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# The Self-Reference Effect, Emotion, and Self-Esteem

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**ABSTRACT:** This study examines the effect of emotionally-charged stimuli on surprise recall rates of self-referentially processed words. In a between-subjects experimental design, 101 undergraduate students from the University of Central Florida (UCF) were randomly assigned to one of three groups (positive words, negative words, or neutral words) and presented with a list of seven adjectives describing appearance (e.g. cute, appalling, tall); experimental procedures were carried out through the UCF Qualtrics online survey design platform. After self-referential processing, a significant difference between all three groups was demonstrated by completion of a one-way ANOVA, with recall rates decreasing from the neutral, to the positive, to the negative group, respectively. Self-Esteem and Contingencies of Self-Worth (CSW) scores for participants were also investigated as possible moderating variables, but no significant interaction effect was identified.

**KEYWORDS:** self-reference, emotion, self-esteem

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## INTRODUCTION

The self-reference effect has been a well-known mechanism in psychological research since its conceptualization in Rogers, Kuiper, and Kirker (1977), which differentiated among four alternative levels of processing: structural, phonemic, semantic, and self-reference. With each respective level, study participants experience deeper processing of word cues.

In summary, beginning at the structural level, participants are asked whether each word presented contains a certain letter, whereas in the phonemic phase participants indicate whether each word contains a specific sound, or sounds similar to another word. In the semantic level, participants are asked about the meaning of each word, resulting in greater processing and subsequent recall than the previous two phases. However, self-reference, or the relating of items to oneself, results in the greatest depth of processing and greatest strength of memory. Thus, according to the findings of Rogers et al. (1977), as the level of word processing progresses, the depth at which the items are analyzed and internalized by participants increases, resulting in greater subsequent recall of the stimuli.

Although the self-reference effect itself is well established, this paper presents a novel and unexpected finding regarding self-reference and its relationship with emotionally charged stimuli. In fact, the present study demonstrates that when processed self-referentially, neutral appearance adjectives are recalled at a higher rate than emotionally charged appearance adjectives, an effect that remains consistent even when controlling for possible mediating factors such as contingency of self-worth based on appearance. Contrary to the common belief that emotional stimuli is better recalled than neutral stimuli, my results may identify a discrepancy in the existing literature, while adding to the knowledge of factors commonly associated with self-referential memory.

## LITERATURE REVIEW

The self-reference effect has been demonstrated in a variety of other stimuli since Rogers et al. (1977). Cunningham, Turk, Macdonald, and Macrae (2008) identify the presence of a similar phenomena in everyday situations by asking participants to engage in a simulated shopping experience during which they either pretended that a virtual shopping buggy was their own or that of

another shopper. Researchers found that, when later asked to recall items placed in the cart throughout the shopping paradigm, participants were better able to do so when the cart imagined was their own, rather than belonging to another. Furthermore, Brown, Keenan, and Potts (1986) report on a paradigm in which they instructed participants to imagine either themselves or Walter Cronkite (a famous American journalist) experiencing an event; similar to the results of previous studies, successive recall of imagined event details was higher for those imagined as happening to the participants themselves, rather than as Mr. Cronkite.

Aside from everyday events, the self-reference effect is also present in various familiar stimuli, such as days of birth or letters of first and family names. Both Kesebir and Oishi (2010) and Nuttin, Jr. (1985) illustrate the effect of self-referential processing in these areas – birthdays of others are better recalled when they are closer to one's own, and letters which are present in one's first or family (last) name are preferred in a random preference test over letters which are not associated with the individual.

Although the self-reference effect has been demonstrated in a variety of stimuli, the relationship between the self-reference effect and emotionally charged stimuli has not been fully examined. In general, the connection between affect and memory has been established. For example, Chipchase and Chapman (2013) illustrate that recall for emotionally charged images, both positive and negative, is better than recall for neutral images. The authors presented participants with 228 pictures (76 positive, 76 negative, and 76 neutral) and asked them to determine whether each item pictured would fit in a shoebox. When given a surprise recall test, participants were better able to remember the emotionally-charged items in the images, examples of which included a butterfly, stuffed animal, or lamb (positive) and a human or animal skull (negative), compared to neutral stimuli like a clock.

