The Effect of Mood Manipulation on Self-Reference Effect

Recall

Wendy Myers

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Approved: _________________________ Date: _______

Thesis Director Signature
Dr. Mary Jean Lynch

Approved: _________________________ Date: _______

Second Reader Signature
Dr. Jennifer Sallee
Abstract

People recall more information when relating it to themselves, resulting in the self-reference effect. Positive information is better recalled than negative information, resulting in the positivity effect. Participants were primed to be in positive, negative, or neutral reflective states. They then performed a task to stimulate different processing judgments for positive, negative, and neutral valence words, followed by a surprise free recall task. The hypothesis was that emotional priming alters the self-reference effect: positive-reflective condition participants would recall the highest proportion of positive words and negative-reflective condition participants the highest proportion of negative words. The self-reference effect was replicated, but priming and word valence had no significant effect. These results indicate the self-reference effect is highly stable across emotional contexts.
The Effect of Mood Manipulation on Self-Reference Effect Recall

**Self-Reference Effect**

The self-reference effect is a well-documented memory advantage in which information processed through a lens of self-relevance increases the amount of information recalled (Rogers, Kuiper, & Kirker, 1977). In Rogers, Kuiper, and Kirker’s (1977) original study, the authors gave participants a presentation of 40 words in which they asked four question types to stimulate structural, phonemic, semantic, and self-referent processing (e.g., Big letters? Rhymes with xxxx? Means same as yyyy? Describes you?). They found that participants remembered more words when engaging in self-referential processing than any other type of processing. This advantageous memory benefit is believed to be due to the depth of each processing type (Rogers, Kuiper, & Kirker, 1977). For example, in structural processing, if asked if a word is in big letters (e.g., CAPS), one could answer the question without necessarily being able to read the word itself. In phonemic processing, when asked if two words rhyme, one would have to be able to read the words and be able to produce a minimal level of pronunciation, but not require knowledge of the words. In semantic processing, one would need knowledge of the meaning of two words in order to compare them for similarity. However, in self-referent processing, one would not only need to know the meaning of the word, but also recognize it as it applied or failed to apply to him/herself. Simply stated, each level of questioning requires increasingly complex processing. Thus, as the most intricate processing level, self-referential questions result in the self-reference effect memory advantage.

The self-reference effect has also been studied in terms of stability across the lifetime. Ross, Anderson, and Campbell (2011) demonstrated evidence of the self-reference effect benefits in children as young as three years old, arguing that the memory advantage develops
directly alongside a burgeoning superordinate concept of self. Conversely, much research has
been conducted on older adults to determine the strength of the self-reference effect between age
groups. Yang, Truong, Fuss, and Bislimovic (2012) found the self-reference effect to be an
effortless, spontaneous process equally beneficial for young adults and older adults. However,
another study found fewer self-reference effect benefits for older adults as compared to younger
adults, citing decreased task performance and less flexibility in the application of the self-
reference effect in that participants experienced fewer benefits when expanding the self-
referential processing to social desirability judgments (Gutchess, Kensinger, Yoon, & Schacter,
2007). Essentially, there is contention as to how the self-reference effect generalizes across the
lifetime, but it is undoubtedly present in some form throughout the lifespan.

Furthermore, the self-reference effect is not static in how it is utilized, regardless of age.
Aside from the straightforward questions used by Rogers, Kuiper, and Kirker (1977) asking
participants if a word described them, there are implications for the self-reference effect in how
people interact with the world. A study from Wu, Liu, and Hou (2015) investigated the ability of
participants to remember people based on the self-reference effect. The authors found that
participants were more likely to remember people if they perceived those people as more similar
to themselves, particularly when primed to be more group-oriented. Similarly, another study
recorded the reactions of participants to eyewitness testimonies, determining a more accurate
recollection of the testimonial when the information was self-relevant (Block, Greenberg, &
Goodman, 2009). These examples illustrate the role of self-relevant processing in every day
situations, indicating a wide range of potential usages.
Positivity Effect

