Mad enough to see the other side: Anger and the search for disconfirming information

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The current research explored the effect of anger on hypothesis confirmation—the propensity to seek information that confirms rather than disconfirms one’s opinion. We argued that the moving against action tendency associated with anger leads angry individuals to seek out more disconfirming information than sad individuals, attenuating the confirmation bias. We tested this hypothesis in two studies of experimentally primed anger and sadness on the selective exposure to hypothesis confirming and disconfirming information. In Study 1, participants in the angry condition were more likely to choose disconfirming information than those in the sad or neutral condition when given the opportunity to read more about a social debate, and reading the disconfirming information affected their subsequent attitude. Study 2 measured participants’ opinions and information selection about the 2008 US Presidential Election and their desire to “move against” a person or object. Participants in the angry condition reported a greater tendency to oppose a person or object, which resulted in the attenuation of the confirmation bias.

Keywords: Anger; Action tendency; Selective information; Confirmation bias; Argumentative.

The ability to objectively evaluate information is a hallmark of rational decision making (Robbins & Judge, 2007). Yet individuals often allow their prior opinions to bias the way they evaluate new information; they seek information that favours their beliefs while ignoring information that does not favour their beliefs—a phenomenon called the confirmation bias (Snyder, 1981; Snyder & Gangestad, 1981; Snyder & Swann, 1978; see Nickerson, 1998, for a review). The confirmation bias affects everyday social decision making. In negotiations, individuals more heavily weigh information that confirms rather than disconfirms their initial plans and strategies (De Dreu & Van Kleef, 2004; Rubin, Pruitt, & Kim, 1994). When conducting an interview, one’s a priori theories about the other person’s traits affect the questions selected; interviewers choose more questions that confirm their prior suspicions and thus lead the candidate to disclose.
more information in favour of the original theory (Snyder & Swann, 1978).

Because this phenomenon is pervasive, it is important to find potential moderators of the bias. What might cause individuals to be more open to information that disconfirms rather than confirms their prior opinions? Sometimes prior psychological states decrease the degree to which people engage in the confirmation bias. For example, people engage in more hypothesis-disconfirming information searches when they are put in a more skeptical mindset (Dawson, Gilovich, & Regan, 2002). In this paper, we explore the potential for another prior psychological state to affect the phenomenon: one’s emotional state. Although prior research has found that negative moods lead to more confirmation bias than positive moods (Jonas, Graupmann, & Frey, 2006), we investigated the potential for differences among discrete, negative emotions. Specifically, we hypothesised that angry individuals would be relatively more likely than those in a sad or neutral mood to seek out hypothesis-disconfirming information, because doing so affords the opportunity to act antagonistically toward others who hold a different opinion. Thus, we investigated whether angry people are relatively less likely than people in other states to fall prey to the confirmation bias.

The effect of emotions on decision making

Recent work in the area of emotions and decision making has demonstrated the importance of examining the effects of specific emotions rather than simply positive and negative affect, since specific negative emotions (such as anger and sadness) can have very different effects even though they are both negative (see Lerner & Tiedens, 2006, for a review).

Prior research has found that aspects of one’s emotional state can spill over to affect subsequent cognition. These effects can be roughly categorised as taking two forms. First, emotions can affect what people think—outcome effects—and, second, they can affect how people think—process effects (Lerner & Tiedens, 2006). An example of an outcome effect is that angry people are more likely to blame others in an unrelated subsequent situation (Keltner, Ellsworth, & Edwards, 1993), so individual blame is an outcome associated with anger. An example of a processing effect is that emotions associated with certainty appraisals result in shallow processing in subsequent situations because of the lingering sense of certainty (Tiedens & Linton, 2001).