Specific to the self-reference effect, research by Fossati et al. (2003) identifies a difference in structural brain activation when self-referentially processing positive and negative personality adjectives. The study found greater neural activation in the right prefrontal cortex when participants were processing positive adjectives and a reduction of activation in areas of the brain—including the insula, temporal and occipital regions—and the inferior parietal regions when processing of negative adjectives occurred. Furthermore, research indicates the presence of a negative memory bias (more frequent

recall of negative stimuli) in depressed patients when compared to healthy controls (Breslow, Kocsis, & Belkin, 1981; Denny & Hunt, 1992; Mathews & Bradley, 1983). Together, these studies seem to illustrate that a difference occurs in mental processing, including self-referential processing, of positive and negative stimuli, especially in certain psychopathology, but they do not explain which form of stimuli, if any, are better remembered in a subsequent surprise recall test.

Therefore, the present study aims to address the relationship between self-referential processing and emotionally charged stimuli by examining whether the recall rates of self-referentially processed positive, negative, and neutral adjectives describing appearance differ when administered in a surprise recall test. As a secondary aim, this study identifies self-esteem and contingencies of self-worth as possible variables that may mediate the presence of negative memory bias in patients with depressive symptoms. Depressed patients are frequently shown to exhibit lower self-esteem than healthy controls, and low self-esteem is considered a possible vulnerability for the development of depression (Beck, 1967; Orth, Robins, & Roberts, 2010); however, studies examining negative memory bias in depressed populations do not regularly include self-referential memory tasks. Thus, the roles that self-esteem and the self-reference effect may play in maintaining a negative memory bias remains unknown, despite the contribution of both self-esteem and self-reference to one's self-schema. Therefore, this study aims to serve as a preliminary analysis of the relationship between these mechanisms: the self-reference effect and emotionally charged stimuli.

### *Hypotheses*

Hypothesis 1: In general, recall rates will be higher for emotionally charged adjectives than neutral adjectives. —>Falsified

Hypothesis 2: There will be a difference between recall rates for positive and negative adjectives. —> Confirmed

Hypothesis 2a: Self-esteem and contingencies of self-worth will act as moderating variables, such that those participants with high self-esteem will remember more positive adjectives, and, in general, participants who have a higher contingency of self-worth based on appearance will remember more positive and negative adjectives than neutral words. —>Falsified

## **METHOD**

### *Participants*

One hundred and one undergraduate students from the University of Central Florida (UCF) completed the survey; participants were recruited through a study advertisement on UCF Facebook pages and an announcement in the author's classes. Criteria for inclusion required participants to be age 18 or over and a primary speaker of English. Of the 101 respondents, 93 (83.7 % female, 16.3 % male,  $M_{age} = 20.20$  years) were included in the final data analysis (30 positive condition, 31 negative condition, 32 neutral condition). Participants were excluded if they incorrectly answered any of the quality control questions, or if they were identified as outliers via a box plot analysis (see Figure 1). Of the remaining 93 respondents, the majority were sophomores (42.9%) and students in the UCF College of Sciences (34.7%). All participant recruitment and subsequent data collection and analyses was approved by the University of Central Florida's Institutional Review Board and followed all relevant guidelines for research with human subjects.

### *Design and Procedure*

A between-subjects experimental design was constructed with the following three conditions: (1) positive self-referential, (2) negative self-referential, and (3) neutral self-referential. The research was conducted through the University of Central Florida Qualtrics survey platform; participants were able to complete the survey at any location where Internet access was available. Participants were randomly assigned into one of the three conditions by the platform and presented with a list of seven automatically randomized adjectives describing physical appearance (e.g. gorgeous, ugly, brunette; the complete list of adjectives is available in Appendix). In each condition, the seven adjectives were presented simultaneously in a list format, each in the same font and size, and all pertaining to the same emotion (positive, negative, or neutral). Immediately following the presentation of each adjective, participants were asked to determine whether the adjectives were descriptive of themselves (self-referential), by choosing either "Yes, this item describes my appearance in general" or "No, this item does not describe my appearance in general" in multiple choice format. Participants were given a total of 10 minutes maximum to view the adjectives and process them. Timing began once participants entered the adjective

page of the survey and occurred automatically through UCF Qualtrics.

