The De-biasing Effect of Incidental Anger on Other-provided Anchors

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ABSTRACT

The current research investigates the effect of incidental anger on anchoring bias. We hypothesized that feeling angry will make people less influenced by other-provided anchors because of the moving against action tendency associated with anger. That is, individuals in an angry state will be likely to perceive a given anchor as a viable target for their desire to attack and actively seek out anchor-inconsistent information, thereby committing less anchoring bias. To examine our hypothesis, in Study 1, we manipulated emotions using film clips and administered a general knowledge task with other-provided anchors. As predicted, participants in the anger condition showed less anchoring bias to the other-provided anchors than those in the sad or neutral condition. Study 2 replicated the finding with a different emotion manipulation technique and different anchoring questions. More importantly, consistent with the moving against action tendency explanation, we also found that people in an angry state committed more anchoring bias for self-generated anchors, compared with people in a sad or neutral state. Copyright © 2011 John Wiley & Sons, Ltd.

KEY WORDS discrete emotions; anger; anchoring bias; anchor source; action tendency

People tend to search for a reference point when information is insufficient or ambiguous. For example, when buying a house, people usually check the prices of other houses in the same neighborhood to get a sense of whether the list price is appropriate (Northcraft & Neale, 1987). This strategy seems reasonable as long as the reference point offers valuable, relevant information. Yet, even random, irrelevant numbers can influence judgments (Tversky & Kahneman, 1974). This phenomenon — “anchoring heuristic” — has been defined as “the assimilation of a numeric estimate to a previously considered standard” (Mussweiler, Strack, & Pfeffer, 2000).

Anchoring is a robust phenomenon. It has been reported in numerous contexts including general knowledge questions (Strack & Mussweiler, 1997; Tversky & Kahneman, 1974), evaluation of gambles (Chapman & Johnson, 1999), probability estimates (Plous, 1989; Wright & Anderson, 1989), trait inference (Gilbert, 1989; Kruger, 1999), and egocentric biases (Gilovich, Medvec, & Savitsky, 2000). Also, the effects remain strong when the anchor value is extreme (Strack & Mussweiler, 1997), or even when people know the anchor value was randomly selected by either a wheel of fortune (Tversky & Kahneman, 1974) or generated from their social security number (Wilson, Houston, Etling, & Brekke, 1996), both of which are irrelevant to the estimate. More surprising, anchoring effects do not disappear when participants are motivated to improve their accuracy (Wilson et al., 1996) or when they have expertise in the field (Wright & Anderson, 1989).

To date, only a few studies have discovered factors that can alleviate anchoring effects, and those that have done so are primarily based on cognitive strategies such as reducing overconfidence in one’s belief by intentionally considering belief-inconsistent evidence (Griffin, Dunning, & Ross, 1990; Koriat, Lichtenstein, & Fischoff, 1980; Lord, Lepper, & Preston, 1984). Some prior research has investigated whether anchoring can be affected by incidental emotions (Bodenhausen, 1993) — emotions that are caused by a prior event and are unrelated to the current situation. These findings show that incidental sadness is associated with more anchoring (Bodenhausen, Gabriel, & Lineberger, 2000; Englich & Soder, 2009). However, prior research has not examined whether anger, a commonly experienced emotion (Averill, 1982), might also affect anchoring.

Anger is an interesting emotion to investigate in that it is also negative in valence but sharply contrasts with sadness in its characteristics. Anger is defined as a negative affective state “arising from the blocking of movement toward a desired goal” (Carver & Harmon-Jones, 2009). Specifically, anger is often directed at another person who engages in intentional acts to disturb one’s efforts to achieve a goal and is thus perceived to be blameworthy for negative consequences (Frijda, 1988; Ortony, Clore, & Collins, 1988). Anger is associated with a behavioral readiness — or action tendency — to approach and act against (Carver & Harmon-Jones, 2009; Frijda, Kuipers, & ter Schure, 1989), compared with sadness that is characterized by avoidance and inaction. We expect that anger will have the opposite effect on anchoring bias to sadness because of this moving against action tendency.

