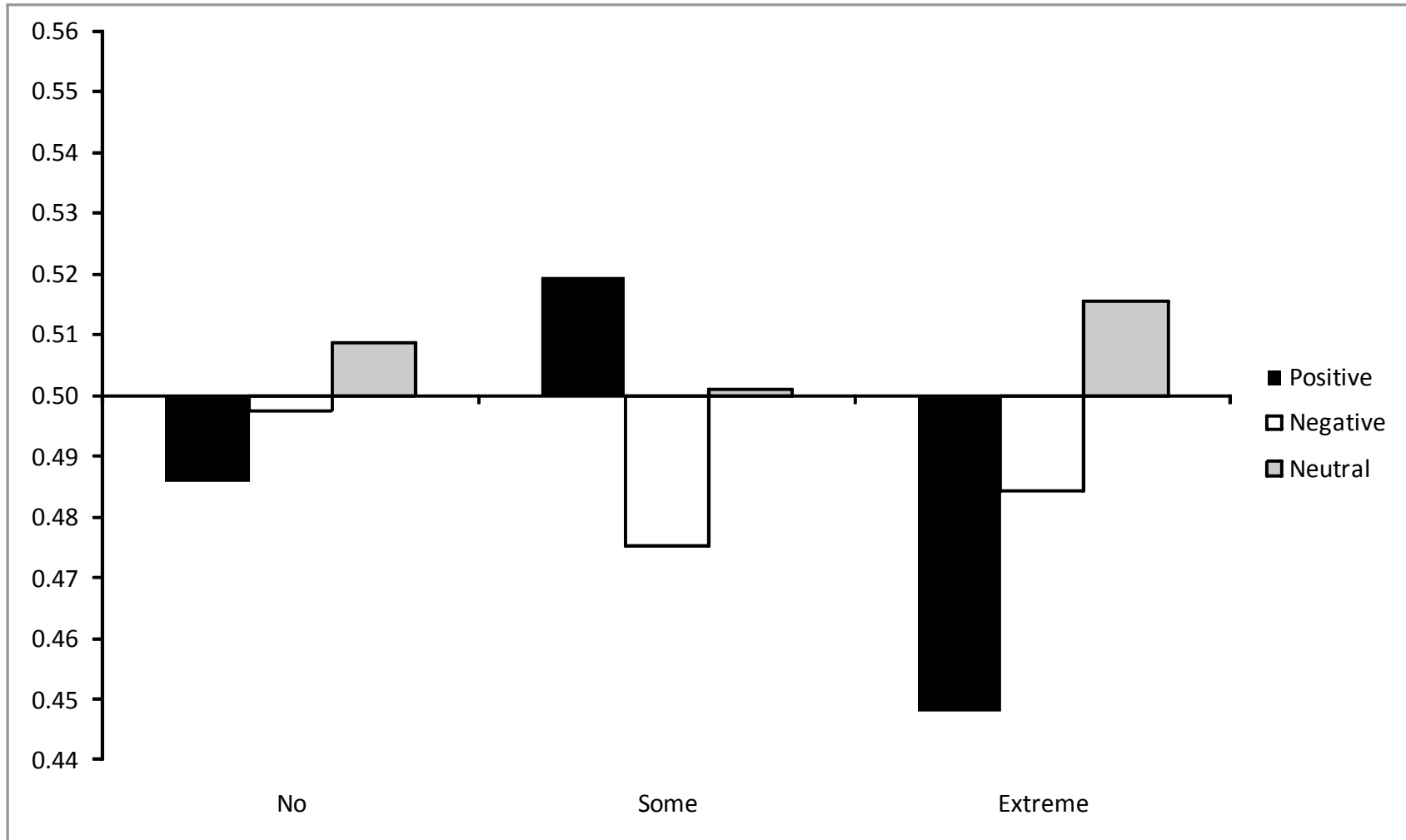


Figure 3. Emotional word identification by level of loss of interest (0,1, or 2) in Experiment 2

Appendix A: Shortened Version of the Marlowe Crowne Social Desirability Scale

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is True (T) or False (F) as it pertains to you personally. Please circle T or F and do not skip any items.

1. I never hesitate to go out of my way to help someone in trouble. T F
2. I have never intensely disliked anyone. T F
3. I sometimes feel resentful when I don't get my way. T F
4. I like to gossip at times. T F
5. There have been times when I felt like rebelling against people in authority even though I knew they were right. T F
6. I can remember "playing sick" to get out of something. T F
7. There have been occasions when I took advantage of someone. T F
8. I'm always willing to admit it when I make a mistake. T F
9. I always try to practice what I preach. T F
10. I sometimes try to get even, rather than forgive and forget. T F
11. When I don't know something I don't at all mind admitting it. T F
12. I am always courteous, even to people who are disagreeable. T F
13. At times I have really insisted on having things my own way. T F
14. There have been occasions when I felt like smashing things. T F
15. I would never think of letting someone else be punished for my wrongdoings. T F
16. I never resent being asked to return a favor. T F
17. I have never been irked when people expressed ideas very different from my own. T F
18. There have been times when I was quite jealous of the good fortune of others. T F
19. I am sometimes irritated by people who ask favors of me. T F
20. I have never deliberately said something that hurt someone's feelings. T F

Appendix B: Shortened Version of the Taylor Manifest Anxiety Scale

Please circle **T** (True) or **F** (False) for each item. Do not skip any items.