The most commonly identified mechanism by which emotions affect subsequent judgements and processing is through cognitive appraisals (Arnold, 1960; Frijda, 1988; Lazarus, 1966; Scherer, 2001; Smith & Ellsworth, 1985), such as valence, certainty, and agency. The appraisal content of emotion has been found to seep from the emotion-eliciting situation into subsequent unrelated situations and to shape the cognition in these unrelated contexts (Lerner & Keltner, 2000, 2001; Han, Lerner, & Keltner, 2007). Drawing on this approach—that an aspect of emotions can affect cognition in subsequent situations—we look to another distinguishing aspect of emotions to understand their effect on cognition: action tendencies.

Specific emotions differ from one another in terms of action tendencies (Frijda, 1988; Frijda, Kuipers, & ter Schure, 1989). The notion of action tendencies is rooted in a functionalist perspective of emotions (Lazarus, 1991; Levenson, 1994; Keltner & Gross, 1999) in which emotions are conceptualised as physical and motivational states that prepare the body and mind to engage in situationally relevant behaviours. Action tendencies can be thought of as the link between experience and behaviour, or, more specifically, the readiness to engage or disengage from interacting with a goal object. For example, anger is associated with an antagonistic impulse to assault or to “move against” and fight a person or object (Carver & Harmon-Jones, 2009; Frijda et al., 1989). In contrast to anger, sadness is associated with helpless action tendencies such as not knowing what to do next and crying.

In this paper we suggest that just as appraisals of specific emotions can influence subsequent judgements and processing, so too could action tendencies.
tendencies affect information processing. That is, the state of behavioural readiness associated with an emotion might affect the way in which information is processed in subsequent situations. We believe that this approach results in novel hypotheses regarding the effects of specific emotions on cognitive tasks. Specifically, we suggest that anger’s association with the “move against” action tendency will result in angry people seeking out information that is in opposition to their prior opinion.

Anger and the search for disconfirming information

Many studies have demonstrated that anger is associated with an antagonistic motive. Angry individuals report engaging in immediate verbal attacks (Fischer & Roseman, 2007), wanting to attack in order to hurt someone (Roseman, Wiest, & Swartz, 1994) and generally wanting to express opposition to others (Kuppens, Van Mechelen, Smits, & De Boeck, 2003). Thus, angry individuals are antagonistic toward others.

If individuals want to act against something or someone when angry, they will likely look for stimuli to move against or opportunities to antagonise others. Some prior research using the emotional Stroop task shows that angry individuals do, indeed, preferentially attend to hostile stimuli more than neutral stimuli (Eckhardt & Cohen, 1997; Smith & Waterman, 2003). Similar findings have been demonstrated when asking angry individuals to do a visual search for a neutral word with several aggression-related distractor words (Cohen, Eckhardt, & Schagat, 1998; Smith & Waterman, 2004). This extra attention to antagonistic opportunities may also shape how people in an angry state confront other cognitive tasks. We examine whether it affects their tendency to seek information that either confirms or disconfirms their beliefs.

When people hold a pre-existing attitude, those who hold an alternative view will be seen as the opposition. Angry people will not shy away from an opportunity for a fight with the opposition. Instead, they will seek opposition and alternative views (disconfirming information), because hearing these countervailing positions provides an opportunity to be antagonistic toward someone who thinks differently about the issue. There are probably many states in which people avoid arguments and disagreement, but in an angry state, the desire to disagree, argue, and confront is high. Someone else’s contrary opinion can provide fodder for an angry individual’s argumentative state and, as such, presents an opportunity for antagonism against someone who disagrees with one’s point of view. Without such material, it may be more difficult for the angry person to engage in the antagonism he or she is driven to express. In short, seeking disconfirming information affords individuals the chance to rebuff the opponent’s point of view.

Research on the confirmation bias lends initial support for the notion that antagonism toward others leads to less confirmation bias. Prior research shows that when someone is ready for debate or an attack on their opinion, they seek disconfirming information (Canon, 1964). Also, when people believe that they can successfully defend their attitudes from another’s attack, they prefer counter-attitudinal information (Albarracín & Mitchell, 2004). So, some prior work shows that being primed for an antagonistic interchange leads to the search for disconfirming information. Our assertion is that anger also produces this kind of antagonistic interchange. It puts individuals in an argumentative state, ready to “move against” (Frijda et al., 1989) someone who disagrees with their opinion. As such, people who are angry will be relatively less likely to fall prey to the confirmation bias than people in other states.