Selective accessibility model and the consider-the-opposite strategy

In a traditional, two-step anchoring task (Tversky & Kahneman, 1974), people are first asked to judge whether their own estimate is greater or less than an anchor value (e.g., Is the Mississippi River longer or shorter than 2000 miles?) and then to give their final estimate (e.g., What is the length of the Mississippi River?). According to the selective accessibility model (Mussweiler & Strack, 1999), anchoring is driven by selective increases in the accessibility of anchor-consistent knowledge about the target. More specifically, when people are asked to compare a target object with a
given anchor, they engage in a hypothesis-testing procedure where they try to selectively retrieve from their memory knowledge supporting the hypothesis that their estimate equals the anchor (selectivity). Later when they are asked to give a final estimate, the hypothesis-consistent knowledge retrieved earlier is easily activated, therefore influencing the final judgment (accessibility).

If anchoring is caused by retrieving anchor-consistent evidence from memory, encouraging people to search for anchor-inconsistent evidence should make them less influenced by the given anchors (Mussweiler et al., 2000). This strategy to “consider-the-opposite” asks participants to think about reasons why anchor values might be inappropriate or to list three arguments against the anchor, and these manipulations significantly weakened the anchoring bias. We believe anger will serve as a catalyst triggering people to argue against the anchor via its inherent moving against action tendency.

**Anger and anchoring bias**

From an evolutionary and functionalistic perspective, discrete emotions are characterized by unique action tendencies (Frijda, 1988; Frijda et al., 1989). The action tendencies are believed to have developed as strategies for dealing with threats in human life and have become internalized as automatic responses. They can be broadly categorized into an approach tendency (i.e., seek out interaction with a target) and an avoidance tendency (i.e., withdraw from a target) (Carver & White, 1994). Anger belongs to the former category (Carver & Harmon-Jones, 2009), and the approach tendency of anger entails hostile goals. That is, anger is associated with a tendency to go against or oppose a target (Frijda, 1988), compared with other negative emotions’ action tendencies such as moving away (fear) or doing nothing but crying (sadness). The action tendencies triggered by certain emotions can linger, thereby leading individuals to respond to a subsequent situation in a manner consistent with the activated action tendencies (Young, Tiedens, Jung, & Tsai, 2011).

The moving against action tendency of anger has been found to lead to an active search for a target against which aggression can be directed. Prior research has shown that angry individuals tend to pay more attention to hostile stimuli than neutral stimuli (Cohen, Eckhardt, & Schagat, 1998; Smith & Waterman, 2003). Young et al. (2011) demonstrated that when angry, individuals tend to seek out attitude-inconsistent information out of their desire to argue against it. Our question is whether an anchor can serve as a viable target. According to the selective accessibility model, individuals test the validity of an anchor value provided by someone else. It is possible that angry individuals will perceive the anchor as a target for their desire to attack and actively seek out information refuting the validity of the given anchor, consequently committing less anchoring bias.

In this paper, we will test whether anger can reduce anchoring bias than sad and neutral emotional states. Sadness will serve as a good comparison state because it differs from anger in its action tendency, and its effect on anchoring has been already examined. We hypothesize that when an anchor value is provided by someone else, people in an angry state will be less susceptible to anchoring than people feeling sad or neutral.

**STUDY 1**

In Study 1, we tested our hypothesis that anger will lead to less anchoring bias than sad or neutral feelings when the anchor is provided by an external source. Participants watched one of three video clips selected to induce anger, sadness, or neutral feelings, respectively. They were then given the traditional two-step anchoring questions involving other-provided anchors: (i) they were asked to compare their own estimate with an anchor value provided by the experimenter, and (ii) they gave their final absolute estimate.