- | | | |
|--|----------|----------|
| 1. I believe I am no more nervous than most others. | T | F |
| 2. I work under a great deal of tension. | T | F |
| 3. I cannot keep my mind on one thing. | T | F |
| 4. I am more sensitive than most other people. | T | F |
| 5. I frequently find myself worrying about something. | T | F |
| 6. I am usually calm and not easily upset. | T | F |
| 7. I feel anxiety about something or someone almost all the time. | T | F |
| 8. I am happy most of the time. | T | F |
| 9. I have periods of such great restlessness that I cannot sit long in a chair. | T | F |
| 10. I have sometimes felt that difficulties were piling up so high that I could not overcome them. | T | F |
| 11. I find it hard to keep my mind on a task or job. | T | F |
| 12. I am not unusually self-conscious. | T | F |
| 13. I am inclined to take things hard. | T | F |
| 14. Life is a strain for me much of the time. | T | F |
| 15. At times I think I am no good at all. | T | F |
| 16. I am certainly lacking in self-confidence. | T | F |
| 17. I certainly feel useless at times. | T | F |
| 18. I am a high-strung person. | T | F |
| 19. I sometimes feel that I am about to go to pieces. | T | F |
| 20. I shrink from facing a crisis or difficulty. | T | F |

Appendix C: The Beck Depression Inventory

1. Sadness

- 0 I do not feel sad.
- 1 I feel sad much of the time.
- 2 I am sad all the time.
- 3 I am so sad or unhappy that I can't stand it.

2. Pessimism

- 0 I am not discouraged about my future.
- 1 I feel more discouraged about my future than I used to be.
- 2 I do not expect things to work out for me.
- 3 I feel my future is hopeless and will only get worse.

3. Past Failure

- 0 I do not feel like a failure.
- 1 I have failed more than I should have.
- 2 As I look back, I see a lot of failures.
- 3 I feel I am a total failure as a person.

4. Loss of Pleasure

- 0 I get as much pleasure as I ever did from the things I enjoy.
- 1 I don't enjoy things as much as I used to.
- 2 I get very little pleasure from the things I used to enjoy.
- 3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

- 0 I don't feel particularly guilty.
- 1 I feel guilty over many things I have done or should have done.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all the time.

6. Punishment Feelings

- 0 I don't feel I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

7. Self-Dislike

- 0 I feel the same about myself as ever.
- 1 I have lost confidence in myself.
- 2 I am disappointed in myself.
- 3 I dislike myself.

8. Self-Criticalness

- 0 I don't criticize or blame myself more than usual.
- 1 I am more critical of myself than I used to be.
- 2 I criticize myself for all of my faults.
- 3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes

- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself, but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

10. Crying

- 0 I don't cry anymore than I used to.
- 1 I cry more than I used to.
- 2 I cry over every little thing.
- 3 I feel like crying, but I can't.

11. Agitation

- 0 I am no more restless or wound up than usual.
- 1 I feel more restless or wound up than usual.
- 2 I am so restless or agitated that it's hard to stay still.
- 3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

- 0 I have not lost interest in other people or activities.
- 1 I am less interested in other people or things than before.
- 2 I have lost most of my interest in other people or things.
- 3 It's hard to get interested in anything.

13. Indecisiveness

- 0 I make decisions about as well as ever.
- 1 I find it more difficult to make decisions than usual.
- 2 I have much greater difficulty in making decisions than I used to.
- 3 I have trouble making decisions.

14. Worthlessness

- 0 I do not feel I am worthless.
- 1 I don't consider myself as worthwhile and useful as I used to.
- 2 I feel more worthless as compared to other people.
- 3 I feel utterly worthless.

15. Loss of Energy

- 0 I have as much energy as ever.
- 1 I have less energy than I used to have.
- 2 I don't have enough energy to do very much.
- 3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

- 0 I have not experienced any change in my sleeping pattern.
- 1a I sleep somewhat more than usual.
- 1b I sleep somewhat less than usual.
- 2a I sleep a lot more than usual.
- 2b. I sleep a lot less than usual.
- 3a. I sleep most of the day.
- 3b. I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

- 0 I am no more irritable than usual.
- 1 I am more irritable than usual.
- 2 I am much more irritable than usual.
- 3 I am irritable all the time.

18. Changes in Appetite

- 0 I have not experienced any change in my appetite.
- 1a My appetite is somewhat less than usual
- 1b My appetite is somewhat more than usual
- 2a My appetite is much less than before
- 2b My appetite is much greater than usual.
- 3a I have no appetite at all.
- 3b I crave food all the time.

19. Concentration Difficulty

- 0 I can concentrate as well as ever.
- 1 I can't concentrate as well as usual.
- 2 It's hard to keep my mind on anything for very long.
- 3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

- 0 I am no more tired or fatigued than usual.
- 1 I get more tired or fatigued more easily than usual.
- 2 I am too tired or fatigued to do a lot of the things I used to do.
- 3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

- 0 I have not noticed any recent change in my interest in sex.
- 1 I am less interested in sex than I used to be.
- 2 I am much more interested in sex now.
- 3 I have lost interest in sex completely.

Appendix D: Inventory of Depression and Anxiety Symptoms

Below is a list of feelings, sensations, problems, and experiences that people sometimes have. Read each item to determine how well it describes your recent feelings and experiences. Then select the option that best describes **how much** you have felt or experienced things this way **during the past two weeks, including today**. Use this scale when answering:

1	2	3	4	5
Not at all	A little bit	Moderately	Quite a bit	Extremely
_____ 1. I was proud of myself				_____ 15. I thought about hurting myself
_____ 2. I felt exhausted				_____ 16. I did not have much of an appetite
_____ 3. I felt depressed				_____ 17. I felt like eating less than usual
_____ 4. I felt inadequate				_____ 18. I thought a lot about food
_____ 5. I slept less than usual				_____ 19. I did not feel much like eating
_____ 6. I felt fidgety, restless				_____ 20. I ate when I wasn't hungry
_____ 7. I had thoughts of suicide				_____ 21. I felt optimistic
_____ 8. I slept more than usual				_____ 22. I ate more than usual
_____ 9. I hurt myself purposely				_____ 23. I felt that I had accomplished a lot
_____ 10. I slept very poorly				_____ 24. I looked forward to things with enjoyment
_____ 11. I blamed myself for things				_____ 25. I was furious
_____ 12. I had trouble falling asleep				_____ 26. I felt hopeful about the future
_____ 13. I felt discouraged about things				_____ 27. I felt that I had a lot to look forward to
_____ 14. I thought about my own death				_____ 28. I felt like breaking things