In choosing a comparison state, we were influenced by the work on specific emotions and cognition (Lerner & Tiedens, 2006). Sadness makes a particularly interesting comparison. Sadness, like anger, is a negative emotional state. Thus, it has more in common with anger, the emotion of interest, than a neutral state or a positive state. However, sadness is also importantly different from anger. Specifically, sadness is not associated with the antagonistic desire to move against others that characterises anger.
Thus, a comparison between anger and sadness helps disentangle whether effects are due to negativity or the desire to move against someone else. In addition, some research has demonstrated that sadness leads to deeper cognitive processing than anger (Bodenhausen, Sheppard, & Kramer, 1994; Tiedens & Linton, 2001), which would also presumably decrease the confirmation bias, making the comparison a cautious, conservative one. If we find, as we predict, that anger results in less confirmation bias than sadness, it suggests that the effects of anger on this task are not due to its effects on depth of processing, but instead to something more proximal, such as the antagonistic motivation created by anger.

Overview of studies

A prototypical illustration of the confirmation bias is the selective search for information (Snyder & Swann, 1978; see Hart et al., 2009, for a review). The selective search for information paradigm presents individuals with opportunities to examine information that confirms or disconfirms their own prior beliefs. Studies consistently demonstrate that individuals favor hypothesis-confirming information. Study 1 used the selective exposure to information paradigm to investigate our primary hypothesis that anger moderates the confirmation bias. Further, we explored whether seeing more disconfirming statements led participants to become more moderate or more extreme in their views. Study 2 replicated the primary effect using a different topic and materials, and we tested whether the moving against action tendency associated with anger incited hypothesis disconfirmation.

STUDY 1: SELECTIVE EXPOSURE TO INFORMATION ABOUT HANDS-FREE DEVICES

In this study, participants read about a topic that was discussed in news media at the time of the data collection—whether using hands-free devices for cellular telephones reduces car accidents. We hypothesized that people in an angry emotional state would be more likely to select hypothesis disconfirming information than individuals in a sad state or neutral state. We also examined whether attitudes are influenced by the selected information.

Method

Participants and procedure. Ninety-seven undergraduate students at a public university participated in this experiment for $3. We selected participants who indicated that they thought hands-free devices reduce car accidents. They were recruited by e-mail. After signing up for the online session, participants received a link to the online studies entitled Daily Events Questionnaire and Hands-Free Devices Questionnaire. The session was thus advertised as comprised of two separate and unrelated studies.

Materials. The “first” study was presented as investigating the relationship between memory and emotions. Participants in the Angry (Sad) Condition imagined a specific time in their life when they felt especially angry (sad), recounting the event in writing as concretely as they could (method adapted from Keltner et al., 1993). In the Neutral Condition, participants read that the study was about people’s memories about small, everyday events. These participants recalled and wrote about events that happened to them the day before the session.

The ostensibly unrelated “second study” was about hands-free devices. Participants first read a brief introduction to the debate, which stated that: “Some people argue that hands-free devices make talking on the cell phone while driving more safe, but others argue that driving while using the hands-free device is just as dangerous as driving with a cell phone in hand”. Then participants rated their attitude about the issue (“Do hands-free devices on cell phones reduce car accidents?” where $-5 = \text{definitely no}, 0 = \text{I don’t know}, 5 = \text{definitely yes}$). The instructions explained that they would be presented with the topic sentences of eight paragraphs on this issue, all of which were ostensibly collected from the media. The participants’ task was to read
the topic sentences and to choose up to five paragraphs that they were interested in reading in their entirety. Four topic sentences were clearly supporting and four were clearly criticizing hands-free devices as decreasing car accidents. However, they were listed in random order when the participants read them. The main dependent variables were how many chosen sentences confirm or disconfirm one’s initial attitude.

