https://econtent.hogrefe.com/doi/pdf/10.1027/1618-3169/a000489 - Greenstein Michael <mgreenstein1@framingham.edu> - Thursday, September 10, 2020 10:52:30 AM - IP Address:98.216.220.176

Short Research Article

Anger Increases Susceptibility to Misinformation

Michael Greenstein[1,2] and Nancy Franklin[2]

[1]Department of Psychology and Philosophy, Framingham State University, Framingham, MA, USA
[2]Department of Psychology, Stony Brook University, Stony Brook, NY, USA

Abstract. The effect of anger on acceptance of false details was examined using a three-phase misinformation paradigm. Participants viewed an event, were presented with schema-consistent and schema-irrelevant misinformation about it, and were given a surprise source monitoring test to examine the acceptance of the suggested material. Between each phase of the experiment, they performed a task that either induced anger or maintained a neutral mood. Participants showed greater susceptibility to schema-consistent than schema-irrelevant misinformation. Anger did not affect either recognition or source accuracy for true details about the initial event, but suggestibility for false details increased with anger. In spite of this increase in source errors (i.e., misinformation acceptance), both confidence in the accuracy of source attributions and decision speed for incorrect judgments also increased with anger. Implications are discussed with respect to both the general effects of anger and real-world applications such as eyewitness memory.

Keywords: misinformation, emotion, anger, memory

For decades, researchers have identified ways to alter existing memories or even to create entirely new false memories (Loftus et al., 1978; Wade et al., 2002). Memory can be altered by, among other things, suggestive interviewing (Loftus et al., 1978; Loftus & Pickrell, 1995) or doctored photographs (Wade et al., 2002). False memories have even been reported for presumably emotional and personally salient events, like getting lost in a mall as a child (Loftus & Pickrell, 1995) or committing a crime as a teenager (Shaw & Porter, 2015). False memories for such emotional content flies in the face of lay beliefs that strong emotion always improves memory (Schmechel et al., 2006). Emotion's actual impact on memory is more nuanced (Deffenbacher et al., 2004; Van Damme et al., 2017). Indeed, emotional arousal creates risk for false memories through, for example, mood congruence (Howe & Malone, 2011) or suppressed processing of peripheral details (Deffenbacher et al., 2004; Kensinger, 2009).

Research involving emotion and suggestibility has typically focused on the dimensions of valence and arousal, with high arousal typically increasing vulnerability to misinformation over low arousal (Van Damme, 2013) and, less consistently, negative emotions producing stronger misinformation effects than positive emotions (Porter et al., 2010; Porter et al., 2003, but see Storbeck & Clore, 2005). However, these patterns are not universal, suggesting that arousal and valence are insufficient for explaining emotion's impact on misinformation. Complementing and extending this research is a robust literature examining the effects of the motivational tendencies (approach or avoidance) and the context of the emotion's elicitation (e.g., pregoal or postgoal) on cognition (Carver & Harmon-Jones, 2009; Van Damme et al., 2017). While these studies may be able to explain findings not easily explained by valence and arousal, they do not always take into account differing motivational tendencies for approach or avoidance associated with different discrete emotions (Kaplan et al., 2016).

With these shortcomings in mind, the present work examines a specific, discrete, emotion's impact on misinformation acceptance. Anger can be characterized as negative, high arousal, and approach-related (Carver & Harmon-Jones, 2009). Research examining anger has shown that it impacts attention and memory by enhancing goal-relevant information processing (Finucane, 2011; Levine & Burgess, 1997) and increases reliance on relatively simple cognitive processes, such as increased stereotype and script use (Bodenhausen et al., 1994; Tiedens, 2001), that support immediate action. The impact of anger on false memory acceptance is less clear, with some studies using the Deese–Roediger–McDermottt paradigm showing anger to increase false memories for a critical lure after exposure to a list of thematically related words

© 2020 Hogrefe Publishing

https://econtent.hogrefe.com/doi/pdf/10.1027/1618-3169/a000489 - Greenstein Michael <mgreenstein1@framingham.edu> - Thursday, September 10, 2020 10:52:30 AM - IP Address:98.216.220.176

(Corson & Verrier, 2007; but see Van Damme, 2013). A study based on word lists, however, provides limited value for examining the impact of anger on misinformation acceptance given how closely anger tends to be associated with interpersonal actions (e.g., Bodenhausen et al., 1994).