The self-reference effect has also been found in conjunction with the positivity effect, a phenomenon in which people reflect about themselves positively to the exclusion of negative recall (Sedikides & Green, 2000). Sedikides and Green (2009) described this tendency as a model of inconsistency-negativity management in which people, wanting to maintain their positive self-concept, recall positive self-relevant information better than negative self-relevant information. This “rose-colored glasses” effect has implications for the self-reference effect in that items recalled through self-referential processing tend to be positive (D’Argembeau, Comblain, & Van der Linden, 2005). Particularly for older adults, Mather and Carstensen (2005) found that the positivity effect increases with age and Mather and Knight (2005) linked this upsurge to the use of cognitive controls. They argued that older adults spend more time cognitively managing information to capitalize on decreased cognitive resources and therefore prioritize positive information over negative, likely due to the desire to preserve a positive self-concept (Sedikides & Green, 2000). It is also important to note that the positivity effect is present without priming, indicating an inherent proclivity (Mather & Carstensen, 2005). In fact, self-evaluative priming in both positive and negative valences, while effective for a short time, tends to be regulated quickly to resemble a participant’s baseline self-concept (Vallacher, Nowak, Froelich, & Rockloff, 2002). Overall, this research implies a consistent, inherent occurrence of the positivity effect within the self-reference effect.

Conversely, research has also been conducted about the effects of negative affective states on the self-reference effect. As conducted by Fan and colleagues (2016), participants primed with a negative affective state prior to engaging in the recall task experienced a reduced memory advantage in self-referent processing. The authors believed this to be a result of
negative stimuli recruiting more attentional resources, thereby weakening the self-reference effect. These findings contrasts sharply with research regarding mood-congruent recall in which people tend to better recall information that matches their mood state (i.e., a person in a negative mood is more likely to remember negative information) (Murray, Whitehouse, & Alloy, 1999). Murray, Whitehouse, and Alloy (1999) found that people who were categorized as depressed remembered more negative stimuli in a surprise free recall task versus their non-depressed counterparts, indicative of a memory benefit pertaining to affective states. Based on the self-evaluative priming effects described by Vallacher, Nowak, Froehlich, and Rockloff (2002), the study from Fan and colleagues (2016) might not have found results consistent with mood-congruency because their priming procedure was based on general negative affective states rather than self-evaluative affective states. Specifically, the researchers primed participants with general neutral and negative images such as a lock and fecal matter, respectively, rather than self-relevant material.

Based on the gap in the research regarding the interrelationship between self-relevant priming and the self-reference effect, the present study sought to adopt the originally established protocols for the self-reference effect from Rogers, Kuiper, and Kirker (1977) and modify the mood manipulation priming utilized by Fan and colleagues (2016) to be self-referent. To accomplish that task, participants were asked to engage in positive self-reflection, negative self-reflection, or a neutral reflection of a current educational course. This manipulation was expected to impact the valence of the words recalled within the self-reference effect. Specifically, based on the theory of mood congruency (Murray, Whitehouse, & Alloy, 1999), it was hypothesized that participants in the positive-reflective condition would maintain the positivity effect and have the greatest proportion of positive-valence target words recalled. Negative-reflective condition
participants were expected to recall the highest proportion of negative-valence words, while neutral-reflective condition participants were expected to recall an intermediate proportion of positive-valence and negative-valence words.

Method

Participants

There were 77 participants aged 18-24. All participants attended North Central College and were currently enrolled in an introductory psychology course. In exchange for participation, subjects received course credit.

Materials

Materials included three 5-item questionnaires, a PowerPoint presentation of 40 words with accompanying processing questions (e.g., structural, phonemic, semantic, self-referential) (Lynch, 2017), and a demographics questionnaire.

Questionnaires.

The three 5-item questionnaires were positive, negative, or neutral in nature with each questionnaire being assigned to the corresponding conditions of positive-reflective, negative-reflective, and neutral-reflective, respectively. All of the five questions in each questionnaire type were in parallel forms (e.g., positive-reflective survey: “please describe your greatest achievement”; negative-reflective survey: “please describe your greatest regret”; neutral-reflective survey: “please describe a class in which you currently enrolled”). (See Appendices A-C).

PowerPoint Word Lists.

Similarly to Rogers, Kuiper, and Kirker’s (1977) original self-reference effect task, the word list involved 40 adjectives that could describe a person. Each word was presented with a
processing question: structural ("Is the target word in CAPS?"), phonemic ("Does the target word rhyme with xxxx?"), semantic ("Is the target word a synonym of xxxx?"), and self-referential ("Does the target word describe you?") (Lynch, 2017). For counterbalancing, each of the 40 words was paired with each of the four processing type questions and then further differentiated by whether the answer to the processing questions was yes or no, resulting in eight different PowerPoint presentations. The primary difference between the standard protocol from Rogers, Kuiper, and Kirker (1977) and the protocol utilized presently was the modification of the word list to create a more even distribution of positive (e.g., “adorable”), negative (e.g., “careless”), and neutral (e.g., “discrete”) words with 11 positive words, 15 negative words, and 14 neural words. (See Appendix D).