After choosing the paragraphs based on their topic sentences, participants had the opportunity to read each of the chosen paragraphs in full. Then, they rated their general attitude about hands-free devices, as they had done at the beginning of the experiment. Finally, as a manipulation check, participants recalled the questionnaire at the beginning of the session and rated the extent to which they felt angry, sad, and neutral after completing the writing exercise, where 1 = not at all, 7 = very much.

Results

Manipulation checks. A one-way ANOVA on each emotion manipulation check revealed that there were significant condition differences in self-reported experience of anger, $F(2, 94) = 12.50$, $p < .001$, sadness, $F(2, 94) = 9.70$, $p < .001$, and neutral feelings, $F(2, 94) = 7.60$, $p = .001$ (see Table 1). Participants in the Angry Condition reported feeling significantly more angry than participants in the Sad and Neutral Conditions, $F(1, 95) = 16.52$, $p < .001$. Those in the Sad Condition were more sad than those in the Angry and the Neutral Conditions, $F(1, 95) = 10.09$, $p < .01$. And more neutral feelings were reported in the Neutral Condition than in the Angry and Sad Conditions, $F(1, 95) = 15.17$, $p < .001$.

Selective exposure to information. We tabulated the number of hypothesis confirming (pro hands-free devices) sentences and the number of hypothesis disconfirming (anti hands-free devices) sentences that each participant selected. A 3 Condition (angry, sad, neutral) × 2 Selection (confirming, disconfirming) mixed-model ANOVA, where Selection was a within-subjects factor revealed a significant interaction, $F(2, 94) = 3.99$, $p < .05$, $\eta^2 = .08$ (see Table 2). Analyses of simple effects revealed that participants in the Angry Condition chose more disconfirming items than confirming items, $F(1, 32) = 7.95$, $p < .01$, $\eta^2 = .20$. In the Sad and Neutral Conditions, participants chose the same number of disconfirming and confirming items, $F(1, 31) = 0.86$, $p = .36$ and $F(1, 31) = 0.22$, $p = .64$, respectively. Thus, these results show that people who were induced to feel angry do not select more confirming than disconfirming information and instead, demonstrate a reversal of the typical confirmation-bias pattern.

Attitude change. Seeking disconfirming information is seen as an important information search strategy because the seeker will get a fuller, more balanced perspective on the problem she or he wants to solve. However, we do not know whether the angry people pay attention to the disconfirmatory information that they choose. One could imagine that in their desire to move against someone else’s opinion, they simply resist the new information. If they are resisting the disconfirmatory information,

<table>
<thead>
<tr>
<th>Experienced emotion</th>
<th>Angry</th>
<th>Sad</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger</td>
<td>3.58 (1.44)</td>
<td>2.75 (1.72)</td>
<td>1.75 (1.22)</td>
</tr>
<tr>
<td>Sadness</td>
<td>3.12 (1.88)</td>
<td>3.72 (1.69)</td>
<td>1.91 (1.42)</td>
</tr>
<tr>
<td>Neutral</td>
<td>3.33 (1.67)</td>
<td>3.48 (1.58)</td>
<td>4.84 (1.90)</td>
</tr>
</tbody>
</table>

Note: Means in the same row that do not share subscripts differ at $p < .001$, except the sadness row, $p < .01$. 
then they don’t get any advantage from their exposure to it. On the other hand, if their desire to argue against someone else's opinion results in their actually paying attention to it, then their tendency to move against the opposition may provide them some cognitive benefits. The attitude measures at the beginning and end of the study give us some insight into how the disconfirming information is used: whether the other side is rejected outright and fuels more extreme attitudes, or, whether once viewed, participants integrate disconfirming statements and experience more moderate attitudes.