- _____ 29. I had disturbing thoughts of something bad that happened to me
- _____ 30. Little things made me mad
- _____ 31. I felt enraged
- _____ 32. I had nightmares that reminded me of something bad that happened
- _____ 33. I lost my temper and yelled at people
- _____ 34. I felt like I had a lot of interesting things to do
- _____ 35. I felt like I had a lot of energy
- _____ 36. I had memories of something scary that happened
- _____ 37. I felt self-conscious knowing that others were watching me
- _____ 38. I felt a pain in my chest
- _____ 39. I was worried about embarrassing myself socially
- _____ 40. I felt dizzy or light headed
- _____ 41. I cut or burned myself on purpose
- _____ 42. I had little interest in my usual hobbies or activities
- _____ 43. I thought that the world would be better off without me
- _____ 44. I felt much worse in the morning than later in the day
- _____ 45. I felt drowsy, sleepy
- _____ 46. I woke up early and could not get back to sleep
- _____ 47. I had trouble concentrating
- _____ 48. I had trouble making up my mind
- _____ 49. I talked more slowly than usual
- _____ 50. I had trouble waking up in the morning
- _____ 51. I found myself worrying all the time
- _____ 52. I woke up frequently during the night
- _____ 53. It took a lot of effort for me to get going
- _____ 54. I woke up much earlier than usual
- _____ 55. I was trembling or shaking
- _____ 56. I became anxious in a crowded public setting
- _____ 57. I felt faint
- _____ 58. I found it difficult to make eye contact with people
- _____ 59. My heart was racing or pounding
- _____ 60. I got upset thinking about something bad that happened
- _____ 61. I found it difficult to talk with people I did not know well

_____ 62. I had a very dry mouth

_____ 63. I was short of breath

_____ 64. I felt like I was choking

Appendix E: Social and Physical Anhedonia Scale

- True False 1. I have usually found lovemaking to be intensely pleasurable.
- True False 2. Having close friends is not as important as many people say.
- True False 3. When eating a favorite food, I have often tried to eat slowly to make it last longer.
- True False 4. I attach very little importance to having close friends.
- True False 5. I have often enjoyed the feel of silk, velvet, or fur.
- True False 6. I prefer watching television to going out with other people.
- True False 7. I have sometimes enjoyed feeling the strength in my muscles.
- True False 8. On some mornings, I didn't get out of bed immediately when I first woke up.
- True False 9. Dancing, or the idea of it, has always seemed dull to me.
- True False 10. A car ride is much more enjoyable if someone is with me.
- True False 11. I have always found organ music dull and unexciting.
- True False 12. I like to make long distance phone calls to friends and relatives.
- True False 13. The taste of food has always been important to me.
- True False 14. Playing with children is a real chore.
- True False 15. I have had very little fun from physical activities like walking, swimming, or sports.
- True False 16. There have been a number of occasions when people I know have said hello to me.
- True False 17. I have seldom enjoyed looking at photographs of friends.

- True False 18. I have always enjoyed looking at photographs of friends.
- True False 19. On hearing a good song, I have seldom wanted to sing along with it.
- True False 20. Although there are things that I enjoy doing by myself, I usually seem to have more fun when I do things with other people.
- True False 21. I have always hated the feeling of exhaustion that comes from vigorous activity.
- True False 22. I sometimes become deeply attached to people I spend a lot of time with.
- True False 23. The color that things are painted has seldom mattered to me.
- True False 24. There have been time when I've dialed a telephone number only to find that the line was busy.
- True False 25. The sound of rustling leaves has never much pleased me.
- True False 26. People sometimes think that I am shy when I really just want to be left alone.
- True False 27. Sun bathing isn't really more phone than lying down indoors.
- True False 28. When things are really going good for my close friends, it makes me feel good too.
- True False 29. There just are not many things that I have ever really enjoyed doing.
- True False 30. When someone close to me is depressed, it brings me down also.
- True False 31. I don't know why some people are so interested in music.
- True False 32. At times when I was ill or tired, I have felt like going to bed early.
- True False 33. Flowers aren't as beautiful as many people claim.
- True False 34. My emotional responses seem very different from those of other people.
- True False 35. I have always enjoyed having my back massaged.
- True False 36. When I am alone, I often resent people telephoning me or knocking on my door.
- True False 37. I never wanted to go on any of the rides at an amusement park.

- True False 38. Just being with friends can make me feel really good.
- True False 39. Trying new foods is something I've always enjoyed.
- True False 40. On some occasions I've noticed that some other people are better dressed than myself.
- True False 41. The warmth of an open fireplace hasn't especially soothed and calmed me.
- True False 42. When things are bothering me, I like to talk to other people about it.
- True False 43. Poets always exaggerate the beauty and joys of nature.
- True False 44. I prefer hobbies and leisure activities that do not involve other people.
- True False 45. When I have seen a statue, I have had the urge to feel it.
- True False 46. It's fun to sing with other people.
- True False 47. I've always had a number of favorite foods.
- True False 48. Driving from New York to San Francisco is generally faster than flying between these cities.
- True False 49. I don't understand why people enjoy looking at the stars at night.
- True False 50. Knowing that I have friends who care about me gives me a sense of security.
- True False 51. I have had very little desire to try new kinds of foods.
- True False 52. When I move to a new city, I feel a strong need to make new friends.
- True False 53. I never have the desire to take off my shoes and walk through a puddle barefoot.
- True False 54. People are usually better off if they stay aloof from emotional involvements with most others.
- True False 55. I've never cared much about the texture of food.
- True False 56. I believe that most light bulbs are powered by electricity.