Immediately after the page of target adjectives, participants were asked to complete a series of seven simple math problems to clear their immediate short-term memory (e.g.  $4 + 5 = ?$ ), and then instructed to complete a five minute surprise recall task, asking them to enter as many target adjectives as they could remember from the proceeding section.

Following presentation of the adjectives and the recall task, additional scales were administered to assess the effect of self-esteem and contingencies of self-worth as moderating variables.

#### *Self-Esteem*

Rosenberg's Self-Esteem Scale (Rosenberg, 1965) was utilized to assess self-esteem. The scale consists of 10 items anchored by 1 (*Strongly Agree*) and 4 (*Strongly Disagree*). Sample items include "I feel that I am a person of worth, at least on an equal plane with others" and "All in all, I am inclined to feel that I am a failure." Higher scores indicate greater self-esteem. In the present study, Cronbach's alpha for the scale was .73.

#### *Contingencies of Self-Worth*

The Contingencies of Self-Worth (CSW) Scale (Crocket et al., 2003) was used. The 35-item scale consists of seven subscales (Family Support, Competition, Appearance, God's Love, Academic Competence, Virtue, and Approval from Others) developed to identify areas in which college students base their self-esteem. Although the appearance subscale was of primary interest for the study (since adjectives describing appearance were presented), all subscales were administered to participants. Sample items from the appearance subscale read, "My self-esteem is influenced by how attractive I think my face or facial features are" and "my self-esteem does not depend on whether or not I feel attractive." The higher the participant's score on each subscale, the more the participant bases their self-esteem in that area. The Cronbach's alpha for each are listed in Table 1; as a whole, the CSW was highly reliable ( $\alpha = .82$ ).

Two quality control questions were included within the survey format and read "Please mark agree (or disagree) for this question." Data collected was stored online in the UCF Qualtrics platform and subsequently in a password

protected file on the author's laptop; following data collection, a one-way ANOVA was conducted in SPSS to compare the differences between means for each of the conditions. Furthermore, correlations between each of the moderating variables and number of words recalled were conducted. Of note, given the nature of a surprise recall task, participants were not informed of the true purpose of the study in the informed consent statement. Instead, participants were informed after completion of the survey using a debriefing statement.

## RESULTS

A median split was performed for scores on Rosenberg's Self Esteem Scale and each of the subscales of the Contingencies of Self-Worth Scale in order to separate those participants who were in the upper and lower 50th percentiles. Results indicated a significant positive correlation between self-esteem scores and number of words recalled ( $r = .234, p = .024$ ). However, results failed to indicate a significant correlation between number of words recalled and any of the subscales of the Contingencies of Self-Worth Scale.

Given the significant correlation between self-esteem and number of words recalled, a one-way between-subjects ANOVA was conducted in SPSS to examine any possible interactions between self-esteem and positive, negative, or neutral experimental condition. Results indicated a significant main effect for condition ( $F(2, 87) = 25.649, p < .001$ ), but a main effect for self-esteem did not survive multiple corrections ( $p = .098$ ), nor was an interaction between the two variables demonstrated ( $p = .980$ ), failing to support Hypothesis 2a. LSD post-hoc tests indicated a significance difference ( $p = .007$ ) in number of words recalled between participants in the positive condition ( $M = 5.53, SD = 0.86$ ) and participants in the negative condition ( $M = 4.87, SD = 1.02$ ), thus supporting Hypothesis 2 and indicating that positive emotionally charged appearance adjectives are remembered at a significantly higher rate than negative emotionally charged appearance adjectives. However, a significant difference was also identified between participants in the neutral condition ( $M = 6.63, SD = 0.91$ ) and participants in both the positive condition ( $p < .001$ ) and the negative condition ( $p < .001$ ; see Figure 2). This indication that neutral words are recalled at a significantly higher rate than either type of emotionally charged words does not support Hypothesis 1, which stated that, in general, emotionally charged adjectives would be recalled at a higher rate than neutral adjectives.