We ran a 3 Emotion (angry, sad, neutral) × 2 Attitude (beginning, end) mixed-model ANOVA in which emotion was a between subject factor and attitude was a repeated measure (see Table 3 for means by emotion condition). There was no main effect for Emotion, but there was a main effect for Attitude such that participants in all conditions became less convinced that hands-free devices reduce car accidents, $F(1, 94) = 46.55, p < .001$. Moreover, the interaction between the Attitude and Emotion was marginally significant, $F(2, 94) = 2.41, p = .09$. The means involved in this interaction are displayed in Table 3. The interaction is caused by the decrease in support for hands-free devices being larger in the angry condition than in the sad and neutral conditions, $F(1, 95) = 4.67, p < .05$.

**Test for mediation.** Does information selection account for the differential attitude change across emotion conditions? To test for mediation, we adopted Baron and Kenny’s (1986) multiple-regression procedure. In the first step in our test of mediation, emotion condition predicted the outcome variable attitude change (i.e., time 1 – time 2), $\beta = .22$, $t(95) = 2.16, p < .05$. In the second step, proportion of disconfirming information qualified as a potential mediator, because emotion condition predicted information selection, $\beta = .35$, $t(95) = 3.65, p < .001$. In the third step, information selection and attitude change were simultaneously regressed on emotion condition, and information selection had a significant unique effect on attitude change, $\beta = .41$, $t(94) = 4.13, p = .001$. Also, in this last equation, the relationship between emotion condition and attitude change was not significant, $\beta = .07$, $t(94) = 0.74, ns$, suggesting that the relationship between emotion condition and attitude change was accounted for by participants’ selection of disconfirming information (Sobel test, $z = 2.90, p < .01$).

**Table 2. Choice of confirming and disconfirming information by emotion conditions (Study 1)**

<table>
<thead>
<tr>
<th>Type of information</th>
<th>Angry</th>
<th>Sad</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirming</td>
<td>1.33a (1.16)</td>
<td>2.06b (0.91)</td>
<td>2.00b (1.05)</td>
</tr>
<tr>
<td>Disconfirming</td>
<td>2.15b (1.12)</td>
<td>1.81b (1.12)</td>
<td>1.84b (1.19)</td>
</tr>
</tbody>
</table>

*Note: Means in the same row or column that do not share subscripts differ at p < .05.*

**Table 3. Attitudes about hands-free devices before and after selecting information (Study 1)**

<table>
<thead>
<tr>
<th>Attitude</th>
<th>Angry</th>
<th>Sad</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before information selection</td>
<td>8.66 (1.29)</td>
<td>8.50 (1.11)</td>
<td>8.53 (0.95)</td>
</tr>
<tr>
<td>After information selection</td>
<td>6.66 (2.07)</td>
<td>7.53 (1.64)</td>
<td>7.34 (2.41)</td>
</tr>
</tbody>
</table>

*Note: All within column comparisons are significant at p < .01. All comparisons within row are not significant, except Angry and Sad after information selection, p < .10.*

COGNITION AND EMOTION, 2011, 25 (1) 15
Discussion

The results of this study lend support for our hypotheses: angry participants selected relatively more disconfirming information than participants in the sad and neutral conditions. Thus, this study demonstrates that anger moderates the tendency to select hypothesis-confirming information. Interestingly, our results also showed more attitude change among people who were angry, and this was fully mediated by the selection of disconfirming information. The attitudes of angry individuals were affected by the information they gained. In this sense, the tendency to seek out disconfirming information may actually provide angry individuals with the cognitive benefit of getting a fuller, more balanced perspective. As such, this study may also provide one of the few examples in which anger has cognitive benefits. Typically, studies have depicted people as engaging in problematic judgement and decision-making processes when angry, but here, we observed angry people selecting a less biased set of information than people in other emotional states.

We have argued that angry individuals sought disconfirming information to argue against others who disagree with them, but once they read the disconfirming statements, they were somewhat influenced by them. The fact that angry individuals experienced greater attitude change could be interpreted as evidence that they were not in fact meaning to move against the disconfirming arguments and that their selection of disconfirming information is due to some other mechanism. To more directly test that the desire to move against others’ opinions is the mechanism that explains the difference in information search among conditions, we measured action tendencies in Study 2. Study 1 also selected for participants with a particular attitude—they all thought hands-free devices reduce car accidents. To ensure that the results generalise to individuals on both sides of an attitudinal debate, we looked at the information selection of people on different sides of the 2008 US Presidential Election in Study 2.

