

UC Santa Barbara

UC Santa Barbara Previously Published Works

Title

Angry expressions induce extensive processing of persuasive appeals

Permalink

<https://escholarship.org/uc/item/56v4c67t>

Authors

Calanchini, Jimmy

Moons, Wesley G

Mackie, Diane M

Publication Date

2016-05-01

DOI

10.1016/j.jesp.2016.02.004

Peer reviewed



Angry expressions induce extensive processing of persuasive appeals



Jimmy Calanchini ^{a,*}, Wesley G. Moons ^b, Diane M. Mackie ^c

^a University of California, Davis, United States

^b Moons Analytics, United States

^c University of California, Santa Barbara, United States

HIGHLIGHTS

- Angry expressions led to more favorable attitudes towards strong than weak arguments.
- Other expressions led to equally favorable attitudes towards strong & weak arguments.
- Angry expressions induced processing in people who do not normally process carefully.
- Threat signaled by angry expressions induced extensive processing of appeals.

ARTICLE INFO

Article history:

Received 22 July 2015

Revised 8 February 2016

Accepted 15 February 2016

Available online 17 February 2016

Keywords:

Emotion expressions

Persuasion

Attitudes

Anger

Threat

ABSTRACT

Persuasive appeals sometimes include expressions of anger in an attempt to influence message recipients' thoughts, attitudes, and behaviors. The current research investigated how angry expressions change the way in which a persuasive appeal is considered. In five experiments, participants reported more favorable attitudes towards strong than weak appeals attributed to sources expressing anger, indicating careful processing of those appeals. However, participants reported equally favorable attitudes towards appeals attributed to sources expressing other emotions, indicating a lack of careful processing. Angry expressions induced extensive processing even in those not dispositionally inclined to do so, and also influenced attitudes towards issues related to, but not specifically addressed in, the appeal. Mediation and causal-chain analyses indicate that extensive processing was induced by the threat signaled by angry expressions.

© 2016 Elsevier Inc. All rights reserved.

1. More extensive processing of persuasive appeals from angry sources

Imagine you are on a jury that must decide the guilt or innocence of a person charged with murder. The life-or-death decision facing you depends not only upon the facts presented in the case, but also upon the interpersonal dynamics that transpire among you and your fellow jurors during deliberations. Such was the situation depicted in the film *12 Angry Men*. For example, Juror 10 argues angrily that the defendant's ethnicity and socioeconomic status are sufficient evidence of his guilt. This blatantly racist claim offends the other jurors who collectively turn their backs to him. In contrast, Juror 8 rises to anger in order to draw attention to inconsistencies in the prosecution's case that had been overlooked by the inept public defender, which sets in motion a cascade of attitude change among his fellow jurors that ultimately produces a verdict of not guilty.

Juror 10's arguments apparently lacked merit and were rejected, whereas Juror 8's arguments were apparently well-founded and won over his fellow jurors. However, as the saying goes, sometimes it is not just what you say, but also how you say it. Perhaps the ultimate outcome of these deliberations was not due to the content of the arguments alone, but also was influenced by the angry manner in which the arguments were delivered. Did expressing anger make Juror 10's weak arguments even less persuasive, but make Juror 8's strong arguments even more persuasive? More broadly, does the source of a persuasive appeal's simultaneous expression of anger influence the way in which that appeal is considered?

Angry expressions signal important information about the angry person's inner states. According to Van Kleef's (2009) emotions as social information (EASI) model, emotion expressions provide information about how the source of the emotion regards a situation which, in turn, can activate inferential processes in the perceiver. Specific emotions arise in response to appraisals of specific situations (Frijda, 1986; Lazarus, 1991), so emotion expressions provide relatively precise information about the source of the emotion's intentions (Fridlund, 1994; Keltner & Haidt, 1999), inner states (Ekman, 1993), and orientation

* Corresponding author at: Department of Psychology, 134 Young Hall, 1 Shields Ave, Davis, CA 95616, United States.