The present work examines anger's impact on false memory using the more ecologically valid three-phase misinformation paradigm (Loftus et al., 1978). This paradigm involves (1) exposure to a complex event (not just a word list), followed by (2) postevent input from a second source (e.g., another person commenting on the event), when misinformation is typically presented, and then (3) a final memory test regarding the source of various original and misinformation details. The current experiment used two types of misinformation during the second stage, schema-consistent and schema-irrelevant. Participants should be more likely to accept schema-consistent than schema-irrelevant misinformation (Bodenhausen et al., 1994). Additionally, if anger simplifies processing such that it broadly reduces scrutiny of new information, angry participants should be more likely overall to accept misinformation than neutral participants. Furthermore, if anger also increases reliance on heuristic processing, then angry participants should be disproportionately susceptible to schema-consistent misinformation (Bodenhausen et al., 1994). Finally, if anger streamlines cognitive processing in the service of action, then it should also speed up memory decisions and increase confidence in these decisions (Smith & Ellsworth, 1985).

Method

Participants

Ninety-seven[1] (52 female) Stony Brook University undergraduates participated in this study for partial course credit. All were native English speakers aged 18–44 (M = 20.79 years, SD = 4.26). They were randomly assigned to receive an angry (50) or neutral emotion induction. The 18 participants who had already seen the movie *Defending Your Life* (Grand et al., 1991) or did not complete the experiment (due to attrition, computer error, or experimenter error) were removed from the study, which left 79 participants (40 angry) in the study.

Materials and Procedure

All elements of the study were conducted on a Dell computer using SuperLab presentation software.

The experiment began with the Stroop and Go/No-Go tasks. These tasks assess the ability to inhibit irrelevant information, which may affect misinformation acceptance.

The main portion of the experiment consisted of three phases: Encoding, Misinformation, and Source Test. A 12-min delay separating each pair of phases served as the emotion induction (anger or neutral) task.

The encoding phase consisted of an introductory narrative, followed by an 8-min excerpt of the film, *Defending Your Life* (Grand et al., 1991). The narrative provided a fictional context to help understand the film clip and set up the relevant event schema (a date).

The first 12-min emotion induction involved three 4-min tasks (a task-switching exercise, a four-alternative forced-choice trivia test, and a scripted interview). In the neutral induction, the experimenter behaved professionally and politely. In the anger induction, the experimenter was disorganized, dismissive, insulting, lost documents, provided only vague instructions, created unnecessary work, and interrupted the participant.

The Misinformation phase consisted of 40 four-alternative forced-choice questions about the film. All questions contained a subordinate clause, 20 of which contained misinformation (Loftus et al., 1978). Additionally, of the 20 misinforming subordinate clauses, 10 contained schema-consistent misinformation (e.g., "At the end of their first date, before **Daniel kisses Julia goodnight**, what does Julia say?" [the subordinate clauses were not presented in boldface during the experiment]), and 10 contained plausible but schema-irrelevant misinformation (e.g., "When the pepper-haired waiter **with a goatee** comes to the table, what does he ask?"). Participants experienced one of two versions of this test with the versions differing on which set of subordinate clauses contained misinformation (Table 1).

The 12-min delay between Misinformation and Source Test involved an autobiographical self-report emotion induction (Bodenhausen et al., 1994), which was intended to reinforce the initial induction and extend the experience of the assigned emotion (Isen et al., 1976). All participants wrote for 12 min about an episode in their lives when they had been made angry (anger condition) or an episode that involved going to a museum (neutral condition). The

[1] An *a priori* power analysis was conducted using the G*Power program. This analysis used an alpha level of .05, expected power of .8, and anticipated effect size of .33 (determined through examination of conceptually similar studies [e.g., Bodenhausen et al., 1994; Corson & Verrier, 2007; Finucane, 2011; Loftus et al., 1978]). This determined that this study needed 75 participants to detect an effect.

© 2020 Hogrefe Publishing

https://econtent.hogrefe.com/doi/pdf/10.1027/1618-3169/a000489 - Greenstein Michael <mgreenstein1@framingham.edu> - Thursday, September 10, 2020 10:52:30 AM - IP Address:98.216.220.176

Table 1. Sample items for Phase 2

	Misinformation item	True item
Schema-irrelevant	What do Daniel and Julia sit on during their conversation **when Julia drops her purse?**	What do Daniel and Julia sit on during their conversation **outside at night?**
Schema-consistent	What does the conversation turn to after **the waiter writes down Daniel and Julia's orders?**	What does the conversation turn to after Daniel and Julia **celebrate their date with a toast?**

Note. Each participant saw either the misinformation or no misinformation version of the sentence. The bolded sections highlight the differences between the misinformation and no misinformation versions (and were not bolded when presented to participants).

autobiographical emotion induction was consistent with the participant's earlier emotion induction.