**DISCUSSION**

The present study should serve as a preliminary investigation into the relationship between self-referentially processed stimuli, emotion, and self-esteem. A significant difference was identified between recall rates for positive and negative emotionally charged adjectives when processed self-referentially, such that positive adjectives were recalled at a higher rate than negative adjectives. This result supports and expands on the work of Fossati et al. (2003) by identifying which type of emotionally charged words are better recalled when processed self-referentially. However, contrary to the results of Chipchase and Chapman (2013), the present study identified a trend in which neutral words were recalled at a significantly greater rate than emotionally charged words. This is likely due to the fact that many of the neutral words (e.g. blonde, blue-eyed, short) are readily used in everyday descriptions of physical appearance and were therefore easily accessible in the participants existing memory when activated for the recall task. However, a non-self-referential condition was not included in the present study, although it may have provided support for this hypothesis. Given the importance of self-referential processing in the task, future studies should include a non-self-referential control condition, as well as assess the familiarity of presented adjectives to include this data as a control variable in analyses.

Given that a significant correlation was obtained between self-esteem scores and number of words recalled, regardless of condition, these results seem to suggest self-esteem plays some role in self-referential recall, perhaps because those participants with higher self-esteem are more comfortable thinking about the self. However, since no significant main effect for self-esteem was identified in the ANOVA analysis, the type of words presented can be an important predictor of words recalled. Moreover, although a significant main effect for condition was supported, no interaction between the hypothesized moderating variables of self-esteem and contingencies of self worth was identified. This finding may suggest that differences in recall rates for types of emotionally-charged words are moderated by a third, yet unidentified variable, or perhaps the difference between recall rates of positive and negative adjectives is consistent across all conditions and all moderators when processed self-referentially.

Alternatively, the lack of an interaction between the two variables may be due to a lack of variability in self-esteem scores, with 39.8% of respondents falling in the low range (10-20) on the measure, and 52.7% of respondents falling in mid range (21-30). Thus the 0.5% of respondents who received a score indicating high self-esteem (31-40) may not have been statistically powerful enough to elicit an interaction effect. Similarly, the assessment of a predominantly female sample may contribute to the lack of an interaction effect, due in part to possible anatomical differences between male and female brains. The differences, while minute, may lead to processing differences when regarding stimuli, failing to elicit an interaction effect in a homogenous sample.

Furthermore, although self-esteem and contingencies of self-worth were examined as possible moderating variables that could relate to the presence of negative memory bias in depressed patients, level of depressive symptomology was not assessed in current study participants. Given the online nature of the study and lack of clinical support resources available to the author, it was decided that clinical assessment and monitoring of depressive symptoms was not appropriate for the study at present; however, future research should obtain depression scores via clinician-rated or self-report measures to be included in analyses.

Finally, limitations of the study include common-method bias, since all data was collected in the same way at the same time. The interaction effect may have been significant if the method of data collection differed across age groups, time periods, or mechanism. Future research should attempt to utilize other methods of more controlled experimental design, such as requiring participants to complete the task in a laboratory setting, rather than through an online survey. In addition, future research should focus on identifying possible moderators for the difference in recall rates for emotionally charged stimuli when processed self-referentially, as well as identifying other stimuli which elicit the same effect (e.g. events, objects, images, etc).

Although these findings are worthy of future investigation regarding the direction of memory bias in healthy and depressed populations, the direction of the effect might be attributed to the nature of the stimulus, as adjectives are fundamentally different than actual events in one's life. Future research should also investigate the mechanism by which greater recall scores for positive stimuli were obtained in order to apply and verify the

results for use in possible clinical treatment techniques.

## **CONCLUSION**

In general, the findings in the present study are applicable to the commonly-held belief in the research literature and colloquial conversation that, in general, people (especially those suffering from depression) tend to focus primarily on negative aspects of their lives (e.g. in relationships, school, work, etc.) and consistently return to these events in memory despite other positive events that they may subsequently experience. In the present study, an opposing result was discovered, given that positive adjectives were recalled at a significantly higher rate than negative adjectives. This suggests that, even in participants with low to moderate self-esteem, higher recall of positive stimuli occurs in some situations.

