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LOYOLA UNIVERSITY CHICAGO

THE IMPACT OF MOOD ON ADJUSTMENT FROM SELF-GENERATED ANCHORS

A THESIS SUBMITTED TO  
THE FACULTY OF THE GRADUATE SCHOOL  
IN CANDIDACY FOR THE DEGREE OF  
MASTER OF ARTS

PROGRAM IN APPLIED SOCIAL PSYCHOLOGY

BY

CARA RAY

CHICAGO, ILLINOIS

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## ABSTRACT

Although they are typically thought to be separate, emotion and reason are closely linked. Affective feelings are thought to determine which cognitive processing styles are in place at a given time. Happy moods were previously thought to lead to fast, automatic, unconscious, global, and superficial processing styles, whereas sad moods lead to slow, deliberative, conscious, local, and analytic processing styles. More recent research shows that this link is relatively flexible, so that moods may signal the value of currently accessible processing styles, or any accessible thoughts. These findings have important implications for susceptibility to cognitive biases, such as certain types of anchoring effects. In the proposed project, happy and sad moods will be induced using either music or stories. Stop rules will be used to manipulate whether mood signals performance— in this case, adjustment away from self-generated anchoring effects – or task enjoyment. Happy moods should lead to decreased adjustment compared to sad moods in the former case, and increased adjustment in the latter.

## CHAPTER ONE

### INTRODUCTION

Emotion and reason have traditionally been viewed as separate, even competing influences on judgment and decision making. Emotion is thought to contaminate reason, and it is the job of reason to control the unruly influence of emotion. Recent perspectives indicate that this might not be the case, and that emotion and reason are in fact closely connected, with emotion guiding reasoning processes. In particular, emotion may either help or harm reason by influencing the ways in which individuals process information. For instance, positive affective feelings, especially happy moods, are linked to fast, automatic, globally-oriented, and superficial processing styles, often encouraging a reliance on intuition and heuristics. Negative affective feelings, especially sad moods, are linked to slow, deliberative, locally-oriented, and systematic processing styles, often encouraging careful attention to specific details. This interaction between emotion and cognition may have important implications for susceptibility to judgmental biases.

#### **Affective Feelings and Cognitive Mistakes**

Previous research indicates that emotion may recruit different styles of cognitive processing. A great deal of research supports the view that positive affective feelings produce a top-down, global, superficial and heuristic processing style and negative

affective feelings produce a bottom-up, local, systematic and deliberative processing style. Common explanations of this link between feeling and thinking propose that positive and negative emotions provide information about one's current environment. Sad moods signal a problematic environment, leading to more systematic and deliberative processing so as to solve or avoid the problem. Happy moods signal a benign environment in which no increased effort is needed, encouraging superficial and heuristic processing (Forgas, 2013; Schwarz, 2002). Thus, this research suggests a rather fixed effect of affective feelings on processing styles, with happy moods directly producing heuristic processing and sad moods directly producing deliberative processing.

On judgment and decision-making tasks, the tendency to adopt a more bottom-up, detailed style of thinking insulates sad people from many judgmental biases, whereas the tendency to adopt a more top-down, global style of thinking makes happy people commit cognitive mistakes. Happy moods, for example, lead individuals to rely more on scripts and category-based knowledge rather than details compared to sad moods (Bless et. al, 1996). Happy moods also promote the use of stereotypes, whereas sad moods promote the use of information that is specific to the individual (Bodenhausen, Kramer, & Susser, 1994; Isbell, 2004). Happy moods make individuals more likely to rely on heuristics such as ease-of-retrieval, in which the ease of having to recall relatively few examples of a trait gives the impression that people possess that trait (Ruder & Bless, 2003). The tendency of happy moods to encourage more superficial and categorical thinking styles, though often leading to judgmental biases, is also often



useful. For example, happy moods allow the formation of broader categories with more unusual exemplars (Isen & Daubman, 1984), greater levels of abstraction (Beukeboom & Semin, 2005), and more adept creative problem solving in tasks such as the Remote Associate's Test and Duncker's candle problem (Isen et al., 1987). In a persuasion context, people in happy moods are often more persuaded by heuristic cues such as source expertise, whereas sad people are often more persuaded by strong rather than weak arguments, (Bless, Bohner, Schwarz, & Strack, 1990; Mackie & Worth, 1989), indicating heuristic or superficial processing and systematic or deliberative processing, respectively. Although the tendency to think more systematically and deliberatively may insulate sad people from many judgmental biases, one exception can be found in research examining the influence of affective feelings on anchoring effects.