Finally, all participants were given a surprise 80-item Source Test. They read statements derived from the subordinate clauses that had been presented during the misinformation phase (e.g., "The waiter has a goatee") and indicated whether each had been encountered in the film, the questions, both, or neither. The 20 items (10 schema-consistent and 10 schema-irrelevant) they had previously been misinformed about made up the critical items, but there were an equal number of questions from each of the four potential sources. The 20 new items were the same as the 20 items that participants in the other version of the experiment had been misinformed about (Table 1). Participants rated their confidence for each source decision on a 7-point scale.

Following the source test, participants completed the self-report scales. To determine whether the confrontational anger induction affected self-efficacy, which may, in turn, affect the measures of interest, we included the General Self-Efficacy scale (GSES; Schwarzer et al., 1997). Participants also completed a modified subset of the State-Trait Anger Expression Inventory (STAXI; Spielberger et al., 1988) and rated how irritable, annoyed, and frustrated they had felt over the previous hour using a 5-point scale. These ratings were included as emotion-induction validation measures.

Results

Seven participants were removed from the experiment based on low corrected recognition scores. With the removal of these participants, there were 18 participants in each of the four (Emotion condition × Counterbalanced question set version) experimental conditions. The two versions of the study, which were included to allow us to counterbalance which questions included true versus misleading information, did not differ with respect to any of the analyses (all $ps > .2$), so we collapsed across them for all subsequent analyses. Thus, there were 36 participants each in the anger and neutral conditions. All other factors were manipulated within-participant.

Individual Differences Measures

Independent samples *t*-tests found no difference between participants in the angry and neutral conditions on the Stroop task, $t(70) = 0.459$, $p = .459$, 95% CI −246.44, 403.67, $d = .11$, Go-No/Go task $t(70) = 0.821$, $p = .698$, 95% CI −3.02, 7.25, $d = .19$, or the GSES, $t(70) = 1.84$, $p = .069$, 95% CI −0.17, 4.34, $d = .43$. Thus, it is unlikely that preexisting differences in inhibition ability or post-induction self-efficacy could account for any memory effects.

Emotion Manipulation Check

Independent samples *t*-tests showed higher state anger in those who experienced the anger induction ($M = 20.91$, $SD = 1.69$) than the neutral induction ($M = 16.64$, $SD = 0.45$) within the modified STAXI, $t(70) = 2.45$, $p = .017$, 95% CI 0.80, 7.76, $d = .56$, as well as higher irritability, $t(70) = 3.36$, $p = .001$, 95% CI 0.93, 1.15, $d = .74$, and annoyance, $t(70) = 4.63$, $p < .001$, 95% CI 0.62, 1.55, $d = .96$. There were, however, no differences between the anger and neutral induction conditions with regard to frustration, $t(70) = 1.47$, $p = .147$, 95% CI −0.13, 0.85, $d = .34$, or trait elements of the modified STAXI, $t(70) = 1.58$, $p = .118$, 95% CI −0.52, 4.46, $d = .37$. The latter suggests that any differences in memory performance would be attributable to state rather than trait anger.

Misinformation Acceptance

The primary prediction of this study was that people in the anger condition would be more susceptible to misinformation than those in the neutral condition. Thus, if a Question-Only (misinformation) item was attributed to the Film or to Both Film and Questions, we considered it a misinformation-based misattribution.

Prior to examining misinformation acceptance, we examined whether participants recognized the misinformation as old, using a 2 (Emotion condition: anger vs. neutral) × 2 (Schematicity: schema-consistent vs.

 © 2020 Hogrefe Publishing

https://econtent.hogrefe.com/doi/pdf/10.1027/1618-3169/a000489 - Greenstein Michael <mgreenstein1@framingham.edu> - Thursday, September 10, 2020 10:52:30 AM - IP Address:98.216.220.176