- True False 57. When I have walked by a bakery, the smell of fresh bread has often made me hungry.
- True False 58. Although I know I should have affection for certain people, I don't really feel it.
- True False 59. I have often enjoyed receiving a strong, warm handshake.
- True False 60. People often expect me to spend more time talking with them than I would like.
- True False 61. I have often felt uncomfortable when my friends touch me.
- True False 62. I feel pleased and gratified as I learn more and more about the emotional life of my friends.
- True False 63. I have never found a thunderstorm exhilarating.
- True False 64. I go at least once every two years to visit either northern Scotland or some part of Scandinavia.
- True False 65. Standing on a high place and looking out over the view is very exciting.
- True False 66. When others try to tell me about their problems and hang-ups, I usually listen with interest and attention.
- True False 67. I have often found walks to be relaxing and enjoyable.
- True False 68. I never had really close friends in high school.
- True False 69. The sound of rain falling on the roof has made me feel snug and secure.
- True False 70. I am usually content to just sit alone, thinking and daydreaming.
- True False 71. I like playing with and petting soft little kittens or puppies.
- True False 72. I can not remember a time when I talked with someone who wore glasses.
- True False 73. The sound of organ music has often thrilled me.
- True False 74. I'm much too independent to really get involved with other people.
- True False 75. Beautiful scenery has been a great delight to me.

- True False 76. There are few things more tiring than to have a long, personal discussion with someone.
- True False 77. The first winter snowfall has often looked pretty to me.
- True False 78. It made me sad to see all my high school friends go their separate ways when high school was over.
- True False 79. Sex is okay, but not as much fun as most people claim it is.
- True False 80. Sometimes when walking down the sidewalk, I have seen children playing.
- True False 81. I have sometimes danced by myself just to feel my body move with the music.
- True False 82. I have often found it hard to resist talking to a good friend, even when I have other things to do.
- True False 83. I have seldom cared to sing in the shower.
- True False 84. Making new friends isn't worth the energy it takes.
- True False 85. One food tastes as good as another to me.
- True False 86. There are things that are more important to me than privacy.
- True False 87. On seeing a soft, thick carpet, I have sometimes had the impulse to take off my shoes and walk barefoot on it.
- True False 88. I have never combed my hair before going out in the morning.
- True False 89. After a busy day, a slow walk has often felt relaxing.
- True False 90. People who try to get to know me better usually give up after a while.
- True False 91. The bright lights of a city are exciting to look at.
- True False 92. I could be happy living all alone in a cabin in the woods or mountains.
- True False 93. The beauty of sunsets is greatly overrated.
- True False 94. If given the choice, I would much rather be with others than be alone.

- True False 95. It has always made me feel good when someone I care about reaches out to touch me.
- True False 96. I find that I often walk with a limp, which is the result of a skydiving accident.
- True False 97. I have usually found soft music boring rather than relaxing.
- True False 98. I find that people too often assume that their daily activities and opinions will be interesting to me
- True False 99. I have usually finished my bath or shower as quickly as possible just to get it over with.
- True False 100. I don't really feel very close to my friends.
- True False 101. The smell of dinner cooking has hardly ever aroused my appetite.
- True False 102. My relationships with other people never get very intense.
- True False 103. When I pass by flowers, I have often stopped to smell them.
- True False 104. I cannot remember a single occasion when I have ridden on a bus.
- True False 105. Sex is the most intensely enjoyable thing in life.
- True False 106. In many ways, I prefer the company of pets to the company of people.
- True False 107. I think that flying a kite is silly.
- True False 108. I have never cared to sunbath; it just makes me hot.
- True False 109. The sounds of a parade have never excited me.
- True False 110. It has often felt good to massage my muscles when they are tired or sore.
- True False 111. When I'm feeling a little sad, singing has often made me feel happier.
- True False 112. A good soap lather when I'm bathing has sometimes soothed and refreshed me.
- True False 113. A brisk walk has sometimes made me feel good all over.
- True False 114. I have been fascinated with the dancing of flames in a fireplace.

Appendix F: Experiment 1 Stimulus Words

Positive Words

baby
beach
free
friend
fun
happy
home
hope
kitten
rose
smile
soft
spring
summer
sun
sweet

Negative words

agony
bomb
cancer
coma
dead
fear
hell
mean
pain
plague
rude
shark
snake
thief
war
weapon

Appendix G: 2AFC Stimulus Words, Experiment 2

Positive Words	Valence	Arousal	Frequency	Positive Words	Valence	Arousal	Frequency
baby	8.22 (1.20)	5.53 (2.80)	62	humor	8.56 (0.81)	5.50 (2.91)	47
free	8.26 (1.31)	5.15 (3.04)	260	kind	7.59 (1.67)	4.46 (2.55)	313
fun	8.37 (1.11)	7.22 (2.01)	44	joy	8.60 (0.71)	7.22 (2.13)	40
happy	8.21 (1.82)	6.49 (2.77)	98	pretty	7.75 (1.26)	6.03 (2.22)	107
heart	7.39 (1.53)	6.34 (2.25)	173	hope	7.05 (1.96)	5.44 (2.47)	178
honest	7.70 (1.43)	5.32 (1.92)	47	pleasure	8.28 (0.92)	5.74 (2.81)	62
win	8.38 (0.92)	7.72 (2.16)	55	proud	8.03 (1.56)	5.56 (3.01)	50
wise	7.52 (1.23)	3.91 (2.64)	36	soft	7.12 (1.34)	4.63 (2.61)	61

Appendix G, cont.

Negative Words	Valence	Arousal	Frequency	Negative Words	Valence	Arousal	Frequency
bomb	2.10 (1.19)	7.15 (2.40)	36	hate	2.12 (1.72)	6.95 (2.56)	42
dead	1.94 (1.76)	5.73 (2.73)	174	stress	2.09 (1.41)	7.45 (2.38)	107
failure	1.70 (1.07)	4.95 (2.81)	89	angry	2.85 (1.70)	7.17 (2.07)	45
hell	2.24 (1.62)	5.38 (2.62)	95	pain	2.13 (1.81)	6.50 (2.49)	88
prison	2.05 (1.34)	5.70 (2.56)	42	lie	2.79 (1.92)	5.96 (2.63)	59
riot	2.96 (1.93)	6.39 (2.63)	7	insult	2.29 (1.33)	6.00 (2.46)	7
rude	2.50 (2.11)	6.31 (2.47)	6	thief	2.13 (1.69)	6.89 (2.13)	8
sick	1.90 (1.14)	4.29 (2.45)	51	sin	2.80 (1.67)	5.78 (2.21)	53

Appendix G, cont.