### **Anchoring Effects**

Anchoring effects occur when judgments are influenced by a salient anchor or starting point even when the value of the anchor is arbitrary or meaningless. For example, in a classic demonstration of this effect Tversky and Kahneman (1974) asked their participants two consecutive questions about the percentage of African countries in the United Nations. The first question asked participants to determine whether the percentage of countries was higher or lower than an arbitrary number (e.g., 65% or 10%) that was chosen by spinning a wheel. Participants were then asked to estimate of this percentage. Final estimates were higher when the initial anchor was a higher value and lower when the anchor was smaller value.

Initial accounts of anchoring effects proposed that when subjects consider the anchor, they use this value as a starting point but fail to sufficiently adjust their final answer away from this starting point, producing estimates that are biased towards the anchor (Tversky & Kahneman, 1974). Other accounts suggested that adjustments are typically insufficient because they stop adjusting near the boundary of a range of plausible target values closest to the anchor (Quattrone, Lawrence, Finkel, & Andrus, 1981). However, anchoring effects occur even when the anchor is a plausible value for the target (Northcraft & Neale, 1987), indicating that a failure to adjust past the boundary of a range of plausible values alone is not responsible for anchoring effects. Furthermore (Kahneman & Jacowitz, 1995) found that merely comparing a target to an anchor leads to anchoring effects, and that adjustment is not needed for these effects to occur. More importantly, little evidence has been found for effortful adjustment away from the anchor in the standard anchoring paradigm (for a review, see Chapman & Johnson, 2002). Rather, anchoring appears to result from the fact that individuals tend to test hypotheses by seeking to confirm them (Klayman & Ha, 1987).

Most current explanations of anchoring effects propose that when people entertain an initial starting value, they begin by testing the possibility that this value is correct (Mussweiler, 2003). This biased hypothesis testing calls to mind information consistent with the anchor (e.g., "Africa is huge," "There must be a lot of countries in Africa"), which in turn increases the impact of this initial value on final judgments. The more extensively individuals entertain the idea that an anchor is correct, the more information consistent with the anchor that comes to mind, ultimately biasing final

judgments toward the anchor. Similarly, Chapman and Johnson (1999) suggested that the process of attending to an anchor activates aspects of the target that are compatible with the anchor. Once these concepts are activated, individuals may construct aspects of the target that are compatible with the target, recall them more readily, and weight them more heavily. This processing of target aspects causes target judgments to assimilate towards the anchor. Consistent with these predictions, considering target attributes that were similar to those of the anchor did not influence the magnitude of anchoring effects, suggesting that such processes may normally underlie anchoring effects. On the other hand, considering differences between the anchor and the target attenuated or eliminated anchoring effects. Similarly, priming individuals with a search for differences as opposed to similarities (Mussweiler, 2002), generating information that is incompatible with target (e.g., considering an anchor that is on a different dimension than the target, such as the width of the Brandenburg Gate instead of its height, Strack & Mussweiler, 1997), and generating support for the idea that the anchor is not a good potential target value (Mussweiler, Strack, & Pfeiffer, 2000) weakens anchoring effects. Furthermore, generating information about an anchor for an unlikely target produced contrast effects, thereby reversing anchoring effects rather than merely weakening them (Strack & Mussweiler, 1997).

The studies described above indicate that a spontaneous yet deliberative focus on anchor-consistent target, rather than a lack of deliberative movement away from the anchor information, leads to anchoring effects. However, evidence has been found for adjustment with the case of extreme, highly implausible anchors. While anchoring

effects occur even if the value is implausible (or impossible), the effect of implausible anchors seems to diminish with increasing extremity (Chapman & Johnson, 1994). Mussweiler and Strack (2001b) suggested that one can quickly determine whether or not a numeric anchor is an appropriate potential value for the target, using easily accessible category knowledge about the target (Mussweiler & Strack, 2000a). However, since this knowledge is not sufficient for estimating a target value, individuals might have to adjust to the nearest boundary of a range of plausible values (Mussweiler & Strack, 2000b) and conduct a confirmatory test on the hypothesis that the boundary is a potential value for the target. Consistent with this notion, Mussweiler and Strack (2001a) found greater anchoring effects between plausibly high and low anchors than implausibly high anchors differing (by a greater magnitude than the plausible anchors) in extremity. These findings further support the idea that anchoring effects in absolute estimates are due to increased focus on anchor-consistent knowledge.

The more elaborate, deliberative, and extensive processing of information triggered by negative affect should increase the generation of anchor-consistent information. As a result, sad individuals are more susceptible to anchoring effects (Bodenhausen, Gabriel & Lineberger, 2000). Similarly, Englich and Soder (2009) found that sad moods lead to anchoring effects whereas happy moods greatly reduced anchoring effects in non-experts. Experts, who are less susceptible to the influence of mood, showed strong anchoring effects regardless of whether they were happy or sad. These findings indicate that happy moods may lead to less thorough processing of the anchor compared to sad moods, and thus, weaker anchoring effects.