**Demographics Questionnaire.**

The demographic questionnaire gathered basic demographic data such as age, sex, major area of study, and ethnicity. (See Appendix E).

**Procedure**

Participants were assigned at random to one of three conditions: positive-reflective, negative-reflective, or neutral-reflective. In each of the conditions, participants were asked to fill out one of the three 5-item surveys to stimulate positive self-reflection, negative self-reflection, or neutral reflection depending upon the condition. Following the emotional priming of the surveys, participants watched a PowerPoint presentation featuring 40 target words of positive, negative, or neutral valence and 40 processing questions. During the presentation, participants were asked to make yes/no judgments in response to the questions. Following the PowerPoint presentation, participants were asked to answer a demographic questionnaire. Participants were then given a surprise free recall task in which they were asked to write down as many of the
target words as they could remember. In the negative-reflective conditions, participants were then asked to watch a short, inspirational YouTube video to counteract any negative cognitions stimulated by the self-reflective survey.

**Results**

A total of 77 subjects (29 males, 48 females, $M_{Age} = 19.04$ years, $SD = 1.03$) participated in the study with 26 assigned to the positive-reflective condition, 26 assigned to the negative-reflective condition, and 25 assigned to the neutral-reflective condition.

The variables measured included the total number of target words correctly recalled from all types of processing and the proportion of emotionally weighted target words correctly recalled within the self-reference effect (e.g., positive-, negative-, neutral- valence). It should also be noted that 8 of the 40 words were eliminated for primacy and recency effects, leaving a total of 32 words for statistical analysis. Overall, there were 10 positive (31.25%), 12 negative (37.5%), and 10 neutral (31.25%) words considered for analysis. All analyses were conducted with an alpha of .05.

A one-way within-subjects ANOVA compared the recollection rates between processing types (e.g., structural, phonemic, semantic, self-referential) to determine whether the self-reference effect was replicated. The present study found that self-referential processing conferred a statistically significant memory advantage, $F(1, 76) = 186.80, p < .001$ (see Table 1 for means and standard deviations).

A one-way between-subjects ANOVA was used to determine if the self-reference effect was affected by priming conditions. This analysis revealed no significant differences, $F(2, 74) = 0.041, p = .960$ (see Table 2 for means and standard deviations).
The final statistical analysis utilized a MANOVA to determine if the emotional valence of words recalled within self-referential processing varied between priming conditions. Once more, the analysis revealed no significant differences between conditions (see Table 3 for means and standard deviations; see Table 4 for ANOVA results).

**Discussion**

The goal of the present study was to determine the role of self-reflective mood manipulation on total recall, general self-reference recall, and, more specifically, the emotional valence of words recalled within the self-reference effect. Previous research has provided ample documentation of the memory benefit associated with self-referential processing (Rogers, Kuiper, & Kirker, 1977; Fan et al., 2016; Wu, Liu, & Hou, 2015; Block, Greenberg, & Goodman, 2009; D’Argembeau, Comblain, & Van der Linden, 2005; Gutchess, Kensinger, Yoon, & Schacter, 2007; Leblond et al., 2015; Leshikar, Dulas, & Duarte, 2015; Ross, Anderson, & Campbell, 2011; Yang, Truong, Fuss, & Bislimovic, 2012). Occurring with the self-reference effect, previous research has also indicated a strong tendency towards the positivity effect in which subjects are more likely to recall positive self-relevant information over negative self-relevant information (Mather & Carstensen, 2005; Mather & Knight, 2004; Sedikides & Green, 2000). Additionally, Fan and colleagues (2016) elucidated the role of affective states by priming participants with general negative stimuli to induce negative emotions. The researchers concluded that negative affective states reduced the self-reference effect when participants were primed with general negative images.

The present study sought to induce positive, negative, and neutral self-reflective affective states rather than generalized affective states or solely negative affected states such as those seen in previous research (Fan et al., 2016; D’Argembeau, Comblain, & Van der Linden, 2005) to
determine if self-relevant affective states changed the self-reference effect. It was hypothesized that self-reflective affective states would alter the self-referent memory advantage by impacting the proportion of emotive words remembered. More specifically, the kind of affective state was hypothesized to increase the recall of similar valence words; subjects in the negative-reflective condition would be more likely to remember the highest proportion of negative-valence words over their positive-reflective and neutral-reflective counterparts. The self-reference effect was replicated – self-referent processing results in better retention of words than structural, phonemic, and semantic processing. Priming with affective self-reflection did not affect the benefits of self-referent processing. Priming also did not affect the kind of words recalled.