Neutral Words	Valence	Arousal	Frequency	Neutral Words	Valence	Arousal	Frequency
cord	5.10 (1.09)	3.54 (2.09)	6	stool	4.56 (1.72)	4.00 (2.14)	8
metal	4.95 (1.17)	3.79 (1.96)	61	seat	4.95 (0.98)	2.95 (1.72)	54
paper	5.20 (1.21)	2.50 (1.85)	157	board	4.82 (1.23)	3.36 (2.12)	239
pencil	5.22 (0.68)	3.14 (1.90)	34	bowl	5.33 (1.33)	3.47 (2.12)	23
phase	5.17 (0.79)	3.98 (1.82)	72	news	5.30 (1.67)	5.17 (2.11)	102
sphere	5.33 (0.87)	3.88 (1.99)	22	bench	4.61 (1.40)	3.59 (2.07)	35
square	4.74 (1.02)	3.18 (1.76)	143	month	5.15 (1.09)	4.03 (1.77)	130
wagon	5.37 (0.97)	3.98 (2.04)	55	column	5.17 (0.85)	3.62 (1.91)	71

Appendix H: DP Stimulus Words, Experiment 2

Positive Words	Valence	Arousal	Frequency	Neutral Words	Valence	Arousal	Frequency
baby	8.22 (1.20)	5.53 (2.80)	62	column	5.17 (0.85)	3.62 (1.91)	71
free	8.26 (1.31)	5.15 (3.04)	260	board	4.82 (1.23)	3.36 (2.12)	239
fun	8.37 (1.11)	7.22 (2.01)	44	bench	4.61 (1.40)	3.59 (2.07)	35
happy	8.21 (1.82)	6.49 (2.77)	98	month	5.15 (1.09)	4.03 (1.77)	130
hope	7.05 (1.96)	5.44 (2.47)	178	square	4.74 (1.02)	3.18 (1.76)	143
pleasure	8.28 (0.92)	5.53 (3.07)	61	metal	4.95 (1.17)	3.79 (1.96)	61
joy	8.60 (0.71)	7.22 (2.13)	40	bowl	5.33 (1.33)	3.47 (2.12)	23
proud	8.03 (1.56)	5.56 (3.01)	50	seat	4.95 (0.98)	2.95 (1.72)	54

Appendix H, cont.

Negative Words	Valence	Arousal	Frequency	Neutral Words	Valence	Arousal	Frequency
angry	2.85 (1.70)	7.17 (2.07)	45	wagon	5.37 (0.97)	3.98 (2.04)	55
bomb	2.10 (1.19)	7.15 (2.40)	36	sphere	5.33 (0.87)	3.88 (1.99)	22
dead	1.94 (1.76)	5.71 (2.73)	174	paper	5.20 (1.21)	2.50 (1.85)	157
hell	2.24 (1.62)	5.38 (2.62)	95	news	5.30 (1.67)	5.17 (2.11)	102
pain	2.13 (1.81)	6.50 (2.49)	88	phase	5.17 (0.79)	3.98 (1.82)	72
rude	2.50 (2.11)	6.31 (2.47)	6	cord	5.10 (1.09)	3.54 (2.09)	6
thief	2.13 (1.69)	6.89 (2.13)	8	stool	4.56 (1.72)	4.00 (2.14)	8
prison	2.05 (1.34)	5.70 (2.56)	42	pencil	5.22 (0.68)	3.14 (1.90)	34

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

Approval Notice
Initial Review – Expedited Review

February 9, 2006

E. Samuel Winer, BA
Psychology
1007 W Harrison Street
M/C 285
Chicago, IL 60612
Phone: (312) 996-9036 / Fax: (312) 413-4122

RE: Protocol # 2006-0065
“Unconscious Inhibition in Word Identification”

Dear Mr. Winer:

Members of Institutional Review Board (IRB) #2 reviewed and approved your research protocol under expedited review procedures [45 CFR 46.110(b)(1)] on February 7, 2006. You may now begin your research.

Your research meets the requirement(s) for the following category - Expedited Review Approval Category 45 CFR 46.110(b)(1):

Protocol reviewed under expedited review procedures [45 CFR 46.110] Category: 7

(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 following information about your approved research protocol:

Protocol Approval Period: February 7, 2006 - February 6, 2007

Approved Subject Enrollment #: 100

Additional Determinations for Research Involving Minors: The Board determined that this research satisfies 45CFR46.404, 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.

Performance Sites: UIC

Sponsor:

OSSR

Research Protocol:

- a) Unconscious Inhibition in Word Identification

Recruitment Material:

- a) UIC Psychology Department Subject Pool

Informed Consent:

- a) Agreement to Participate - "Word Inhibition", version 1, 2/18/06

Please note the Review History of this submission:

Receipt Date	Submission Type	Review Process	Review Date	Review Action
02/01/2006	Initial Review	Expedited	02/07/2006	Approved

Please remember to:

→ Use only the IRB-approved and stamped consent document(s) enclosed with this letter when enrolling new subjects.

→ Use your **research protocol number** (2006-0065) on any documents or correspondence with the IRB concerning your research protocol.