## **A Flexible Influence of Affective Feelings on Processing Style**

Most affect-cognition theories suggest that particular affective feelings recruit particular styles of processing, with positive feelings triggering heuristic, global, and superficial processing and negative feelings triggering, systematic, local, and deliberative processing. These accounts predict a rather simple relationship between affective feelings and anchoring effects.

Other accounts suggest instead that the link between affect and processing styles might not be fixed. According to the Affect as Cognitive Feedback Account (Huntsinger, Isbell & Clore, 2014), the information conveyed by affective feelings is far more general and less constrained than previously assumed. Thus, rather than only providing information about the environment, this view suggests instead that affective feelings provide embodied feedback about the adequacy of currently accessible mental content, including accessible thoughts and styles of thinking. Happy moods signal that accessible thoughts and styles of thinking are adequate for the task, thereby facilitating their use. Sad moods signal that such thoughts and styles of thinking are inadequate, thereby inhibiting their use. If this is the case, happy moods will encourage the continued use of whichever style of processing is accessible at a given moment, whereas sad moods will encourage use of the other style.

Such a view suggests that the aforementioned influence of affect on anchoring effects will reverse if an analytic, deliberative, and local style of processing made accessible, rather than the usually default heuristic, superficial, and global style of processing. Just such a result was recently obtained. In this research (Huntsinger & Ray,

2014), participants were primed via a word completion task with either deliberative, analytic processing styles or superficial processing styles, and afterwards they read either a happy or sad story. They then completed the anchoring questions taken from Jacowitz and Kahneman (1995). As predicted, there was a significant interaction of mood and processing style, such that happy participants showed greater anchoring effects than sad participants when primed with deliberative, analytic processing styles; whereas sad participants showed greater anchoring effects than happy participants when primed superficial, heuristic processing styles. The results of these studies indicate that the impact of mood on anchoring effects might be more flexible depending on accessible processing styles than earlier accounts might propose.

The discussion of anchoring effects thus far concerned situations in which anchors are provided by some source outside of participants, in most cases the experimenter. In cases of experimenter provided anchors, research indicates that deliberative, systematic processing makes anchoring effects more pronounced whereas superficial, heuristic processing makes them less pronounced (Bodenhausen et al., 2000; Englich & Soder, 2009). This relationship between affect and anchoring effects was recently found to be flexibly responsive to the relative accessibility of heuristic versus deliberative styles of processing, as predicted by the Affect as Cognitive Feedback Account (Huntsinger et al., 2014). There are circumstances in which anchors are generated by the self, however. In such cases the role of processing style in enhancing or attenuating anchoring effects is the opposite of that for experimenter provided anchors.

## **Self-Generated Anchors**

Self-generated anchors are those which the subject knows are close to the target value, and which typically come to mind quickly. Epley and Gilovich (2001) demonstrated that when anchors are self-generated, they operate as mental shortcuts, or heuristics. This stands in contrast to experimental anchors, which operate as the objects of a confirmatory hypothesis test. After the anchor comes to mind, subjects then may engage in deliberative adjustment away from the anchor. In such cases, factors that increase the use of detailed, systematic and deliberative processing styles should reduce anchoring effects and factors that decrease the use such processing styles should enhance anchoring effects. For instance, when asked in what year George Washington was elected president, most individuals know that it is not long after 1776, when America declared its independence from Britain. Most participants do not estimate that George Washington was elected as late as 1789. In this experiment, those who nodded their heads were apparently more accepting of the self-generated anchors and provided estimates that were closer to the anchor than those who shook their heads. In the latter case, head-shaking lead to denial of the self-generated anchor and lead to more deliberative and extensive adjustment away from the anchor. Thus, a lack of cognitive effort thus led to insufficient adjustment.

In other research, Epley and Gilovich (2006) manipulated various factors that reduce the capacity for deliberative, systematic, and local processing to determine if they could influence adjustment. They found that participants who had low motivation to engage in detailed thinking, who were placed under cognitive load, or who had

recently consumed alcohol adjusted less from self-generated anchors than those who had high motivation, had not consumed alcohol, or were not placed under cognitive load. Furthermore, Epley and Gilovich (2005) showed that forewarnings and incentives lead to increased adjustment away from self-generated anchors, but not from experimenter-provided anchors. This indicates that careful, deliberative thinking leads to increased adjustment away from self-generated anchors. These findings indicate that processing styles may have different impacts on anchoring effects depending on the type of anchor.