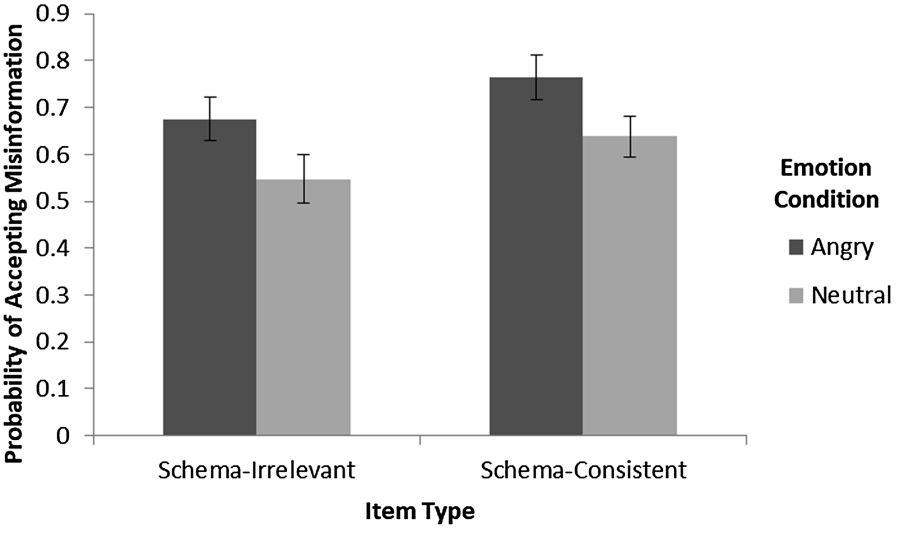

Figure 1. Misattributions of misinformation to the film during the source test. Angry participants were more likely to incorporate misinformation into their memory for the original event than were neutral participants.

schema-irrelevant) analysis of variance (ANOVA). Given that each misinformation item had been previously presented (in Phase 2 only), any response that declared it as having been previously presented (i.e., an answer of Questions Only, Film Only, or Film and Questions) constituted an accurate response for purposes of Old/New recognition. Schema-irrelevant items (M = 0.63, SD = 0.18) were more likely than schema-consistent items (M = 0.56, SD = 0.17) to be recognized as old $F(1, 70) = 9.62$, $p = .003$, $\eta_p^2 = .121$, replicating findings that unanticipated or distinctive items are better recognized (e.g., Hunt, 2013). Most importantly, no main effects or interactions emerged involving emotion condition (all ps > .7). Thus, differences in recognition rates do not appear to underlie the differences described below in falsely attributing suggested details to the film.

We defined suggestibility as the number of misinformation-based misattributions (i.e., had been attributed to Film or to Both Film and Questions) divided by the number of misinformation items that had been recognized as old (i.e., had been attributed to Film, to Questions, or to Both Film and Questions). We conducted a 2 (Emotion condition: anger vs. neutral) × 2 (Schematicity: schema-consistent vs. schema-irrelevant) ANOVA examining suggestibility. As predicted, participants in the anger condition were more suggestible than those in the neutral condition, $F(1, 70) = 4.34$, $p = .041$, $\eta_p^2 = .058$ (Figure 1). Additionally, participants were more inclined to erroneously accept schema-consistent misinformation as having originated in the Film, $F(1, 70) = 9.73$, $p = .003$, $\eta_p^2 = .122$. Schematicity did not interact with emotion condition, $F(1, 70) = 0.02$, $p = .969$, $\eta_p^2 < .001$. Therefore, anger increased susceptibility to misinformation overall rather than disproportionately for schema-consistent information.

Source Accuracy for Original Event Details

The increased suggestibility found in the anger condition supports the conclusion that the approach bias and reduced scrutiny associated with anger favor information acceptance. Alternatively, it is possible that anger broadly impairs source monitoring. If so, then we should observe similarly increased source errors for items that had actually occurred during the film.

To test this, we first examined recognition for Old items using a 2 (Emotion condition: anger vs. neutral) × 2 (Schematicity: schema-consistent vs. schema-irrelevant) × 2 (Source: film vs. film and questions) ANOVA, expanding upon the recognition analysis described above. Again, we found superior recognition (higher hit rates) for schema-irrelevant than schema-consistent items, $F(1, 70) = 8.47$, $p = .005$, $\eta_p^2 = .108$. Unsurprisingly, participants were also more likely to recognize items that had appeared twice (i.e., in Both Film and Questions M = 9.13 items, SD = 0.89) than to recognize those that had appeared only in the Film (M = 7.90 items, SD = 1.30), $F(1, 70) = 71.00$, $p < .001$, $\eta_p^2 = .50$. Again, no main effects or interactions emerged involving emotion condition (all $ps > .05$). Thus, it appears unlikely that differences between emotion conditions regarding source performance reflected underlying differences in recognition accuracy.