→ Review and comply with all requirements of the, "**UIC Investigator Responsibilities, Protection of Human Research Subjects**"

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

We wish you the best as you conduct your research. If you have any questions or need further help, please contact the OPRS office at (312) 996-1711 or me at (312) 413-2053. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,
Sophia L. Radlowski, M.Ed
IRB Coordinator, IRB # 2
Office for the Protection of Research Subjects

Enclosures:

1. **UIC Investigator Responsibilities, Protection of Human Research Subjects**
2. **Informed Consent Document:**
 - a) Agreement to Participate - "Word Inhibition", version 1, 2/18/06

cc: Leonard S. Newman, Psychology, M/C 285
Gary E. Raney, Psychology, M/C 285

E. SAMUEL WINER

RESEARCH INTERESTS

Implicit markers of anxiety and depression; Information-processing and psychopathology; Substance perception; Research design

EDUCATION

University of Illinois at Chicago (2005-2012)
APA-Accredited Clinical Psychology Ph.D. Program

Dissertation: Encoding of Positive Information in Depressed and Anxious Persons

Master of Arts (2008, August)

Thesis: Individual Differences and the Unconscious Identification of Pleasant and Unpleasant Words

University of Michigan, Ann Arbor (2003-2004)
Pre-graduate coursework in Psychology

University of Illinois at Chicago (1999-2003)
Bachelor of Arts in English Literature with Highest Distinction (2003, July)

American University (1996-1997)
Introductory coursework

AWARDS

APA Dissertation Research Award, American Psychological Association (2011)

-Awarded based on dissertation prospectus quality to assist science-oriented doctoral students of psychology with research costs (\$1,000, 30-40 awarded nationally)

SSCP Student Poster Award, Distinguished Contribution, Society for the Science of Clinical Psychology (2011)

-Awarded to the best posters presented by graduate student SSCP members during the meeting of the Association for Psychological Science (\$100 and APS membership, 8 total awarded at conference)

Harry S. Upshaw Award for Excellence in Teaching, Department of Psychology, University of Illinois at Chicago (2011)

-Awarded “to the graduate student in the Department of Psychology at the University of Illinois at Chicago who best exemplifies Harry Upshaw’s dedication to teaching excellence” (\$500, annually awarded)

Provost’s Award for Graduate Research, Graduate College of Liberal Arts and Sciences, University of Illinois at Chicago (2010)

-Awarded by the graduate college “to recognize most outstanding students in their program of study who represent the excellence of the graduate program” (\$1,820, awarded to 15 total students of the graduate college)

Student Presenter Award, Graduate College of Liberal Arts and Sciences, University of Illinois at Chicago (2007-2011) (\$600 total)

Travel Award, Department of Psychology, University of Illinois at Chicago (2007-2011) (\$800 total)

Travel Award, Graduate Student Council, University of Illinois at Chicago (2007-2011) (\$500 total)

Seed Grant (Co-PI), Office of Social Science Research, University of Illinois at Chicago (2006)

-Merit-based award received for Master’s prospectus that furnished laboratory with required apparatus (156 Hz refresh rate enabled monitor and RAM) (\$700)

Young Investigator Award, ADHD Molecular Genetics Network (2006)

-Award received for travel and hotel room to present at the ADHD Molecular Genetics Network in Brussels, Belgium (\$1,500)

Highest Distinction, Department of English, University of Illinois at Chicago (2003)

National Society of Collegiate Scholars (2000)

Golden Key International Honour Society (2000)

PUBLICATIONS

Winer, E. S. & Snodgrass, M. (in press). Signal detection theory. In M. Matthen (Ed.), *Oxford Handbook of the Philosophy of Perception*. Oxford: Oxford University Press.

Winer, E. S., Cervone, D., Newman, L. S., & Snodgrass, M. (2011). Subchance perception: Anxious, non-defensive individuals identify subliminally-presented positive words at below-chance levels. *Personality and Individual Differences*, 51, 996-1001.

- Winer, E. S.**, & Newman, L. S. (2011). Defensive processes. In D. S. Dunn (Ed.), *Oxford Bibliographies Online: Psychology*. New York: Oxford University Press. doi: 10.1093/obo/9780199828340-0021
- Cervone, D., & **Winer, E. S.** (2010). On social-cognitive and dialogical models of personality: Theoretical and empirical steps toward an integrative view. *International Journal for Dialogical Science*, 4, 5-22.
- Najdowski, C., & **Winer, E. S.** (2009). The neuroscientific study of the self: Methodological and theoretical challenges. *New School Psychology Bulletin*, 6, 7-12.
- Newman, L., Nibert, J., & **Winer, E. S.** (2009). Mnemic neglect is not an artifact of expectancy: The moderating role of defensive pessimism. *European Journal of Social Psychology*, 39, 477-486.
- Snodgrass, M., Kalaida, N., **Winer, E. S.** (2009). Access is mainly a second-order process: SDT models whether phenomenally (first-order) conscious states are accessed by reflectively (second-order) conscious processes. *Consciousness and Cognition*, 18, 561-564.
- Snodgrass, M., & **Winer, E. S.** (2009). Unconscious perception. In T. Bayne, A. Cleermans, & P. Wilken (Eds.), *Oxford Companion to Consciousness* (pp. 508-512). Oxford, U. K.: Oxford University Press.
- Snodgrass, M., **Winer, E. S.**, & Kalaida, N. (2009). Perception: Implicit and subliminal. In W. Banks (Ed.), *Encyclopedia of Consciousness* (Vol. 2, pp. 135-145). New York: Elsevier.

CONFERENCE SYMPOSIA CHAIRED

- Winer, E. S.** & Veilleux, J. C. (2012, May). *When Positive is Negative and Vice Versa: Counterintuitive Findings in Emotional Information-Processing*. Symposium presented at the 24th annual meeting of the Association for Psychological Science, Chicago, IL.

CONFERENCE PRESENTATIONS

- Ginger, E. J., **Winer, E. S.**, & Veilleux, J. C. (2012, November). *Further Validation of the State Loss of Interest and Pleasure Scale (SLIPS)*. Poster to be presented at the 46th annual meeting of the Association for Behavioral and Cognitive Therapies, National Harbor, MD.
- Winer, E. S.**, Cervone, D., Rocus, S., Newman, L. S., & Snodgrass, M. (2012, May). *Subchance perception of positive information*. Paper presented at the 24th annual meeting of the Association for Psychological Science, Chicago, IL.
- Winer, E. S.**, Veilleux, J. C., & Ginger, E. J. (2011, September). *Development and validation of the State Loss of Interest and Pleasure Scale (SLIPS)*. Poster presented at the 25th annual meeting of the Society for Research in Psychopathology, Boston, MA.