### **The Proposed Research**

Past research revealed flexibility in the influence of affective feelings on experimenter provided anchors as a consequence of the accessibility of tendencies to engage in different styles of processing. The purpose of the experiment proposed here was twofold. First, no research to date has examined the influence of affective feelings on self-generated anchoring. Thus one purpose was to demonstrate that such an influence exists. Because self-generated anchors serve as heuristics, the traditional influence of affective feelings on judgmental biases should be observed, such that positive affect should enhance and negative affect should decrease anchoring effects. This result would be consistent with prior research demonstrating an influence of implicit affective cues, such as head nodding versus head shaking (Epley & Gilovich, 2001) and arm flexion versus arm extension (Epley & Gilovich, 2004), on self-generated anchoring.



A second purpose was to examine flexibility in the influence of affective feelings on self-generated anchors. If affective feelings directly recruit different styles of processing, and if systematic processing increases adjustment from self-generated anchors, then one would only predict a main effect of affective feelings on anchoring effects. Specifically, happy moods will lead to greater acceptance of the anchor and produce estimates that are closer to the anchor than sad moods, which will lead to rejection of the anchor and produce estimates that are further away. On the other hand, if the influence of mood on processing styles depends on people's interpretation of their moods (Martin et al., 1993), or if mood confers value on currently accessible processing orientations (Huntsinger, Isbell, & Clore, 2014), then the influence of mood on self-generated anchoring effects should be flexibly responsive to changing cognitive contexts.

This possibility was examined by adopting the stop rule paradigm developed by Martin and colleagues (Martin et al., 1993). In one study, for example, individuals in happy and sad moods were given a stack of cards containing information about a target and were instructed to form an impression of him. Half of the participants were told to read the information until they felt that they had enough for forming their impression, whereas the other half were told to continue reading until they no longer enjoyed it. Consistent with the idea that happiness serves as a "go" signal and sadness as a "stop" signal, happy participants in the "enough information" condition stopped reading behaviors sooner than did sad participants. Importantly, these effects reversed in the "enjoy" condition. That is, individuals in happy moods relied on their affective cues to

indicate that they were still enjoying the task, and thus the implication was that they should continue it. In contrast, those in sad moods interpreted their affect as an indication that they no longer enjoyed the task, and consequently they stopped sooner. These results were among the first to reveal that the information conveyed by mood varies with what is accessible in different contexts (in this case different goal contexts).

Based on this research, I predicted that the impact of mood on adjustment from self-generated anchors should depend on whether or not mood is interpreted to indicate enjoyment of a task or progress towards a goal. I hypothesized that when following an enjoyment stop rule, happy participants will adjust farther from self-generated anchors than sad participants. However, when following a performance stop rule, sad participants will adjust farther from self-generated anchors than happy participants. This latter pattern should also hold true when participants are not instructed to follow any particular stop rule, since Martin et al. (1993) reasoned that people may typically adopt a performance-based stop rule when completing a task by default. Furthermore, Martin et al (1993, Experiment 2) found an effect of Need for Cognition, an individual difference variable reflecting how much an individual enjoys engaging in effortful thought (Cacioppo, Petty, and Kao). Specifically, they found that the stop rule by mood interaction only held true for those high in Need for Cognition. Thus, Need for Cognition was examined for exploratory purposes, since it might influence the effect of mood on amount of processing.

## CHAPTER TWO

### METHODS

#### **Participants**

Participants consisted of 177 undergraduate students at Loyola University Chicago who completed the experiment in exchange for course credit. The study design is a 2 (mood: happy, sad) x 3 (stop rule: enjoyment, performance, none) between-participants factorial. There were approximately 30 participants per cell.

#### **Materials and Procedure**

Participants were told that the purpose of the study was to examine thinking and reasoning processes. Participants were told that while participating in the main experiment, they would listen to music as part of a pilot test for a future study. They then completed the mood manipulation by describing a life event (see Appendix A) and listening to music that has been shown to successfully induce happy and sad moods in prior research. In the positive mood condition, participants wrote about a happy event while listening to Mozart's "Eine kleine Nachtmusik" via headphones. In the negative mood condition, participants wrote about a sad event while listening to Mahler's "Adagietto." Subjects will then move on to the anchoring task. Participants were instructed to provide a series of numeric estimates following one of three stop rules adapted from Martin and colleagues (1993) and Hirt and colleagues (1997) to fit the

task. In the performance stop rule condition, participants were told to provide an answer and move on to the next question when they felt that they had reached a sufficient estimate. In the enjoyment condition, participants were told to provide an answer when they no longer enjoyed thinking about the question. Those in the no stop rule condition were instructed to provide an estimate and move on to the next question (Appendix B). Participants then completed eight anchoring questions (e.g., “When was Washington elected president?”) from Epley and Gilovich (2001; 2006, see Appendix C). They completed a mood manipulation check (Appendix D) and were asked to indicate whether they knew the anchor for each item, and if it came to mind during the anchoring task (Appendix E). They also completed a series of questions adapted from Hurt et al. 1997 to assess subjective performance on the task: “How much effort did you put into the task?” (1=very little to 7=very much), “How well do you think you performed at this task?” (1=very poorly to 7=very well), “How satisfied are you with your level of performance on this task?” (1=very unsatisfied to 7=very satisfied), and “Overall, how accurate do you think your set of responses to this task were?” (1=not at all accurate to 7=very accurate). Finally, they completed the short-form Need for Cognition Scale (Cacioppo, Petty, & Kao, 1984, Appendix F).