**Method**

**Participants**

Participants were recruited from a participant pool maintained at a west-coast public university. A total of 65 individuals participated in this study in exchange for $4. Ages ranged from 18 to 55 years (mean = 21.91, SD = 7.03). Forty-eight participants (73.8%) were women, 37 were Asian American (56.9%), and 15 were white (23.1%).

**Procedure**

The study was conducted in a computer laboratory. On arrival, the participants were led to a desk with a computer connected to the study website. They were instructed that they would participate in two unrelated experiments — a memory study (designed to induce emotions) and a general knowledge study (to measure anchoring bias). The emotion manipulation included three video clips that have been validated as inducing anger, sadness, and neutral feelings by prior research (Gross & Leventon, 1995; Lerner, Small, & Loewenstein, 2004): My Bodyguard (anger), The Champ (sadness), and a National Geographic Special on the Great Barrier Reef (neutral).

Participants were randomly assigned to view one of the three clips, and after the clip ended, they were told that they would be asked to answer a few questions about it after completing the second task.

The second task was framed as a test of general knowledge in various domains. Participants were asked to answer four questions in total (see Appendix). Each question required two steps: (i) make a binary comparison between their own estimate and a given anchor value (e.g., “Is the year the telephone was invented earlier or later than 1850?”) and (ii) give an absolute final estimate (e.g., “What is the year the telephone was invented?”). Half of the questions were presented with a high anchor (the 85th percentile of the distribution of estimates in the calibration group recruited by Jacowitz and Kahneman (1995), whereas the other half were presented with a low anchor (the 15th percentile). The order of high and low anchors was counterbalanced across participants.

When the participants completed all four questions, they were asked to answer a few questions about the content of the video clip they had watched earlier and to fill out a short
questionnaire including emotion manipulation check items (e.g., to what extent did you feel angry/sad/neutral after watching the video clip?, where 1 = not at all, 7 = very much) and demographic information questions (e.g., gender, age, and ethnicity).

Results

Manipulation checks

A one-way analysis of variance (ANOVA) on each emotion manipulation check item revealed significant differences by emotion conditions in self-reported anger ($F(2, 62) = 23.91, p < .001, \eta_p^2 = .44$), sadness ($F(2, 62) = 17.30, p < .001, \eta_p^2 = .36$), and neutral feelings ($F(2, 62) = 11.51, p < .001, \eta_p^2 = .27$). Participants in the Anger Condition ($M = 4.82, SD = 1.65$) felt significantly more angry than participants in the Sadness ($M = 2.11, SD = 1.88$) and Neutral ($M = 1.76, SD = 1.36$) Conditions ($F(1, 63) = 47.70, p < .001, \eta_p^2 = .43$). Those in the Sadness Condition ($M = 5.50, SD = 1.51$) reported significantly more sadness than those in the Angry ($M = 4.68, SD = 1.89$) and Neutral ($M = 2.68, SD = 1.49$) Conditions ($F(1, 63) = 13.61, p < .001, \eta_p^2 = .18$). And those in the Neutral Condition ($M = 5.12, SD = 1.99$) reported feeling more neutral than those in the Angry ($M = 2.64, SD = 1.87$) and Sadness ($M = 3.11, SD = 1.75$) Conditions ($F(1, 63) = 22.52, p < .001, \eta_p^2 = .26$).

Anchoring effects

Anchoring bias is observed when participants report a higher estimate when a high anchor is provided and a lower estimate when a low anchor is provided. That is, the greater the difference between responses to high anchors and responses to low anchors, the more the anchoring bias. Because each question had a different measurement unit, we first standardized participants’ final estimate values for each question. Then, we averaged the standard scores of the two high-anchor items and the two low-anchor items, respectively, to compute two separate scores, a high anchor $z$-score and a low anchor $z$-score (Bodenhausen et al., 2000). Then, we conducted a 3 Emotion (angry, sad, neutral) x 2 Anchor (high, low) mixed model ANOVA analysis, where Anchor was a counterbalanced within-subject factor. The results showed a significant main effect of anchor ($F(1, 62) = 85.76, p < .001, \eta_p^2 = .58$). That is, high anchors led to higher estimates than low anchors ($M_s = .51$ vs $-.50$), which indicates strong anchoring bias. As expected, the interaction between emotion and anchor was significant ($F(2, 62) = 4.20, p < .05, \eta_p^2 = .12$). Specifically, anchoring bias was significantly weaker in the Anger Condition than in the Sadness or Neutral Conditions, as evidenced by the smaller gap between responses to high versus low anchors (see Figure 1).