Winer, E. S. & Cervone, D. (2011, May). *Depressed and anxious persons inhibit positive information: Three subliminal perception studies*. Poster presented at the 23rd annual meeting of the Association for Psychological Science, Washington, DC.

***Chosen Best SSCP Poster, Distinguished Contribution, of the APS Convention
*Featured as a Conference Video Presentation by the APS Observer**

Winer, E. S. (2011, January). *Extreme loss of interest predicts subchance perception of positive information*. Poster presented at the 6th annual meeting of the Emotion Pre-Conference of the Society for Personality and Social Psychology, San Antonio, TX.

Winer, E. S., Cervone, D., Newman, L. S., Snodgrass, M. (2010, November). *High anxiety and automatic response style predict differential identification of briefly-presented positive and negative words*. Poster presented at the 44th annual meeting of the Association for Behavioral and Cognitive Therapies, San Francisco, CA.

Winer, E. S., Cervone, D. (2010, May). *High-anxious individuals recognize positive words at below chance rates when responding automatically*. Poster presented at the 22nd annual meeting of the Association for Psychological Science, Boston, MA.

Bazan, A., **Winer, E. S.,** Kushwaha, R., Brakel, L. A. W., Snodgrass, M., & Shevrin, H. (2010, May). *Unconscious inhibition in language processing: A subliminal study at the objective detection threshold*. Paper presented at the annual meeting of the Belgian Association for Psychological Sciences, Brussels, BEL.

Winer, E. S., Cervone, D., Fiori, M. Tripathi, R., Veilleux, J., & Barwacz, D. (2010, January). *Unconscious thoughts? Mood, not level of consciousness, predicts decision quality*. Poster presented at the 11th annual meeting of the Society for Personality and Social Psychology, Las Vegas, NV.

Winer, E. S. & Cervone, D. (2009, May). *High-Anxious/Low-Defensive individuals are state-oriented to positive and negative information*. Poster presented at the 21st annual meeting of the Association for Psychological Science, San Francisco, CA.

Winer, E. S. (2009, February). *Individual differences and subchance perception: Anxiety, defensiveness, and the misidentification of pleasant words*. Poster presented at the 10th annual meeting of the Society for Personality and Social Psychology, Tampa Bay, FL.

Bazan, A., **Winer, E. S.,** Kushwaha, R., Brakel, L.A.W., Snodgrass, M., & Shevrin, H. (2008, April). *Les sujets défensifs évitent l'ambiguïté inconsciente – une étude d'amorçage subliminal au seuil de détection objectif*. Paper presented at the International Conference for Affect and Symbolisation, Lyon, FR.

Winer, E. S., Newman, L., & Snodgrass, M. (2008, February). *Subliminal perception of pleasant and unpleasant words: Interactive effects of anxiety and social desirability*.

Poster presented at the 9th annual meeting of the Society for Personality and Social Psychology, Albuquerque, N.M.

Lepisto, D. **Winer, E. S.**, Shevrin, H., & Snodgrass, M. (2007, June). *Replicated inhibition of unpleasant word identification under objective threshold conditions*. Poster presented at the 11th annual meeting of the Association for the Scientific Study of Consciousness, Las Vegas, NV.

Charney, E., Stein, M., Palmero, R., Phillips, H., Greisenegger, E., **Winer, E. S.**, Su, C., & Newcorn, J. (2007, June). *The Atomoxetine-stimulant side effects rating scale (ASSERS)*. Poster presented at the 47th annual meeting of the national institute of mental health (NIMH) new clinical drug evaluation unit (NCDEU), Boca Raton, FL.

Winer, E. S., Lepisto, D., Shevrin, H., & Snodgrass, M. (2007, May). *Unconscious inhibition of negative word stimuli*. Poster presented at the 19th annual meeting of the Association for Psychological Science, Washington, D.C.

Winer, E. S., Stein, M., Kim, S., & Cook, E. (2006, October). *DAT1 and DRD4 Polymorphisms and IQ in Children with ADHD: A replication of Mill et al. (2006)*. Poster presented at the 7th annual international meeting of the Attention Deficit Hyperactivity Disorder molecular genetics network, Brussels, BEL.

Bazan A., **Winer E. S.**, Kushwaha R., Brakel, L.A.W., Snodgrass, M., & Shevrin, H. (2006, June). *Brain and behavioral correlates of unconscious phonological similarity: An ERP study at the objective detection threshold*. Paper presented at the 10th annual meeting of the Association for the Scientific Study of Consciousness, Oxford, U.K.

Silver, A., Nibert, J., Newman, L., & **Winer, E. S.** (2006, May). *Threat and mnemonic neglect: Recall biases of repressors*. Poster presented at the 18th annual meeting of the Association for Psychological Science, New York, N.Y.

Winer, E. S., Lepisto, D., Shevrin, H., & Snodgrass, M. (2005, June). *Is your unconscious prepared? Preference and word meaning determine unconscious facilitation and inhibition*. Poster presented at the 9th annual meeting of the Association for the Scientific Study of Consciousness, Pasadena, C.A.

Snodgrass, M., Lepisto, D., **Winer, E. S.**, & Shevrin, H. (2005, June). *On the fate of negative emotional stimuli: Levels of consciousness mediate vigilance versus defense*. Paper presented at the 9th annual meeting of the Association for the Scientific Study of Consciousness, Pasadena, C.A.