### **Analyses**

The happy and sad (reverse-scored) mood manipulation items formed a subscale with sufficient reliability,  $\alpha = .89$ . Thus, these items were averaged together to create a single measure of happy (versus sad) mood. The results of the mood manipulation were analyzed using a 2(mood: positive vs. negative) by 3(stop rule: performance, enjoyment,

none) analysis of variance (ANOVA). It was expected that participants would report more positive feelings after writing about a happy life event and listening to happy music than after writing about a sad life event and listening to sad music. It was also expected that there would be no effect of stop rule. Furthermore, the items pertaining to arousal (e.g. tired, reverse-scored) also formed a reliable scale,  $\alpha = .83$ , so these items were also combined to form a single measure of arousal. These items were also submitted to the Mood X Stop Rule ANOVA to ensure that there were no unwanted influences on arousal.

Consistent with prior research (e.g., Epley & Gilovich, 2006), anchoring effects were measured by calculating a standardized anchor-estimate gap. The absolute difference between the estimates provided and the self-generated anchor was standardized across participants for each item (such that positive numbers indicated further adjustment from the anchors) and then averaged for each participant across items. Also consistent with prior research (Epley & Gilovich, 2006), participants were excluded on an item-by-item basis if they did not know the anchor for each question, indicate that the anchor came to mind, or provide an answer for the question. Participants were also excluded if they failed to provide a single definite answer (e.g. “1800s” or “more than 20”). The results were analyzed using a 2 (mood: happy, sad) by 3 (stop rule: enjoyment, performance, none) analysis of variance (ANOVA).

## CHAPTER THREE

### RESULTS

#### **Manipulation Check Results**

Submitting the mood manipulation check to the Mood by Stop Rule ANOVA revealed the predicted main effect of mood,  $F(1, 177) = 466.38, p < .001$ . Specifically, participants reported feeling happier in the positive mood condition ( $M = 5.37, SD = 0.87$ ) than they did in the negative mood condition ( $M = 2.19, SD = 1.87$ ). There was no significant main effect of stop rule,  $F(2,177) = 0.113, p = .893$ , or interaction effect between mood and stop rule,  $F(2,177) = .243, p = .784$ . An ANOVA revealed that there was also a significant effect of the mood manipulation on arousal,  $F(1,177) = 146.965, p < .001$ , such that participants reported that they felt more aroused in the positive mood condition than in the negative mood condition. They felt more aroused in the positive mood condition ( $M = 4.93, SD = 0.88$ ) than they did in the negative mood condition ( $M = 3.28, SD = 0.94$ ). There was no significant main effect of stop rule,  $F(2,177) = 1.16, p = .316$ , or interaction effects between mood and stop rule,  $F(2,177) = 1.097, p = .336$ .

#### **Anchoring Results**

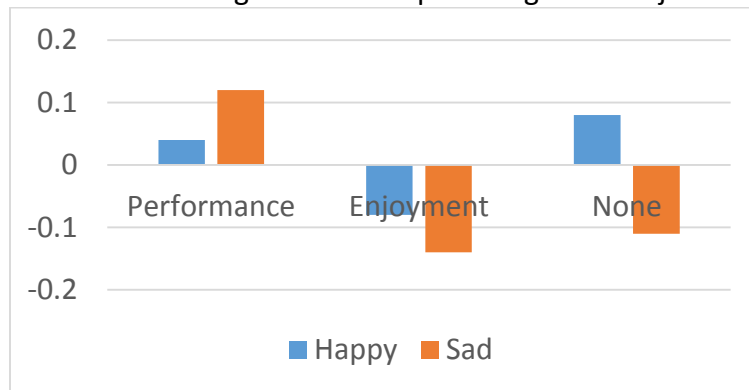
The ANOVA revealed an insignificant interaction effect between mood and stop rule on adjustment from the anchor,  $F(2, 171) = 0.80, p = .453$ . There were also no significant main effects of mood,  $F(1, 171) = .452, p = .503$ , or stop rule,  $F(2, 171) =$

1.531,  $p = .219$ . However, the analysis largely revealed the predicted pattern of means.