We defined source accuracy as the number of correct source identifications for film details divided by the

© 2020 Hogrefe Publishing

https://econtent.hogrefe.com/doi/pdf/10.1027/1618-3169/a000489 - Greenstein Michael <mgreenstein1@framingham.edu> - Thursday, September 10, 2020 10:52:30 AM - IP Address:98.216.220.176

number of film details correctly recognized as old (i.e., attributed to Film, to Questions, or to Both). We ran a 2 (Emotion condition: anger vs. neutral) × 2 (Schematicity: schema-consistent vs. schema-irrelevant) × 2 (Source: Film vs. Both Film and Questions) ANOVA on source accuracy for film details. Emotion condition did not impact source accuracy for these items, $F(1, 70) = .351$, $p = .555$, $\eta_p^2 = .005$. In combination with the previous source accuracy analysis, this demonstrates that anger systematically increases suggestibility rather than simply increasing source errors indiscriminately, which is again consistent with an approach-oriented bias to accept information as a fact. Schematicity produced no main effect in this analysis, $F(1, 70) = .482$, $p = .490$, $\eta_p^2 = .007$, nor did the factors interact (all ps > .1). There was a main effect of the item's source with greater source accuracy for Film-Only items ($M = 0.76$, $SD = 0.16$) than for items that had occurred in Both Film and Questions ($M = 0.49$, $SD = 0.21$), $F(1, 70) = 77.05$, $p < .001$, $\eta_p^2 = .524$. Although the highest recognition scores occurred for items encountered multiple times, repetition did not benefit source accuracy. This, however, may reflect a bias to respond "Film-Only" rather than reflecting actually enhanced source accuracy for items presented only in the film.

Confidence

Because anger generally serves to guide cognition in urgent, approach-oriented circumstances, we predicted that it would increase confidence in source judgments (supporting the execution of a rapid response) even in the face of reduced accuracy. Due to the association between self-efficacy and confidence, $r(70) = .429$, $r^2 = .184$, $p < .001$, we conservatively included the GSES score in this analysis. The relationship between GSES and confidence violated the assumption of homogeneity of regression slopes, and so we conducted a multiple regression rather than an analysis of covariance. Before doing so, we computed Mahalanobis distances to determine bivariate outliers and excluded one participant whose data exceeded three *SD*s from the mean.

The multiple regression was significant, $F(2, 68) = 13.94$, $p < .001$, with both emotion ($\beta = .270$, $t(67) = 2.60$, $p = .012$) and self-efficacy ($\beta = .519$, $t(67) = 5.00$, $p < .001$) emerging as predictors of confidence. Notably, participants who underwent the anger induction were more confident in their source attributions than were those in the neutral condition, even when self-efficacy was accounted for.

Our findings suggest that anger increases both suggestibility and confidence, undermining the typically positive relationship between certainty and accuracy (DeSoto & Roediger, 2014). Indeed, the relationship did not demonstrate this typically positive relationship, $r(70) = .006$, $p = .959$. However, when examining angry and neutral participants separately, different patterns emerged. Neutral participants showed the traditional positive relationship between confidence and source accuracy, $r(34) = .468$, $p = .004$, whereas angry participants showed an equally strong relationship in the opposite direction, $r(34) = -.461$, $p = .005$ (Figure 2). Using Fisher's R to Z transformation to compare these correlation coefficients, we found the difference to be significant, $Z = 4.09$, $p < .001$.

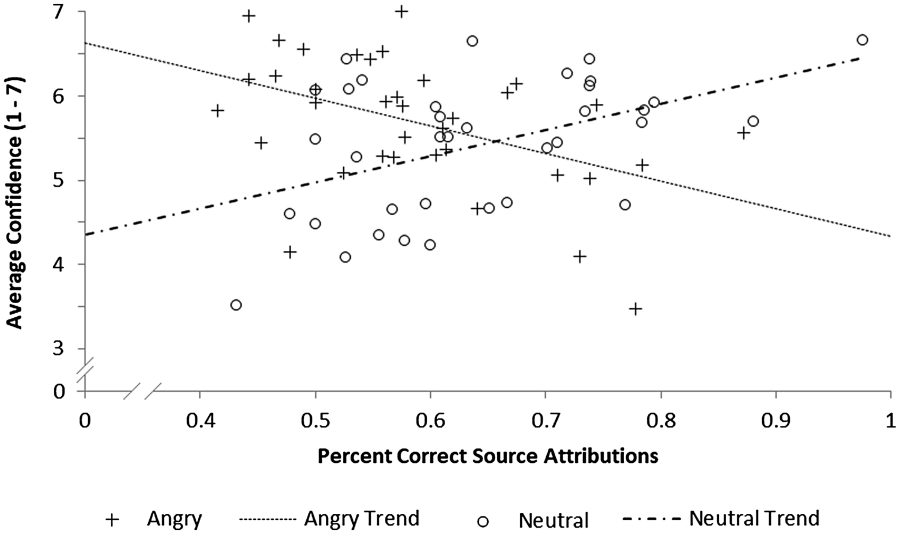

Figure 2. Angry participants' confidence increased as their source accuracy decreased, while neutral participants' confidence increased as their source accuracy increased.