STUDY 2: SELECTIVE EXPOSURE TO INFORMATION ABOUT THE 2008 US PRESIDENTIAL ELECTION

Method

Participants and procedure. Eighty-nine adults were recruited by e-mail to participate in this online experiment for $7. After signing up, participants received a link to the ostensibly unrelated online studies entitled Daily Events Study and Political Views Study.

Materials. We used the same emotion-induction task for anger and sadness as in Study 1, but we dropped the neutral condition, because the pattern of means was the same as in the sad condition and because, as described above, sadness is the better comparison condition.

Upon completing the emotion manipulation in the “first” study, participants were thanked for their participation and clicked ahead to the “second” study on the issue of the 2008 US Presidential Election. First, they were reminded that: “Some argue that Senator John McCain should win the election, but others argue that Senator Barack Obama should win the election”. Next, they completed an item measuring their attitude: “Please provide your opinion: Who do you want to win the 2008 Presidential Election?” where their choices were Senator John McCain and Senator Barack Obama.

Next, participants were presented with twelve expert statements on the election. Half of the statements were in favour of McCain (e.g., “Senator John McCain proposes modifying the tax code to give families a $5000 credit to buy medical insurance. This money would give patients more choices in healthcare plans. That is why he should win the 2008 Presidential Election.”). The other half of the expert statements was in favour of Obama (e.g., “Senator Barack Obama proposes federal funding for early childhood education. His plan would offer more opportunities for children in school. Therefore, he should win the 2008 Presidential Election.”). Participants were asked to select statements for
which they wanted to read their full text, using the item: “Would you like to read this article?” (Yes, No).

In addition, the participants were requested to complete four items measuring the “moving against” tendency, as defined by prior work (Frijda et al., 1989, α = .88): “I wanted to oppose something or someone”, “I wanted to assault something or someone”, “I wanted to hurt or insult something or someone”, and “I boiled inside”, where 1 = not at all and 7 = very strongly so.

For the manipulation check, participants were asked to recall the first memory study and rate how much they felt angry after the task: “To what extent did you feel angry after completing the writing exercise?” where 1 = not at all and 7 = very much.

Results

Manipulation checks. Participants in the Angry Condition (M = 4.28, SD = 1.62) reported feeling more angry than participants in the Sad Condition (M = 2.04, SD = 1.56), t(87) = 6.62, p < .001.

Selective exposure to information. We coded pro-McCain statements as confirming for those who identified as McCain supporters and disconfirming for those who identified as Obama supporters. Similarly, we coded pro-Obama statements as confirming for those who identified as Obama supporters and disconfirming for those who identified as McCain supporters. Next, we tabulated the number of the disconfirming statements and confirming statements chosen. To explore whether information selection differed by choice of candidate, we ran a 2 Candidate Choice (McCain, Obama) × 2 Emotion (angry, sad) × 2 Selection (confirming, disconfirming) mixed-model ANOVA, where Selection was the only within-subjects factor.

There was a main effect of Candidate Choice, such that more participants chose Obama (n = 55) than McCain (n = 34), F(1, 85) = 5.83, p < .05, η² = .06. There was also a main effect of selection, such that participants chose more confirming statements (M = 2.78, SD = 2.23) than disconfirming statements (M = 2.18, SD = 2.21), F(1, 85) = 16.89, p < .001, η² = .16.

However, these main effects were qualified by the predicted 2 Emotion (angry, sad) × 2 Selection (confirming, disconfirming) interaction, F(1, 85) = 4.21, p < .05, η² = .05 (see Table 4). Analyses of simple effects revealed that participants in the Sad Condition chose more confirming than disconfirming statements, F(1, 44) = 15.75, p < .001, η² = .26. Participants in the Angry Condition chose the same number of confirming and disconfirming statements, F(1, 41) = 2.89, ns, η² = .06. Thus, emotion moderated the selection of confirming and disconfirming statements.