Specifically, when following a performance stop rule, sad participants ( $M = 0.12$ ,  $SD = 0.69$ ) adjusted farther away from the self-generated anchor than happy participants ( $M = 0.04$ ,  $SD = 0.61$ ). However, when following an enjoyment stop rule, happy participants ( $M = -0.08$ ,  $SD = 0.28$ ) adjusted further away from the self-generated anchor than sad participants ( $M = -0.14$ ,  $SD = 0.56$ ). In contrast to the predictions, however, happy participants ( $M = 0.08$ ,  $SD = 0.61$ ) adjusted further from the anchors than sad participants ( $M = -0.11$ ,  $SD = 0.59$ , see Figure 1) when they were not instructed to follow a particular stop rule.

Figure 1. Anchoring Results.

Values represent standardized anchor-estimate gaps as a function of mood and stop rule condition. Higher values represent greater adjustment away from the anchors.



### Exploratory Analyses

Regression analyses were conducted to examine if Need for Cognition moderated the interaction effect between mood and stop rule on adjustment from the anchors. Dummy variables were created for mood and stop rule. No significant two-way or three-way interaction effects were found, all  $t$ 's  $< -1.58$ ,  $p$ 's  $> .116$ . Furthermore, I

also examined if mood and stop rule condition had any effects on responses to the measures of subjective task performance. Eight participants who had previously been excluded from analysis of adjustment from anchors were included in this analysis because they were not missing data on these measures. There were no significant effects on reported effort,  $F's < 1.79$ ,  $p's > .171$ ; how well participants believed they performed,  $F's < 1.80$ ,  $p's > .168$ ; satisfaction with performance,  $F's < 0.99$ ,  $p's > .373$ , or perceived accuracy,  $F's < 1.22$ ,  $p's > .298$ .

Latency data were also submitted to a Mood X Stop Rule ANOVA. There was a significant effect of stop rule,  $F(2,179) = 6.066$ ,  $p < .003$ . There was no significant main effect of mood,  $F(1,179) = 1.11$ ,  $p = .293$ , or interaction effect between mood and stop-rule,  $F(2,179) = .396$ ,  $p = .674$ . Post-hoc comparisons using the Bonferroni test revealed that participants spent the longest amount of time (in seconds) on anchoring items in the performance stop rule condition ( $M = 18.30$ ,  $SD = 7.64$ ) than in the no stop rule condition ( $M = 14.10$ ,  $SD = 5.30$ ),  $p < .003$ . There was also a marginally significant mean difference between the enjoyment stop rule condition and no stop rule condition, such that participants spent longer in the enjoyment stop rule condition ( $M = 16.98$ ,  $SD = 7.41$ ) than in the no stop rule condition ( $M = 14.10$ ,  $SD = 5.30$ ),  $p = .062$ .



## CHAPTER FOUR

### DISCUSSION

In conclusion, I attempted to examine if the influence of mood on motivation and effort depended on how individuals interpreted their mood (i.e., consistent with Martin et al.'s account; 1993) or what thoughts were currently accessible (consistent with the Affect as Cognitive Feedback Account; Huntsinger, Isbell & Clore, 2014). It was proposed that positive moods would confer positive value on accessible thoughts, whereas negative moods would confer negative value. In particular, if participants were judging whether their current performance or goal progress was sufficient, positive moods would signal that the performance was sufficient, causing participants to stop working on the task. Negative moods would signal that performance was insufficient, leading to sustained effortful processing. Conversely, if participants were judging whether the current task was enjoyable, positive moods would signal that it was enjoyable, leading to continued work on the task. Negative moods would signal that the task was not enjoyable, causing participants to stop working on the task.

Our study did not find the hypothesized interaction effect of mood and stop rule condition. Participants adjusted to a similar degree regardless of mood, and regardless of whether they were instructed to stop when they no longer enjoyed the task, when they felt they had performed sufficiently, or had been given no particular stop rule

instructions at all. These results are largely inconsistent with past findings regarding the influence of mood on motivation and effort, in which the amount of effort spent on a task depended on the information conveyed by one's mood. While the pattern of means was consistent with such findings, it provides only weak support for the idea that the interpretation of one's mood may regulate motivation and effort in adjustment from self-generated anchors.

One potential reason that the hypothesized results may not have emerged is that participants were rather unwilling to provide estimates of the target values we asked them about. Even though the instructions emphasized that participants should put down an answer, even if it was only a guess, many participants did not answer a number of the questions. This appeared to be the case even if participants knew the correct anchor for the question, and if the anchor came to mind. For example, even if participants thought of the year 1776 when considering when Washington was elected, they preferred to not offer any answer at all rather than merely providing "1776" as their final estimate. Another potential reason that the predicted findings did not emerge is that many participants could not, in fact, report the correct anchor. Future research might collect demographic information on country of origin, since some of the items used pertained specifically to U.S. history.