© 2020 Hogrefe Publishing

https://econtent.hogrefe.com/doi/pdf/10.1027/1618-3169/a000489 - Greenstein Michael <mgreenstein1@framingham.edu> - Thursday, September 10, 2020 10:52:30 AM - IP Address:98.216.220.176

Response Time

Both the approach bias and increased heuristic use associated with anger are thought to support rapid responding in urgent situations (Carver & Harmon-Jones, 2009). Consistent with this, we predicted that source decisions would be made more rapidly by angry than by neutral participants. We excluded any trial in which a participant's source attribution response time was greater than three *SD*s from their personal mean (less than 1% of the data), and we excluded one participant whose mean response time was more than 5 *SD*s slower than the mean across participants. An independent samples *t*-test showed that angry participants (M = 4.68 s, SD = 8.75) made faster source attributions than neutral participants (M = 5.25 s, SD = 1.11), $t(69) = 2.24$, $p = .018$, 95% CI 101.72, 1,048.18, $d = .58$.

Discussion

Anger is an approach-oriented emotion adapted to guide behavior under circumstances that involve time pressure and consequences for safety. Because rapid cognition and disinhibition would support effective action under these circumstances, we made three predictions for how anger would impact outcomes in a misinformation paradigm as follows:

1. Reduced skepticism would increase susceptibility to postevent misinformation.
2. Disinhibition would be manifested as increased confidence.
3. More streamlined cognition would lead to faster responding.

We found evidence for all three of these outcomes. When time is of the essence, there is value in suppressing self-doubt to act quickly and decisively. While the experiment did not call for urgent action, the cognitive adaptations associated with anger should, as observed, impact cognition pervasively, suggesting that these findings reflect a broad cognitive style associated with anger. Furthermore, anger increased suggestibility for schema-irrelevant and schema-consistent details, demonstrating its broad impact on cognition.

Interestingly, anger did not seem to impair memory for events that actually did occur as it affected neither recognition memory nor source accuracy for details actually present in the original event. Instead, anger impaired the ability to dismiss errors that were subsequently suggested. This is consistent with the characterization of anger as streamlining cognition in support of action rather than additional reflection. Coupled with the observed rapid and confident memory decisions, this points to a constellation of risks associated with anger's impact on memory.

Because anger affected confidence and accuracy in opposite directions, it affected the confidence–accuracy relationship. The two are traditionally moderately correlated, as observed in the neutral condition. Anger, however, led to the opposite pattern where increased confidence was associated with decreased accuracy. To the extent that people use expressed confidence to judge the reliability of other people's memory (Wells et al., 1979), this may be problematic. Because anger did not impair participants' source accuracy for events that actually had occurred in the Film, outside observers with corroborating evidence of those film details would have a basis for accepting the participants' confident additional claims. This is precisely the sort of situation that jurors are exposed to in a courtroom.

The current work has clear implications for witness memory. Crimes can induce anger (Matsumoto & Hwang, 2015) and are associated with a risk of highly consequential memory impairment (Deffenbacher et al., 2004). Following an incident, witness memory is subject to postevent input, such as cowitness accounts or leading questions, which can distort memory (e.g., Roediger et al., 2001; Wade et al., 2002). With each discussion or interview comes renewed opportunity for misinformation effects, which our results suggest will disproportionately impact angry witnesses. To the extent that an angry witness becomes more prone to errors of action (incorporating postevent information into memory) rather than inaction (rejecting new information), their memory reports may become particularly unreliable.

Indeed, for at least three reasons, the observed effects may underpredict those that would occur following a crime. First, criminal cases may involve more repetition of and elaboration upon postevent misinformation than occurred in this experiment. For instance, criminal cases that lead to prosecution generally involve multiple interviews of the same eyewitness (e.g., by police officers, detectives, and prosecutors). Separate from these, witnesses often also relate details of the incident to cowitnesses, family, and friends and potentially receive incorrectly suggested details from these sources as well. Second, the anger experienced in a criminal case is likely directed at the source of the memory (the perpetrator) rather than at an incidental target (the experimenter). Although this work demonstrates that anger affects processing of content unrelated to the source of the anger, it is possible that the effects increase for related content. Third, the anger experienced by many victims and witnesses would likely exceed that of our laboratory participants. Inasmuch as the degree of anger that affects the tendency to fall prey to

© 2020 Hogrefe Publishing

https://econtent.hogrefe.com/doi/pdf/10.1027/1618-3169/a000489 - Greenstein Michael <mgreenstein1@framingham.edu> - Thursday, September 10, 2020 10:52:30 AM - IP Address:98.216.220.176

these biases, the potentially angrier victims and other witnesses may be impacted more than our participants were. It is also possible for the above factors to interact with one another, further increasing risk in real-world situations.