Analysis of simple effects revealed that significant differences among emotion conditions were observed when the anchors were high ($F(2, 62) = 5.72, p < .01, \eta_p^2 = .16$). Participants in the Anger Condition reported significantly lower estimates ($M = .19, SD = .42$) than those in the Sadness Condition ($M = .78, SD = .71$, $t(62) = 3.33, p < .001, d = 1.01$) or in the Neutral Condition ($M = .54, SD = .53$, $t(62) = 2.14, p < .05, d = .73$). The comparison between the Sadness Condition and the Neutral Condition was not significant ($t(62) = 1.40, p = .17, d = .38$). For low-anchor scores, there were no significant differences across three emotion conditions, despite the observed trend that anger led to less anchoring (higher estimates for low anchors) than sad or neutral feelings. The case of asymmetric anchoring effects has been reported in prior research (Bodenhausen et al., 2000; Jacowitz & Kahneman, 1995). The effects of high anchors have been found to be stronger than those of low anchors, and it was explained by the fact that high anchors pull up some estimates beyond the anchor. We think that the effects of discrete emotions were better detected when the anchoring effects were stronger (in the case of high anchors).

Study 1 confirmed our hypothesis that experiencing anger will weaken anchoring bias when the anchor is other-provided. We believe that the moving against action tendency associated with anger plays a key role in this phenomenon in that it motivates individuals to search for disconfirming evidence in a desire to attack the anchor provided by someone else. Given that the anchoring bias (in the case of other-provided anchors) occurs because of selective search for evidence supporting the anchors, angry individuals’ propensity to seek out anchor-inconsistent information will make the anchors look more suspect, resulting in less susceptibility to the anchors.

STUDY 2

In Study 1, we demonstrated that angry people were less swayed by anchors given by an external source compared with sad or neutral people. Study 2 was designed to replicate the findings and to demonstrate moderation by a different source of anchor. We have argued that it is the moving against action tendency of anger that made people in the Anger Condition rebut the anchors and deviate farther from them. If the desire to argue with others caused the effects that...
we observed, then the pattern should not apply to anchors provided by oneself. For instance, when people are given a question like “How many days does it take Mars to orbit the Sun?”, most people will start from 365 days that they know as the Earth’s orbital period. Knowing that Mars is farther from the Sun than the Earth, they will increase the number of days until they find a plausible answer and stop adjusting. What differs from the traditional two-step questions in this example is that individuals generate the anchor themselves, instead of receiving an anchor from an external source.

Anchoring for self-generated anchors is driven by insufficient adjustment from the anchor value (Epley & Gilovich, 2001; Tversky & Kahneman, 1974). When the anchor is self-generated, people already know that the anchor value is just an approximation and engage in adjusting process until reaching a boundary of plausible values. Anchoring bias occurs because people stop their adjustment too early before reaching the correct answer. If our findings in Study 1 are in fact because of the desire to argue against and attack someone or something, we expect that the effects will disappear when the anchors are generated by oneself because the moving against action tendency is directed at an external target, not at one’s own reasoning. We go even further and suggest that feeling argumentative with others, people in an angry state are more likely to argue for the goodness of their own anchor, and therefore, they will be more influenced by their own anchors.