## APPENDIX A

Table 1: Correlations Among All Study Variables

Variable	$\alpha$	N	1	2	3	4	5	6	7	8
1. CSW: Family Support	<b>.86</b>	93	--							
2. CSW: Competition	<b>.82</b>	93	.10	--						
3. CSW: God's Love	<b>.97</b>	93	.22*	-.17	--					
4. CSW: Academic Competence	<b>.77</b>	93	.17	.46**	-.30**	--				
5. CSW: Virtue	<b>.77</b>	93	.04	-.04	.07	.29**	--			
6. CSW: Approval from Others	<b>.77</b>	93	.25*	.19	.02	.26*	.21	--		
7. CSW: Appearance	<b>.65</b>	93	.18	.31**	-.14	.34**	.01	.31**	--	
8. Rosenberg's SE Score	<b>.73</b>	93	-.03	-.17	.15	-.14	.13	-.13	-.19	--
9. Number of Words Recalled	--	93	.07	.19	.08	.12	.09	-.01	-.06	.23*

*Note.* Alpha reliabilities are in bold face. Correlations between the Contingencies of Self Worth Subscales performed prior to the median split. Following the median split, no significant correlations identified between any of the CSW subscales and number of words recalled. A significant positive correlation identified between Rosenberg's SE Score and number of words recalled.