Yet another potential reason that the hypothesized results failed to emerge is that it might be somewhat difficult to focus on or monitor the amount of time or effort spent in thinking about a task such as the self-generated anchoring task. The tasks employed by Martin and colleagues (1993) and Hirt and colleagues (1997) involved

flipping over cards with information and generating category examples. It is relatively easy to examine how many responses one has written down or how many cards one has turned over, even if judgments about how many of these responses constitutes “a lot” or “enough.” Conversely, it might be more difficult to monitor or examine how much thought or effort one has put into mentally adjusting an estimate away from an anchor. That is, this information might be less available in working memory than items such as cards or written responses in front of the participant that can be easily counted up. If such thoughts about effort are not highly available, they might subsequently be less accessible. Thus, it might be more difficult for mood to confer value on these thoughts and subsequently regulate motivation and performance.

On the other hand, the effect of stop rule on latency data may suggest that the instructions played a larger part in determining how much effort is sufficient to a task than mood did. Perhaps the performance stop rule, in particular, conveyed rather unambiguously that participants should try harder at this task than they might normally be inclined to. In such cases, participants may not rely on their moods when judging whether or not the amount of time and effort they have spent is sufficient. This is consistent with Forgas’ (1995) discussion of the Affect-As-Information account (Schwarz & Clore, 1988), in which he suggests that mood may not inform judgment if one is already able to easily bring a judgment to mind. This could be the case even if the mood manipulation was highly successful, as it appeared to be in this study. A similar interpretation as to why mood did not influence perceived enjoyment is that participants unambiguously disliked the task. However, this could be inconsistent with

the finding that participants spent more time on the task than those in performance stop rule condition – even if they did not provide many answers. Future research might more closely examine if more time spent on a task reflects more motivation, as opposed to, for example, confusion and hesitation.

APPENDIX A  
MOOD INDUCTION

**Instructions:**

We are attempting to pilot test musical selections for a future study. Please put your headphones on, and press Ctrl+alt+insert to begin playing the music. You will listen to the music throughout the subsequent tasks.

**Positive mood:**

We are trying to create a Life Events Inventory. To accomplish this, we would like you to describe as vividly and in as much detail as possible a recent event that made you feel REALLY HAPPY.

Your response will be used to generate the items for the life event inventory. When recalling the recent event, please pay attention to the emotional aspects of the event, how the event made you feel, what aspects of the event made you feel that way, and so forth.

This should take about 8-10 minutes to complete. Note: on the next page, press enter only when finished writing.

**Negative mood:**

We are trying to create a Life Events Inventory. To accomplish this, we would like you to describe as vividly and in as much detail as possible a recent event that made you feel REALLY SAD.

Your response will be used to generate the items for the life event inventory. When recalling the recent event, please pay attention to the emotional aspects of the event,

how the event made you feel, what aspects of the event made you feel that way, and so forth.

This should take about 8-10 minutes to complete. Note: on the next page, press enter only when finished writing.

## APPENDIX B

### ANCHORING INSTRUCTIONS AND STOP RULE MANIPULATIONS



**Performance stop rule (adapted from Martin et. al, 1993):**

On the following page, you will be asked to provide a series of numerical estimates. As you go through each question, each time you think of a possible answer, ask yourself: 'Have I reached a sufficient estimate?' If the answer is 'no,' continue to think about the question. If the answer is 'yes,' then stop, indicate the estimate in the space provided, and move on to the next question. There is no right or wrong time to stop. Stop thinking about the question when you feel you have reached a sufficient estimate, and move on to the next question.

**Enjoyment stop rule:**

On the following page, you will be asked to provide a series of numerical estimates. As you go through each question, you may ask yourself how you should decide when to stop and go on to the next question. We would like you to provide an answer when you know longer enjoy thinking about the question. In other words, as you are thinking about each question, keep asking yourself "Do I feel like I continuing to think about this question?" As long as the answer is "yes," then continue. When the answer becomes 'no,' then stop, indicate the estimate in the space provided, and move on to the next question. There is no right or wrong time to stop. Think about each question until you no longer enjoy it. We are interested in people's enjoyment of different tasks.

**No stop rule:**

On the following page, you will be asked to provide a series of numerical estimates.

APPENDIX C

ANCHORING QUESTIONS

The year that the second European explorer, after Columbus, landed in the West Indies (1492)

The boiling point (in \_F) of water on Mt. Everest (212)

The number of U.S. states in 1840 (50)

The number of days it takes Mars to orbit the Sun (365)

The year that the last of Jesus' apostles died (0)

The freezing point (in \_F) of vodka (32)

The year that George Washington was first elected President (1776)

What is the gestation period of an African elephant? (months; 9)

Taken from Epley and Gilovich, (2006).