On the basis of this prediction, we expected that, with self-generated anchors, anchoring bias will be observed to a greater degree when people feel angry than when people feel sad or neutral. A direct comparison of individual responses to other-provided anchors versus self-generated anchors will help us obtain empirical support for the role of the moving against action tendency. In addition to including self-generated anchor questions, we also modified our experiment by conducting the study online and using a different emotion manipulation technique and different anchoring questions from Study 1. If we can replicate the prior findings with different materials and procedure, we will be able to gain more confidence in what we found.

**Method**

**Participants**

Participants were recruited from a participant pool maintained at a west coast public university and participated in this study in exchange for $3. After excluding participants who suspected that the two tasks were related, 90 participants remained. Ages ranged from 18 to 44 years ($M = 21.56, SD = 4.30$). Sixty-four students (71.1%) were women, 54 were Asian American (60.0%), and 23 were white (25.6%).

**Procedure**

After signing up through the behavioral research management system, the participants received a link to our study. As in Study 1, they were led to believe that they would participate in two unrelated experiments — a memory study and a general knowledge study. For the emotion induction, participants were asked to recall and write about a specific time when they felt angry (Anger Condition) or sad (Sadness Condition), or what they did yesterday (Neutral Condition) (Keltner, Ellsworth, & Edwards, 1993).

The next segment of the session was described as examining people’s general knowledge across various domains. Participants were asked to answer eight questions in total, four other-provided anchor questions, and four self-generated anchor questions. The self-generated anchor questions were selected from items used by Epley and Gilovich (2001). They took a simple form of asking an absolute estimate (e.g., What is the freezing point of vodka?) without a preceding comparative judgment. The contents of these questions were created to naturally lead people to generate a particular anchor value that can be relied on to find the correct answer (see Appendix). To illustrate, in the question on the freezing point of vodka, most people do not know the right answer, but many know the freezing point of water. So they use the freezing point of water as an anchor and adjust from it to find their answer. To check if participants actually generated the expected anchor values, we asked them to describe how they arrived at their answer after each question.

The other-provided anchor questions were the same type as those used in Study 1. As other research investigations have done (Jacowitz & Kahneman, 1995), two questions were selected from Study 1 and two new questions were added. Given that the self-generated anchor questions involve only one anchor value (no high or low anchors) and we wanted to directly compare participants’ responses to self-generated anchors versus other-provided anchors, this time we provided the same anchors to all the participants. To rule out any unexpected effect of using either high or low anchors only, we used two high anchors and two low anchors as other researchers did (Epley & Gilovich, 2001). Because everyone in the study was exposed to the same anchor values, either other-provided or self-generated, we could create a single index indicating the degree of anchoring bias. The order of other-provided anchor questions and self-generated anchor questions was counterbalanced.

When the participants completed all eight questions, they were asked to fill out a short questionnaire including emotion manipulation check items and demographic information questions.

**Results**

**Manipulation checks**

A one-way ANOVA on each emotion manipulation check item revealed significant condition differences in self-reported anger ($F(2, 87) = 7.33, p < .01, \eta^2_p = .14$), sadness ($F(2, 87) = 7.89, p < .01, \eta^2_p = .15$), and neutral feelings ($F(2, 86) = 5.24, p < .01, \eta^2_p = .11$). Participants in the Anger

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2In Study 1, half of the participants were presented with a high-anchor value and the other half with a low-anchor value about the same question. And across all four anchor questions, participants were given two high anchors and two low anchors. But in Study 2, all the participants were given the same anchor — high anchors for two questions and low anchors for the other two questions. This design makes it easier to make a direct comparison between different sources of anchor (other versus self).
Anchoring effects
To measure the extent to which participants deviated from the given anchor, we first standardized participants’ final estimate values and averaged the standard scores of the four self-generated anchor questions and the four other-provided anchor questions, respectively, within each emotion condition. Before averaging, the scores from two self-generated anchor questions and two other-provided anchor questions (i.e., low-anchor questions) that required upward adjustment from the anchor were reversed. As a result, higher standard scores indicate less deviation from the anchor value and accordingly greater anchoring effects.