Though not statistically significant, these results are noteworthy for several reasons. Based on previous research regarding the positivity effect within self-referential processing, it was expected that participants in the positive-reflective condition would recall higher proportions of positive-valence target words than participants in other conditions due to the inherent saliency of positive self-reflection (Mather & Carstensen, 2005; Mather & Knight, 2005; Vallacher, Nowark, Froehlich, & Rockloff, 2002). It was also expected that participants in the negative-reflective and neutral-reflective conditions would recall the highest proportions of related valence words (i.e., highest proportion of positive-valence words in the positive-reflective condition) based on research regarding mood-congruency recall (Murray, Whitehouse, & Alloy, 1999). Another expectation was that negative-affective states would decrease the self-reference effect’s strength overall based on Fan and colleagues’ (2016) study. However, none of these expectations were met. The self-reference effect remained consistently strong across all conditions, suggesting that the self-reference effect is more stable across a variety of emotional contexts than previously believed.
In the consideration of this study’s impact, it is also important to note its limitations. Previous research has shown that the self-reference effect, though present throughout the lifespan, functions differently across age groups in that older adults potentially experience less flexibility and overall strength in using the self-reference effect compared to children and young adults (Gutchess, Kensinger, Yoon, & Schacter, 2007; Ross, Anderson, & Campbell, 2011). With access to only college students ranging from age 18-24, there is not necessarily generalizability to other age groups. Other age groups may experience different reactions to priming and word valence.

In addition to generalizability concern, a factor not considered in the present analysis was the variability in yes/no responses to self-referential processing questions. Rogers, Kuiper, and Kirker (1977) found better recollection rates when people answered judgment questions in the affirmative across all types of processing. This facet of the research could have influenced the efficacy of the self-reference effect between priming conditions, particularly for negative-valence words, and is a topic that should be considered for future research.

Lastly, the most important point of consideration concerns the self-reflective priming task. It is both possible and likely that participants did not emotionally engage in the task and therefore nullified the priming. For example, in the negative-reflective condition, one participant, when asked to describe what she would change about herself, responded, “I wouldn’t change anything about myself. Even though I’m not perfect I love being me” (see Appendices F-G for sample participant responses). This response indicates a lack of engagement that could have reduced the potency of the intended self-reflective affective states. Lack of engagement could have also been caused by a perceived lack of anonymity in responses, despite the assurance that all responses were collected and stored anonymously. Participants may have been reluctant to
share personal stories of regret. Finally, the format of the emotional priming itself may have been weak. Previous studies, such as the work from Fan and colleagues (2016), utilized visual stimuli to induce general negative affective states. Visual stimuli may be inherently more powerful than a written prompt. Because the goal of this study was to induce self-reflective affective states, it was logistically impossible to acquire relevant pictures.

In conclusion, this study produced a statistically significant replication of the self-reference effect and provides evidence that the self-reference effect is contextually stable regardless of mood states. The study suggests the self-reference effect can be beneficially utilized in any situation that might require memorization.
References


Table 1

Number of Words Recalled from Processing Types

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<th>Processing</th>
<th>Mean</th>
<th>Std. Error</th>
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<td>Structural</td>
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<td>Phonemic</td>
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<td>Semantic</td>
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<td>Self-Reference</td>
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Table 2

Number of Self-Reference Words Recalled Within Conditions

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<th>Condition</th>
<th>Mean</th>
<th>SD</th>
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<td>0.57</td>
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<tr>
<td>Negative</td>
<td>4.15</td>
<td>0.54</td>
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<tr>
<td>Neutral</td>
<td>4.36</td>
<td>0.51</td>
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Table 3

Proportional Recall of Self-Reference Words by Word Valence Within Conditions

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<th>Word Valence</th>
<th>Condition</th>
<th>Mean</th>
<th>SD</th>
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<td>Positive</td>
<td>0.10</td>
<td>0.09</td>
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<tr>
<td>Positive</td>
<td>Negative</td>
<td>0.54</td>
<td>0.06</td>
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<td>Neutral</td>
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<td>0.06</td>
<td>0.10</td>
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<td>Negative</td>
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ANOVA Results for Effects of Word Valence Within Conditions

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<th>F</th>
<th>Sig</th>
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<td>Negative</td>
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<td>Neutral</td>
<td>2</td>
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<td>0.96</td>
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Appendix A
Positive-Reflective Survey

In 2-3 sentences, please describe your greatest achievement.