\*  $p < .05$ , \*\*  $p < .01$

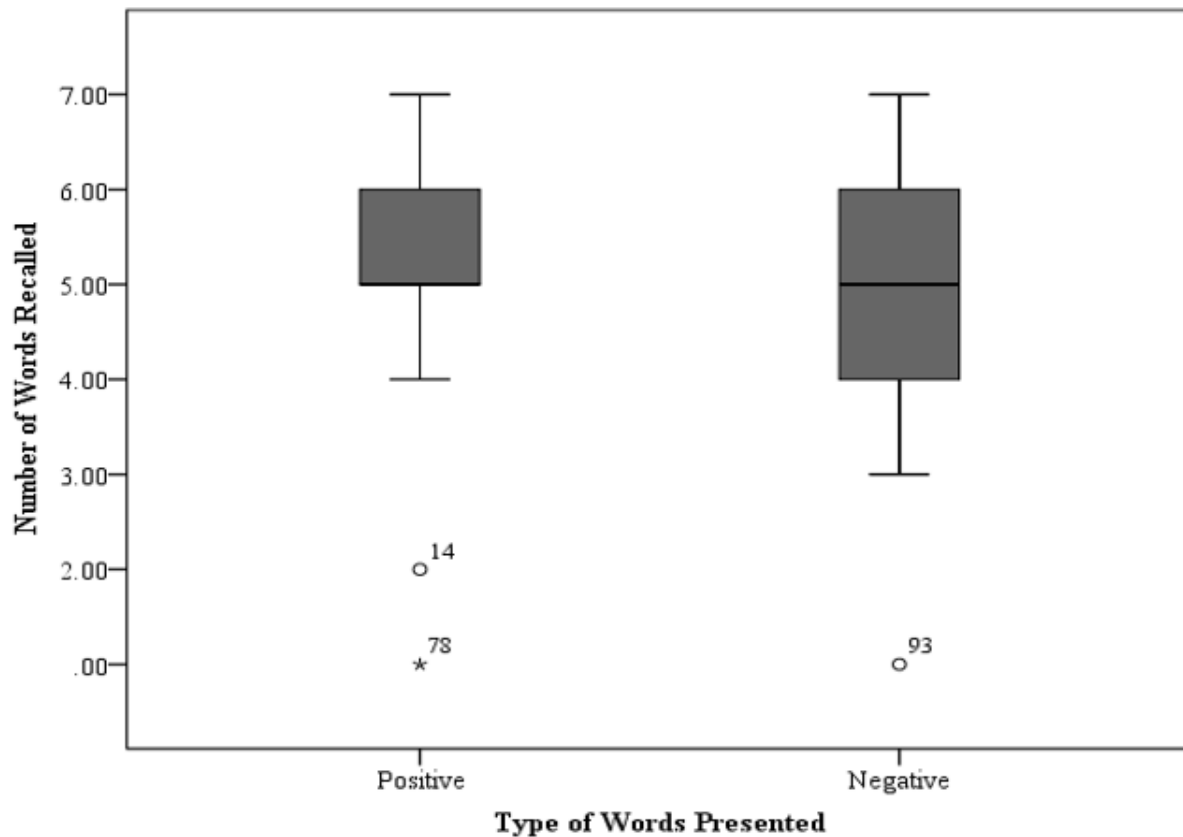
Table 2: Appearance Adjectives Utilized

Positive	Negative	Neutral
Lovely	Ugly	Blonde
Gorgeous	Hideous	Brunette
Attractive	Unattractive	Red-haired
Handsome	Homely	Tall
Cute	Appalling	Short
Appealing	Repulsive	Blue-eyed
Alluring	Offensive	Brown-eyed

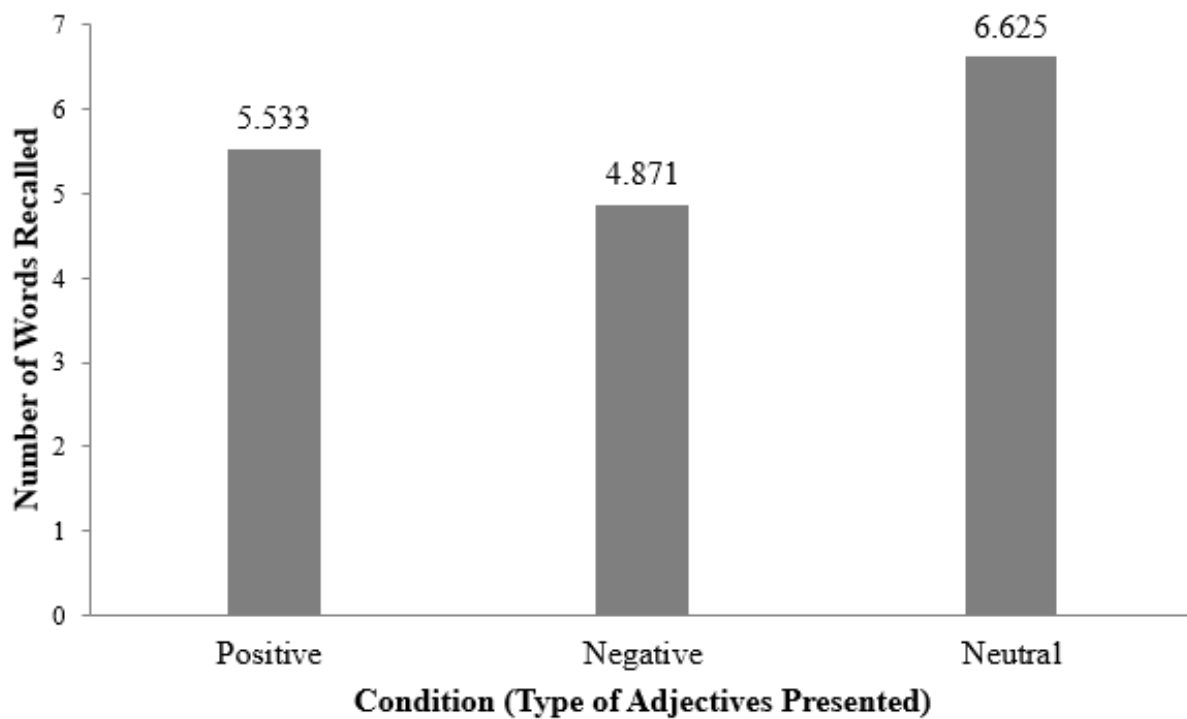


## APPENDIX B

**Figure 1:** Box plot depicting outliers identified and excluded from analysis. No outliers identified in the Neutral Condition, thus this condition was excluded from the figure.



**Figure 2.** Mean number of words recalled by condition. Significant differences found between each condition, with neutral words eliciting the highest rate of recall, followed by positive words, and then negative words.



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