The participants’ scores were submitted to a 3 Emotion (angry, sad, neutral) × 2 Anchor source (self, other) mixed-model ANOVA, where Anchor source was a within-subject factor. As predicted, a significant interaction between emotion and anchor source was found (F (2, 85) = 8.17, p < .01, ηp2 = .16). More specifically, for both other-provided anchor questions and self-generated anchor questions, a significant difference between emotion conditions was found (self: F(2, 85) = 3.58, p < .05, ηp2 = .08; other: F(2, 87) = 3.59, p < .05, ηp2 = .08) (see Figure 2). For other-provided anchor questions, we successfully replicated the Study 1 result that anger (M = −2.22, SD = .65) led to less anchoring bias than sadness (M = −1.18, SD = .63, t(87) = 2.67, p < .01, d = .62) or neutral feelings (M = −.02, SD = .39, t(87) = 1.62, p = .10, d = .45). In contrast, for self-generated anchor questions, anger (M = −2.22, SD = .42) led to more anchoring bias than sadness (M = −.10, SD = .60, t(85) = 2.23, p < .05, d = .62) or neutral feelings (M = −1.12, SD = .53, t(85) = 2.47, p < .05, d = .71). In addition, paired sample t-tests showed that anchoring effects significantly differ by the source of anchor (i.e., other versus self) in the Anger Condition (t(24) = 3.05, p < .01, d = .80) and in the Sadness Condition (t(28) = 2.15, p < .05, d = .46) but not in the Neutral Condition (t(33) = 1.25, p = .22, d = .30).

These results confirm our hypothesis that the effects of anger on anchoring bias will depend on the source of anchor. When the source was someone else, the antagonistic and argumentative motive associated with anger drove people to use the anchor as a target for releasing their desire to attack and consequently weakened its effect on their final estimate. Because the moving against action tendency is other-directed, rather than self-directed, anger did not lead people to scrutinize their own anchors. Angry individuals, compared with sad or neutral individuals, instead accepted the self-generated anchor as a fair approximate.

GENERAL DISCUSSION

In two different studies where two different emotion manipulations were used, we obtained converging evidence that anger exerts a significant impact on anchoring effects. When people felt angry toward others, their judgments on general knowledge...
were less influenced by anchors provided by someone else but more influenced by anchors generated by themselves, compared with when they were in a sad or neutral mood. We believe that this finding can be explained by the moving against action tendency associated with anger. Anger puts people in an antagonistic and argumentative state, which carries over to a subsequent unrelated situation and leads people to seek out a target at which their moving against action tendency can be directed. The anchors provided by the experimenter were a target for attack, whereas the self-generated anchors were not; instead, angry people seemed to argue for the goodness of their own anchor, resulting in more anchoring bias.

**Theoretical implications**

This study makes a significant contribution to the anchoring bias and emotion literature. First, the role of anger in the anchoring bias has not been investigated previously. Following prior research (Bodenhausen et al., 2000; Englich & Soder, 2009) that examined sadness and happiness, the current investigation adds to our understanding of how discrete emotions can have a unique effect on anchoring bias. Although a valence-based approach to emotions that distinguishes primarily between positive and negative emotions can be useful, this work confirms our belief that discrete emotions of the same valence should be examined as a system of unique cognitive and behavioral tendencies.

Second, this research highlights that experiencing negative emotions can be beneficial in certain decision-making contexts (e.g., when others provide the anchor). In prior research, anger has been portrayed as a serious impediment to sound judgment and decision making. Angry people were found to engage in more heuristic information processing (Tiedens & Linton, 2001), more reliance on the superficial cues in a message rather than the strength of the argument (Bodenhausen et al., 1994), more punitive judgment (Lerner, Goldberg, & Tetlock, 1998), and greater escalation of commitment (Tsai & Young, 2010). This study helps us to see both good and bad sides of anger, together with other recent works reporting positive consequences of anger (Moons & Mackie, 2007; Young et al., 2011).