Please list three words that describe your best qualities.

What is something about your body or physical appearance that you admire?

What is a compliment you have heard about yourself?

In 1-2 sentences, please describe what you value about yourself.
Appendix B

Negative-Reflective Survey

In 2-3 sentences, please describe your greatest regret.

Please list three words that describe your worst qualities.

What is something about your body or physical appearance that you dislike?

What is a criticism you have heard about yourself?

In 1-2 sentences, please describe what you would change about yourself.
Appendix C

Neutral-Reflective Survey

In 2-3 sentences, please describe a class in which you are currently enrolled.

Please list three words that describe that class.

What is something about that class that you like?

What is a criticism you have heard about that class?

In 1-2 sentences, please describe what you like/dislike about the professor for that class.
Appendix D

Word List and Valences

<table>
<thead>
<tr>
<th>Target Word</th>
<th>Rhyme</th>
<th>Synonym</th>
<th>Valence</th>
<th>Target Word</th>
<th>Rhyme</th>
<th>Synonym</th>
<th>Valence</th>
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<tbody>
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<td>Adorable</td>
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<td>Dirty</td>
<td>Flirty</td>
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<td></td>
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<td>Foolish</td>
<td>Ghoulish</td>
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<td></td>
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<td>Notorious</td>
<td>Wonderful</td>
<td>Positive</td>
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<td></td>
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<td>Messy</td>
<td>Dressy</td>
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<td>Cautious</td>
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<td>Brainy</td>
<td>Wacky</td>
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*Eliminated for positivity/recency effects. The words occurred with only one type of processing question and only one correct yes/no response in the structural, phonemic, and semantic conditions across all PowerPoint presentations.
Appendix E

Demographics Questionnaire

Participant #: ______________________

Age: ______________________________

Year in school: ____________________

Major: ____________________________

Minor (if applicable): ______________

Ethnicity:
___ White/Caucasian
___ Hispanic/Latino
___ Black/African American
___ Native American
___ Asian/Pacific Islander
___ Other: (Please Specify) ______________
___ Prefer not to answer

Gender:
___ Female
___ Male
___ Other: (Please Specify) ______________
___ Prefer not to answer
Appendix F
Sample Participant Questionnaire Response (Positive-Reflective)

In 2-3 sentences, please describe your greatest achievement.

I earned my Eagle Scout award in August 2016 after 7 years of hard work.

Please list three words that describe your best qualities.

Curious, knowledgeable, dedicated

What is something about your body or physical appearance that you admire?

(Left blank)

What is a compliment you have heard about yourself?

Talented

In 1-2 sentences, please describe what you value about yourself.

I value my unending curiosity [sic] and my passion for learning
Appendix G

Sample Participant Questionnaire Response (Negative-Reflective)

In 2-3 sentences, please describe your greatest regret.

“My greatest regret is no [sic] going to this concert that my friend bought a me a ticket to. I couldn’t go because of school obligations, but I wished I would’ve skipped class.”

Please list three words that describe your worst qualities.

“Overemotional, clingy, worrisome, perfectionist when it comes to academics.”

What is something about your body or physical appearance that you dislike?

“My hair”

What is a criticism you have heard about yourself?

“I care too much about other people more than myself.”

In 1-2 sentences, please describe what you would change about yourself.

“I wouldn’t change anything about myself. Even though I’m not perfect I love being me.”
Appendix H

Sample Participant Questionnaire Response (Neutral-Reflective)

In 2-3 sentences, please describe a class in which you are currently enrolled.

The class is about learning to be an editor for a news organization. We learn all the rules of AP Style + many legal issues that concern journalists. I have that class.

Please list three words that describe that class.

Boring, bullshit, legality

What is something about that class that you like?

I don’t like anything about the class, but the professor is cool.

What is a criticism you have heard about that class?

It’s the most boring class to have ever existed. So boring, that it makes me want to die.

It’s just a joke, do not concern

In 1-2 sentences, please describe what you like/dislike about the professor for that class.

The professor has been running it as a discussion-based course the past few weeks, which is nice, and she’s really chill. I do not like that she made us pay $24 for Newsroom 101 though.