The three-way interaction of Candidate Choice, Emotion, and Selection was not significant, F(1, 88) = 1.21, ns, η² = .01.

Mediation analysis. To examine whether the desire to move against others’ opinions mediated the selection of information, we used regression in within-subject designs (Judd, Kenny, & McClelland, 2001). We computed difference values for confirmation bias by subtracting the number of the chosen disconfirming statements from the number of the chosen confirming statements. Then we used the mediated regression procedure (Baron & Kenny, 1986) to test the mediated models proposed in our hypotheses. Confirming the simple effects tests above, participants in the Angry Condition were less likely to commit the confirmation bias than participants in the Sad Condition, β = -.23, p < .05. Participants in the Angry Condition also had a greater tendency of moving against than participants in the Sad

<table>
<thead>
<tr>
<th>Type of information</th>
<th>Angry</th>
<th>Sad</th>
</tr>
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<tbody>
<tr>
<td>Confirming</td>
<td>2.86, (2.34)</td>
<td>2.69, (2.14)</td>
</tr>
<tr>
<td>Disconfirming</td>
<td>2.56, (2.39)</td>
<td>1.83, (1.99)</td>
</tr>
</tbody>
</table>

Note. Means in the same row or column that do not share subscripts differ at p < .001.
Condition, $\beta = .64$, $p < .001$. Finally, when simultaneously regressing the moving against emotion and information selection on emotion condition, action tendency was associated with information selection, $\beta = -.30$, $p < .05$, but emotion condition was no longer associated with information selection, $\beta = -.04$, $n.s$. Therefore, in support of our hypotheses, the moving against tendency fully mediated the relationship between emotion condition and information selection (Sobel test, $z = 2.22$, $p < .05$).\(^1\) In other words, compared with sad participants, angry participants have a higher tendency to move against others' opinions, which results in an attenuation of the confirmation bias.

GENERAL DISCUSSION

In two studies using two different attitude issues, we showed that anger results in relatively less confirmation bias than the comparison emotional states. When angry, people select less hypothesis-confirming information than people in sad and neutral states. We argued that the moving against action tendency associated with anger leads angry individuals to seek out a greater proportion of hypothesis disconfirming information, attenuating the confirmation bias. In Study 1, participants in the angry condition were more likely to choose disconfirming information than those in the sad or neutral condition when given the opportunity to read more about a controversial social issue. Moreover, because they selected more disconfirming information, angry participants actually changed their attitude more than others. This finding suggests that at least in some contexts, angry people will be more flexible in their attitudes than people in other emotional states. Study 2 presented a conceptual replication in an election and allowed us to examine whether it is the desire to move against others that mediates the relationship between emotion condition and information seeking. We found significant mediation of the moving against action tendency as hypothesised. Specifically, participants in the angry condition reported a significantly greater tendency to oppose a person or object, and this tendency led them to select less attitude consistent information.

Theoretical implications

In prior research, anger has been found to hinder performance by creating a reliance on superficial cues in message and heuristic processing (Bodenhausen et al., 1994; Tiedens & Linton, 2001). Other research has shown anger to be associated with problematic social judgement such as hostile attributions (Tiedens, 2001; Weiner, 1980) and risk seeking (Lerner & Keltner, 2001). These kinds of findings often lead to the conclusion that anger is bad for cognition. The current results are an exception to this pattern (also see Moons & Mackie, 2007). Here, anger appears to lead to a cognitive pattern characterised by less bias. Although the hypothesis disconfirming behaviour that anger produces may well be an aggressive act, meant to move or fight against the opposition's opinion, its result is to provide those who feel angry with better information. As such, these findings are an important instance in which anger is associated with a better cognitive outcome.

Although there has been an explosion of research about the effect of specific emotions on judgement and cognition, much of this work has focused on the role of cognitive appraisals in these effects. That research has been invaluable in demonstrating the importance of examining specific emotions in addition to global mood states.