More important, our study is the first attempt to differentiate the source of anchor in investigating emotional influence. The relationship between anger and anchoring bias would not have been correctly captured if we had not tested the source of anchor. The sharp contrast between anger responses to other-provided anchors and self-generated anchors reveals that anger effects can significantly differ by its target. The fact that sadness shows the opposite contrasting effect strengthens the importance of target characteristics and their relevance to the characteristics of each specific emotion, even though we do not know what about sadness resulted in the observed outcomes. The lesson from this study might be that taking the source of anchor into consideration should be a necessary step, not an option, when investigating the anchoring bias to avoid hasty generalization.

Lastly, our finding that angry people were less influenced by someone else’s idea but more persuadable by their own thought is conceptually consistent with what has been reported in prior research. For example, anger has been found to increase escalation of commitment (Tsai & Young, 2010), which implies that angry people stick to their own beliefs and refuse to change their course of action despite some evidence challenging the original decision. In addition, recent research on power appears to demonstrate a similar psychological mechanism. It has been reported that people feeling powerful tend to be less influenced by the external cues than those feeling powerless. For example, Galinsky and Mussweiler (2001) showed that the powerful are less anchored on another person’s first offer in a negotiation setting. Also, they are likely to be more convinced by their own thoughts or value orientations (Brinol, Petty, Valle, Rucker, & Becerra, 2007; Galinsky, Magee, Gruenfeld, Whitson, & Liljenquist, 2008) because of heightened self-confidence. Given that both feeling power and feeling anger are known as activating the behavioral activation system (Anderson & Berdahl, 2002; Carver & Harmon-Jones, 2009; Keltner, Gruenfeld, & Anderson, 2003) and are closely associated with a sense of self-confidence or certainty (Smith & Ellsworth, 1985; Tiedens & Linton, 2001), this similarity seems to reflect a common underlying psychological mechanism.

**Practical implications**

This study helps us understand how angry people respond to anchors when they make a decision. When they were asked to generate their own anchor, they committed more anchoring bias than when they were presented with an anchor from someone else. Given that more anchoring bias generally implies less accurate decisions, we can infer that angry people are likely to make better decisions when they deal with other-provided information rather than when they speculate by themselves. For instance, in drawing up an annual budget, a person in an angry state might be less anchored by the last managing director’s numbers compared with someone in comparison emotional states. In this way, an angry decision-maker may be less bounded by a budget given to them by someone else. Similarly, incidental anger can improve negotiation outcomes as well. An angry individual might be less anchored by a negotiation partner’s initial offer; feeling argumentative, he or she might be able to counter-offer strongly and achieve more favorable final settlements than negotiators in a sad or neutral state. In conclusion, when a given task requires being more argumentative against an other-provided anchor, being angry can be helpful. As a practical strategy for using the benefits of anger, people can intentionally put themselves in an angry mood (Tamir, Mitchell, & Gross, 2008) or assign a decision-making task to a group member who is already angry.

**Limitations and future directions**

One alternative explanation for our findings can be drawn from the different format of other-provided anchor questions and self-generated anchor questions. First, in addition to the source of anchor, the two types of anchoring questions differ in the format in which they are presented. Other-provided anchor questions include a prior step of the binary comparison task before going into the absolute estimation task. This additional
step could have influenced people’s approach to the question in an unexpected but systematic manner. Also, the contents of the self-generated anchor questions are designed for people to easily generate certain anchors and use them to find the right answers. That is, the contents of questions could have increased or decreased a sense of confidence or any other relevant mental state. Future research should solely manipulate the source of anchor without changing the format or content.