With regard to schematicity, participants in both emotion induction conditions accepted more schema-consistent than schema-irrelevant misinformation. The streamlined cognitive processing style associated with anger did not increase preexisting tendencies to incorporate this type of information into memory (Kleider et al., 2008), although this may also reflect the high plausibility of both schematic and schema-irrelevant items. While this work intentionally sought to use only highly plausible misinformation, future research should continue to explore this question using less plausible misinformation.

The current findings, coupled with the frequency with which anger is experienced (Matsumoto & Hwang, 2015), call for a greater understanding of its effects on memory. Much is already known about memory's vulnerability to misinformation, and the current work finds that anger can increase the frequency of these errors as well as one's confidence in them. Applied to criminal contexts, a richly detailed witness report, combined with high confidence in the associated memory, can contribute to heightened perception of credibility in the eyes of cowitnesses, investigators, judges, and jurors (Wells et al., 1979). Thus, the dangers of anger, particularly in the justice system, where the errors have real consequences, appear to be more serious than previously understood.

References

Bodenhausen, G. V., Sheppard, L. A., & Kramer, G. P. (1994). Negative affect and social judgment: The differential impact of anger and sadness. *European Journal of Social Psychology*, *24*(1), 45–62. https://doi.org/10.1002/ejsp.2420240104

Carver, C. S., & Harmon-Jones, E. (2009). Anger is an approach-related affect: Evidence and implications. *Psychological Bulletin*, *135*(2), 183. https://doi.org/10.1037/a0013965

Corson, Y., & Verrier, N. (2007). Emotions and false memories: Valence or arousal? *Psychological Science*, *18*(3), 208–211. https://doi.org/10.1111/j.1467-9280.2007.01874.x

Deffenbacher, K. A., Bornstein, B. H., Penrod, S. D., & McGorty, E. K. (2004). A meta-analytic review of the effects of high stress on eyewitness memory. *Law and Human Behavior*, *28*(6), 687. https://doi.org/10.1007/s10979-004-0565-x

DeSoto, K. A., & Roediger, H. L. (2014). Positive and negative correlations between confidence and accuracy for the same events in recognition of categorized lists. *Psychological Science*, *25*(3), 781–788. https://doi.org/10.1177/0956797613516149

Finucane, A. M. (2011). The effect of fear and anger on selective attention. *Emotion*, *11*(4), 970–974. https://doi.org/10.1037/a0022574

Grand, R., Grillo, M., Nanas, H., & Brooks, A. (1991). *Defending your life* [Motion picture]. Warner Bros.

Howe, M. L., & Malone, C. (2011). Mood-congruent true and false memory: Effects of depression. *Memory*, *19*(2), 192–201. https://doi.org/10.1080/09658211.2010.544073

Hunt, R. R. (2013). Precision in memory through distinctive processing. *Current Directions in Psychological Science*, *22*(1), 10–15. https://doi.org/10.1177/0963721412463228

Isen, A. M., Clark, M., & Schwartz, M. F. (1976). Duration of the effect of good mood on helping: "Footprints on the sands of time." *Journal of Personality and Social Psychology*, *34*(3), 385. https://doi.org/10.1037/0022-3514.34.3.385

Kaplan, R. L., Van Damme, I., Levine, L. J., & Loftus, E. F. (2016). Emotion and false memory. *Emotion Review*, *8*(1), 8–13. https://doi.org/10.1177/1754073915601228

Kensinger, E. A. (2009). Remembering the details: Effects of emotion. *Emotion Review*, *1*(2), 99–113. https://doi.org/10.1177/1754073908100432

Kleider, H. M., Pezdek, K., Goldinger, S. D., & Kirk, A. (2008). Schema-driven source misattribution errors: Remembering the expected from a witnessed event. *Applied Cognitive Psychology*, *22*, 1–20. https://doi.org/10.1002/acp.1361

Levine, L. J., & Burgess, S. L. (1997). Beyond general arousal: Effects of specific emotions on memory. *Social Cognition*, *15*(3), 157–181. https://doi.org/10.1521/soco.1997.15.3.157

Loftus, E. F., Miller, D. G., & Burns, H. J. (1978). Semantic integration of verbal information into a visual memory. *Journal of Experimental Psychology: Human Learning and Memory*, *4*(1), 19–31. https://doi.org/10.1037/0278-7393.4.1.19

Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. *Psychiatric Annals*, *25*(12), 720–725. https://doi.org/10.3928/0048-5713-19951201-07

Matsumoto, D., & Hwang, H. C. (2015). Emotional reactions to crime across cultures. *International Journal of Psychology*, *50*(5), 327–335. https://doi.org/10.1002/ijop.12103