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\(^1\) The mediating results also generalise when using the approach advocated by Baron and Kenny (1986) and Judd and Kenny (1981) for examining mediation in repeated-measure models. This entails including the covariate to examine whether the effect of the independent variable is reduced while controlling for the mediator. First, we found that participants in the Angry Condition ($M = 3.85$, $SD = 1.77$) reported a greater desire to move against a person or object than those in the Sad Condition ($M = 1.53$, $SD = 1.01$), $t(87) = -7.67$, $p < .001$. Furthermore, results of a 2 Emotion (angry, sad) × 2 Selection (confirming, disconfirming) ANCOVA revealed that when we controlled the tendency of moving against, the previously observed interaction between Condition and Selection on the selection of information was reduced to non-significance, $t(1, 84) = -0.09$, $n.s$, $\eta^2 = .00$. 

18 COGNITION AND EMOTION, 2011, 25 (1)
and in showing that these effects can be due to specific cognitive components of emotional experience. We were greatly influenced by that work in this research, but the contribution of this research is unique. Whereas that research showed that people's interpretations of events that accompany their emotions can shape cognition, we show that the action tendencies—the feelings about what people want to do—also influence cognition and in ways that we don't think can be explained by the appraisal content of the emotion. Thus, we see this research as opening the door to studies about ways in which the many components of emotion influence cognition.

Practical implications

Although we learned that anger leads to less confirmation bias, it does not seem realistic to argue that people should try to experience more anger in order to become a better decision maker because of other negative consequences of anger that should not be ignored (Bodenhausen et al., 1994; Tiedens, 2001). However, in a group setting, these findings can be utilised to make the best use of diverse emotional responses that team members experience in the same situation. Someone who is already experiencing anger from a prior situation may be better at playing the role of the devil's advocate, because she or he is strongly motivated to pay attention to alternative views. By encouraging angry group members to select information necessary for group discussion, the group as a whole may get the benefit of being exposed to diverse views and, as a result, achieve a more balanced perspective.

Limitations and future directions

Since this is just a first foray into how action tendencies might affect cognition, there are many questions that remain unanswered. First, it could be argued that in these studies, it was not action tendency but a correlate of action tendency that affected information selection. That is, the mediation analysis in Study 2 could be driven by an unmeasured third variable that is closely related to the move against action tendency rather than being driven by the action tendency itself. Future research could investigate this possibility of alternative explanations.

Second, future research should test when it is that an action tendency affects subsequent cognition over other aspects of the emotion, such as its appraisal content. We have surmised that the extent to which a component of the emotion—be it appraisal or action tendency—maps onto the task, it will have precedence in affecting performance. Another possibility is that when components of emotion would have conflicting effects on a task, then action tendencies have precedence, because they are behaviour oriented. The current studies do not provide a definitive answer as to why action tendencies affect behaviour in this task, as opposed to associated cognitive appraisals, and future research should address this question.

As for other future directions, there may be a number of other cognitive tasks that would be affected by the antagonistic action tendency associated with anger, and these deserve to be considered. It also will likely be worthwhile to more clearly determine when argumentativeness is consistent with deeper systematic processing and when it is not. Of course, the antagonistic action tendency associated with anger is not the only action tendency that could influence cognitive tasks. Each specific emotion has its own action tendency profile and a number of these may be relevant for cognitive tasks. In this way, we hope that this research spurs future research on the topic of specific emotions, action tendencies and cognition.

Finally, in our first study on the social issue of whether hands-free devices reduce car accidents, anger increased disconfirmatory information search relative to sad and neutral conditions. In the second study about a hotly contested presidential election, anger also increased disconfirmatory information search relative to the sad condition. However, the absolute amount of confirmation bias differed between the two studies. Perhaps we found more confirmation bias in the study about the political election, because this issue was more self-relevant and important than
the hands-free devices issue. Future research may address whether confirmation bias is more prevalent when the topic is self-relevant.

REFERENCES