Second, another future research question concerns the source of one’s anger. Although anger is generally elicited by an external target (e.g., another person), anger can also be elicited by and directed at oneself. For example, we can feel angry toward ourselves when we fail to achieve our goals because of our own mistake or lack of effort. The emotion manipulation techniques adopted in our studies allowed us to examine how a more typical type of anger, anger toward others, influences the anchoring effects. However, we do not know yet whether another type of anger, anger toward self, will have the same effect on anchoring or not. Would feeling angry at oneself create more criticism of self-anchoring? If anger effects change as a function of its source (and thus its target), it would offer us more insights into how the moving against action tendency of anger functions in different contexts. We hope future studies can test these two types of anger in relation to anchoring.

Finally, our study replicated the prior finding that sadness leads to more anchoring bias when the anchor is externally provided (Bodenhausen et al., 2000) and further observed an interesting phenomenon that sadness reduces anchoring bias when the anchor is self-generated. We believe that this unpredicted de-biasing effect of sadness for self-generated anchors can be explained by the fact that sadness is associated with deliberate, extensive thinking (Bodenhausen et al., 2000). That is, when given an anchor, sad people tend to think more actively about the anchor in an attempt to test its validity and as a result retrieve more anchor-consistent information, which ultimately caused more anchoring for other-provided anchors. When the anchor comes from one’s own knowledge, however, the same cognitive style triggered by sadness might work in a different direction. Because people already know that the anchor is not the answer but just a good starting point, they do not have to test its validity, and they can immediately engage in deviating from it. Thinking harder in this process will lead them to find more information justifying their deviation, consequently weakening the anchoring effects. Although the contrasting effects of sadness on anchoring as a function of anchor source was not what we anticipated, this seems to offer a good opportunity to learn more about the unique features of sadness. We believe many other discrete emotions and their relationship to anchoring are worth being investigated.

REFERENCES


APPENDIX

OTHER-PROVIDED VERSUS SELF-GENERATED ANCHOR QUESTIONS USED IN STUDY 1 AND STUDY 2

<table>
<thead>
<tr>
<th>Question</th>
<th>Anchor</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the distance from San Francisco to New York City (in miles)?</td>
<td>6000 (H)/1500 (L)</td>
</tr>
<tr>
<td>What is the year the telephone was invented?</td>
<td>1920 (H)/1850 (L)</td>
</tr>
<tr>
<td>What is the average number of babies born per day in USA?</td>
<td>50 000 (H)/100 (L)</td>
</tr>
<tr>
<td>What is the maximum speed of a housecat (in miles per hour)?</td>
<td>30 (H)/7 (L)</td>
</tr>
<tr>
<td>What is the distance from San Francisco to New York City (in miles)?</td>
<td>6000 (H)</td>
</tr>
<tr>
<td>What is the maximum speed of a housecat (in miles per hour)?</td>
<td>7 (L)</td>
</tr>
<tr>
<td>What is the height of tallest redwood (in feet)?</td>
<td>65 (L)</td>
</tr>
<tr>
<td>What is the population of Chicago (in millions)?</td>
<td>5 (H)</td>
</tr>
<tr>
<td>What is the boiling point of water on Mount Everest (°F)?</td>
<td>212</td>
</tr>
<tr>
<td>How many days does it take Mars to orbit the sun?</td>
<td>365</td>
</tr>
<tr>
<td>What is the gestation period of an African elephant (in months)?</td>
<td>9</td>
</tr>
<tr>
<td>What is the freezing point of vodka (°F)?</td>
<td>32</td>
</tr>
</tbody>
</table>

Note: H, high anchor; L, low anchor.

Authors’ biographies:

Heajung Jung is a doctoral candidate in Human Resources and Organizational Behavior at the Anderson School of Management at UCLA. Her research focuses on the effects of discrete emotions on decision making and organizational behavior.

Maia J Young received her PhD at Stanford’s Graduate School of Business and is currently an assistant professor at UCLA’s Anderson School of Management. She has investigated the effects of anger on decision biases, such as escalation of commitment and confirmation heuristic, in addition to the current work on anchoring. Other research interests include understanding cultural differences in responsibility attribution.

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