## APPENDIX D

### MOOD MANIPULATION CHECK

For the following series of questions, indicate the degree to which the writing task (i.e., the Life Events Inventory) evoked certain feelings (1 = not at all, 7 = very much).

How angry did you feel during the writing task (i.e., the Life Events Inventory)?

How sad did you feel during the writing task (i.e., the Life Events Inventory)?

How happy did you feel during the writing task (i.e., the Life Events Inventory)?

How alert did you feel during the writing task (i.e., the Life Events Inventory)?

How tired did you feel during the writing task (i.e., the Life Events Inventory)?

How happy did you feel during the writing task (i.e., the Life Events Inventory)?

How angry did the writing task make you feel?

How happy did the writing task make you feel?

How sad did the writing task make you feel?

How alert did the writing task make you feel?

How tired did the writing task make you feel?

In the events that you described, to what extent did you typically feel that someone other than yourself had the ability to influence what was happening?

In the events that you described, to what extent did you typically feel that someone else was to blame for what was happening in the situation?

In the events that you described, to what extent were the events beyond anyone's control?

How uncertain were you about what would happen next?

How well did you understand what was happening in the situation?

To what extent did you feel certain that your perspective on the situation was correct?

How well could you predict what was going to happen next?

How angry did you feel while listening to the music?

How sad did you feel while listening to the music?

How happy did you feel while listening to the music?

How alert did you feel while listening to the music?

How tired did you feel while listening to the music?

How happy did you feel while listening to the music?

How angry did the music make you feel?

How happy did the music make you feel?

How sad did the music make you feel?

How alert did the music make you feel?

How tired did the music make you feel?

## APPENDIX E

### ANCHOR CHECK

Please answer the following questions.

What is the year that Columbus landed in the West Indies?

What is the boiling point (in \_F) of water?

What is the number of U.S. states?

How many days it takes Earth to orbit the Sun?

What year was Jesus born?

What is the freezing point (in \_F) of water?

What year did America declare independence from Britain?

What is the gestation period of a human (the duration of pregnancy, in months)?

Please indicate whether the following numbers came to mind during the general knowledge task.

Did the year that Columbus landed in the West Indies (1492) come to mind during the first part of the experiment?

Did the boiling point of water (212 \_F) come to mind during the first part of the experiment?

Did the number of U.S. States (50) come to mind during the first part of the experiment?

Did the number of days it takes Earth to orbit the Sun (365) come to mind during the first part of the experiment?

Did the year that Jesus was born (0) come to mind during the first part of the experiment?



Did the freezing point of water (32 \_F) come to mind during the first part of the experiment?

Did the year that America declared independence from Britain (1776) come to mind during the first part of the experiment?

Did the gestation period of a human (9 months) come to mind during the first part of the experiment?

## APPENDIX F

### 18-ITEM NEED FOR COGNITION SCALE

1. I would prefer complex to simple problems.
2. I like to have the responsibility of handling a situation that requires a lot of thinking.
3. Thinking is not my idea of fun.\*
4. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.\*
5. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.\*
6. I find satisfaction in deliberating hard and for long hours.
7. I only think as hard as I have to.\*
8. I prefer to think about small, daily projects to long-term ones.\*
9. I like tasks that require little thought once I've learned them.\*
10. The idea of relying on thought to make my way to the top appeals to me.
11. I really enjoy a task that involves coming up with new solutions to problems.
12. Learning new ways to think doesn't excite me very much.\*
13. I prefer my life to be filled with puzzles that I must solve.
14. The notion of thinking abstractly is appealing to me.
15. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.
16. I feel relief rather than satisfaction after completing a task that required a lot of mental effort.\*

17. It's enough for me that something gets the job done; I don't care how or why it works.\*

18. I usually end up deliberating about issues even when they do not affect me personally.

\*Reverse scoring is used on this item.

Taken from Cacioppo, Petty, and Kao (1984).

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## VITA

Cara Ray attended Loyola University Chicago, where she received her B.S. in psychology. During her undergraduate career, she helped to collect and code data as a research assistant in the Emotion and Social Cognition Lab (directed by Dr. Jeffrey Huntsinger) and the Social Justice and Intergroup Relations Lab (directed by Dr. Robyn Mallett). While working in the lab, she received the Provost Fellowship for Undergraduate Research. As a Provost Fellow, she conducted an experiment examining the relationship between mood and susceptibility to cognitive biases, including the conjunction fallacy and standard anchoring effects. Ray attended Loyola University Chicago for Graduate School, where she worked as a Graduate Assistant in the Applied Social Psychology Program and continued to assist with data collection in the Emotion and Cognition lab. The current work extends her previous research on how mood influences susceptibility to cognitive biases.