RESEARCH EXPERIENCE

Graduate Researcher, Cervone Laboratory
The University of Illinois at Chicago; (2006-2012)
Daniel Cervone, Ph.D., Director

- Program of research examining anxiety and depression in relation to implicit processing of emotional stimuli

-Trained, led weekly research didactics, and mentored 24 research assistants including diagnostically training assistants on the SCID for Axis I Disorders

- Other previous and ongoing experiments include: development and validation of a new measure of anhedonia; automatic processing of emotional information in schizophrenia; subliminal perception and retrieval-induced forgetting in anxious individuals; detection of ambiguous stimuli after emotional satiation; deliberation-without-attention decision-making; perceptions of time and mortality in relation to processing of emotion

Statistical Consultant, Stein Laboratory

The University of Illinois at Chicago; (2006-2008)

Mark Stein, Ph.D., Director

-Consulted in design and implementation of statistical analyses examining genetic polymorphism predictors of pharmacological outcome in attention-deficit/hyperactivity disorder

Graduate Researcher, Newman Laboratory

The University of Illinois at Chicago; (2005-2006)

Leonard Newman, Ph.D., Director

-Aided in the design and implementation of experiments examining defensive pessimism in relation to remembering self-critical information

-Procured research funding for apparatus required for Master's study

Research Assistant, The Ormond/Hazel Hunt & Family Memorial Laboratory

The University of Michigan Medical Center; (2003-2005)

Howard Shevrin, Ph.D., Director

-Conducted experiments examining: automatic cognitive processing in people exhibiting different explicit cognitive strategies; ERP indices of automatic cognitive processing; cognitive processing goals in relation to the conceptualization of complex shapes

TEACHING EXPERIENCE

Instructor of Record

Abnormal Psychology (Spring 2009)

-Overall comparison of the course with other courses you have taken at UIC: **4.63/5**

-Overall comparison of the instructor with other instructors you have had at UIC: **4.68/5**

Research Methods (Fall 2009)

- Overall comparison of the course with other courses you have taken at UIC: **4.33/5**
- Overall comparison of the instructor with other instructors you have had at UIC: **4.55/5**

Guest Lecturer

Abnormal Psychology (Fall 2008; Spring 2009)

Topics: Dissociative and Somatoform Disorders, Personality Disorders (3 lectures)

Memory & Cognition (Summer 2009)

Topic: Consciousness and Cognition

Introduction to Psychology (Spring 2007; Fall 2010)

Topics: Abnormal Psychology: Definitions and History; Mate Preference and Evolutionary Theory; Belief in a Just World; Snap Judgments; False Memory (6 lectures)

Fieldwork in Psychology (Fall 2010; Spring 2011)

Topics: Statistical Analyses; Writing Results and Discussion Sections (6 lectures)

Discussion Section Instructor

Introduction to Psychology (Spring 2006; Fall 2006; Spring 2007; Spring 2010)

Research Methods (Spring 2008)

Statistics (Summer 2009)

Teaching Assistant

Abnormal Psychology (Fall 2008)

Fieldwork in Psychology (Fall 2010; Spring 2011)

Social Psychology (Fall 2007; Summer 2008; Spring 2009; Summer 2010)

Social Psychology Lab (Fall 2010; Spring 2011)

Theories of Personality (Fall 2005; Spring 2006; Summer 2007)

CLINICAL EXPERIENCE

APA Accredited Clinical Internship, Mental Health Service Line

Edward Hines, Jr., Veterans Affairs Hospital and Loyola University Medical Center (2011-2012)

Bernard Sladen, Ph.D., Internship Director

6-month Half-Time Rotations: Mental Health Intake Center; Home Based Primary Care; Trauma Services; Trauma-Focused Research

-Completed diagnostic evaluation and disposition for patients requiring urgent and emergent psychiatric services and providing psychiatric consultations to emergency room, medical and surgical clinics, and other outpatient clinics

-Acted as part of a multidisciplinary practitioner team delivering psychological and behavioral health consultation services to veterans in their homes

-Receiving specialized training/consultation in Cognitive Processing Therapy for PTSD

-Conducted trauma-focused research examining psychological predictors of treatment adherence

Anxiety Disorders Clinical Externship, Stress and Anxiety Disorders Clinic
The University of Illinois at Chicago Medical Center, Department of Psychiatry; (2009-2011)
Cheryl Carmin, Ph.D., Director

-Provided individual psychotherapy and assessments in a hospital setting to an adult population diagnosed with anxiety disorders and occasional comorbid mood and personality disorders

-Received specialized didactic training and supervision in the cognitive-behavioral treatment of anxiety with additional training in third wave acceptance and mindfulness frameworks

Clinical Externship, The Office of Applied Psychological Services
The University of Illinois at Chicago, Department of Psychology; (2005-2011)
Audrey Ruderman, Ph.D. & Nancy Dassoff, Ph.D, Co-Directors

-Provided individual and couples psychotherapy to an adult population, focusing on Axis I and Axis II diagnoses; interventions undertaken primarily within cognitive-behavioral orientation, and additional training in interpersonal and psychodynamic (in one couples case) orientations

-Administered and scored assessment materials, and wrote integrative reports focusing on learning disorder, personality, and neurocognitive diagnoses

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

Association for Behavioral and Cognitive Therapies
Association for Psychological Science
Society of Personality and Social Psychology
Society for the Study of Clinical Psychology
Society for the Teaching of Psychology

SERVICE

Reviewer

Basic and Applied Social Psychology
European Psychologist
Journal of Experimental Social Psychology
Psychological Science
21st Annual Meeting of the Association for Psychological Science, *Poster Reviewer*
28th Annual Meeting of the International Society for Traumatic Stress Studies, *Poster Reviewer*

Founding Member, UIC Clinical Website Committee

Three-person committee responsible for the redesign and programming of the University of Illinois at Chicago's clinical division website

Co-Editor, UIC Psychology Departmental Newsletter

Graduate newsletter reporting on activity of the department

Founding Member, UIC Social Students Design and Analysis Group

Seven-person club comprised of graduate students

Founding Member, UIC Affective Sciences Journal Club

Seven-person club comprised of faculty and graduate students

Member, UIC Personality Science Journal Club

Six-person club comprised of faculty and graduate students