Porter, S., Bellhouse, S., McDougall, A., Ten Brinke, L., & Wilson, K. (2010). A prospective investigation of the vulnerability of memory for positive and negative emotional scenes to the misinformation effect. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, *42*(1), 55. https://doi.org/10.1037/a0016652

Porter, S., Spencer, L., & Birt, A. R. (2003). Blinded by emotion? Effect of the emotionality of a scene on susceptibility to false memories. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, *35*(3), 165. https://doi.org/10.1037/h0087198

Roediger, H. L., Meade, M. L., & Bergman, E. T. (2001). Social contagion of memory. *Psychonomic Bulletin & Review*, *8*(2), 365–371. https://doi.org/10.3758/BF03196174

Schmechel, R. S., O'Toole, T. P., Easterly, C., & Loftus, E. F. (2006). Beyond the ken? Testing jurors' understanding of eyewitness reliability evidence. *Jurimetrics*, *46*, 177–214. http://www.jstor.org/stable/29762929

Schwarzer, R., Bäßler, J., Kwiatek, P., Schröder, K., & Zhang, J. X. (1997). The assessment of optimistic self-beliefs: Comparison of the German, Spanish, and Chinese versions of the General Self-efficacy Scale. *Applied Psychology: An International Review*, *46*(1), 69–88. https://doi.org/10.1111/j.1464-0597.1997.tb01096.x

Shaw, J., & Porter, S. (2015). Constructing rich false memories of committing crime. *Psychological Science*, *26*(3), 291–301. https://doi.org/10.1177/0956797614562862

Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, *48*(4), 813–838. https://doi.org/10.1037/0022-3514.48.4.813

Spielberger, C. D., Krasner, S. S., & Solomon, E. P. (1988). The experience, expression, and control of anger. In M. P. Janisse

 © 2020 Hogrefe Publishing

https://econtent.hogrefe.com/doi/pdf/10.1027/1618-3169/a000489 - Greenstein Michael <mgreenstein1@framingham.edu> - Thursday, September 10, 2020 10:52:30 AM - IP Address:98.216.220.176

(Ed.), *Individual differences, stress, and health psychology* (pp. 89–108). New York, NY: Springer. ISBN 978-1-4612-3824-9.

Storbeck, J., & Clore, G. L. (2005). With sadness comes accuracy; with happiness, false memory: Mood and the false memory effect. *Psychological Science*, *16*(10), 785–791. https://doi.org/10.1111/j.1467-9280.2005.01615.x

Tiedens, L. Z. (2001). The effect of anger on the hostile inferences of aggressive and nonaggressive people: Specific emotions, cognitive processing, and chronic accessibility. *Motivation and Emotion*, *25*(3), 233–251. https://doi.org/10.1023/A:1012224507488

Van Damme, I. (2013). Mood and the DRM paradigm: An investigation of the effects of valence and arousal on false memory. *Quarterly Journal of Experimental Psychology*, *66*(6), 1060–1081. https://doi.org/10.1080/17470218.2012.727837

Van Damme, I., Kaplan, R. L., Levine, L. J., & Loftus, E. F. (2017). Emotion and false memory: How goal-irrelevance can be relevant for what people remember. *Memory*, *25*(2), 201–213. https://doi.org/10.1080/09658211.2016.1150489

Wade, K. A., Garry, M., Don Read, J., & Stephen Lindsay, D. (2002). A picture is worth a thousand lies: Using false photographs to create false childhood memories. *Psychonomic Bulletin & Review*, *9*(3), 597–603. https://doi.org/10.3758/bf03196318

Wells, G. L., & Lindsay, R. C., & Ferguson, T. J. (1979). Accuracy, confidence, and juror perceptions in eyewitness identification. *Journal of Applied Psychology*, *64*(4), 440–448. https://doi.org/10.1037/0021-9010.64.4.440

History
Received October 7, 2019
Revision received June 2, 2020
Accepted June 26, 2020
Published online September 7, 2020

Acknowledgments
The authors would like to thank the research assistants who collected the data for this project and four anonymous reviewers who provided helpful comments on this manuscript.

Open Data
The data used in this project can be found at https://doi.org/10.6084/m9.figshare.8340698.v1. Any questions about this data should be sent to the corresponding author.

ORCID
Michael Greenstein
https://orcid.org/0000-0001-9763-4752

Michael Greenstein
Department of Psychology and Philosophy
100 State Street
PO Box 9101
Framingham, MA 01701-9101
USA
mgreenstein1@framingham.edu

© 2020 Hogrefe Publishing