E-mail address: jcalanchini@ucdavis.edu (J. Calanchini).

towards others (Hess, Blairy, & Kleck, 2000; Knutson, 1996). Inferential processes have been shown to influence perceiver's judgments and behaviors across a variety of domains. Angry negotiators receive larger concessions than do those expressing other emotions (Van Kleef, De Dreu, & Manstead, 2004). In the workplace, managers who strategically feign anger induce greater compliance among subordinates (Fitness, 2000; Sy, Côté, & Saavedra, 2005). Team members high in information-processing motivation infer from their leader's anger that their performance is unsatisfactory and, subsequently, increase their engagement and work harder to improve their performance (Van Kleef, Anastasopoulou, & Nijstad, 2010; Van Kleef et al., 2009). However, expressing anger can decrease compliance when anger is seen as inappropriate, such as when making a request for help (Van Doorn, Van Kleef, & Van der Pligt, 2015). Similarly, work groups that contain an angry confederate exhibit poorer cooperation than groups with a happy confederate (Barsade, 2002). Thus, expressions of anger can influence judgments and behaviors across a host of domains, sometimes facilitating and sometimes impeding the expresser's intended outcome.

Given that expressed emotion can have consequences for negotiation, leadership, and compliance, we propose that the inferential processes activated by angry expressions also influence how a persuasive appeal is considered. When people receive persuasive appeals, they consider them in two main ways (Chaiken, 1987; Petty & Cacioppo, 1986; for a review, see Smith & DeCoster, 2000). Decades of research have demonstrated that people can engage in a relatively fast, effortless, and superficial style of information processing that requires few cognitive resources. This *non-analytic* information processing is often driven by heuristic cues.¹ Heuristics are quick and efficient decision strategies that operate, in part, by prioritizing some information over other information (Gigerenzer & Gaissmaier, 2011). For example, the status of the source of a persuasive appeal can act as a heuristic for expertise: A doctor might be more persuasive than a layperson, even if both make identical appeals. Thus, heuristic-driven attitude change can happen independently of the content of a persuasive appeal itself. Consequently, non-analytic processing is often characterized by impoverished analysis of the information such that non-analytic processors are typically unable to distinguish between strong, compelling persuasive arguments and weak, specious arguments (Cacioppo, Petty, & Morris, 1983).

In contrast, people can engage in *analytic* information processing, a slower, more effortful, and more extensive scrutiny of information. Analytic processing is characterized by effortful, deliberate, and systematic consideration and evaluation of information. Because analytic processors attend to the content of an appeal, their judgments are sensitive to variations in information quality. Thus, an individual processing analytically will be more persuaded by strong, compelling arguments than by weak, specious arguments. However, in order to engage in this more taxing analytic processing style, persuasive appeal recipients need both the ability and the motivation to do so (Cacioppo et al., 1983; Petty & Cacioppo, 1984).

If angry expressions influence how a persuasive appeal is considered, do they act as heuristics, induce analytic processing, or both? Although no previous research (to our knowledge) has examined the relation between emotion expressions and processing, there have been numerous demonstrations that the personal and subjective experience of felt emotions can determine whether or not people engage in analytic or non-analytic processing. Some research has shown that people experiencing anger are more likely to base judgments on heuristics than people experiencing other emotions (e.g., Bodenhausen, Sheppard, & Kramer, 1994; Tiedens & Linton, 2001). These findings are often interpreted as anger reflecting physiological or motivational states, such as high arousal or high certainty, that reduce the ability or

motivation to process analytically (Smith & Ellsworth, 1985; Walley & Weiden, 1973). In contrast, other theoretical perspectives view the negative internal states associated with anger as conducive to analytic processing (e.g., Schwarz, 1990; Wegener & Petty, 1994). For example, negative affect may signal that something is wrong in the environment and, consequently, motivate careful scrutiny. That the personal experience of anger can both increase reliance on heuristics and also induce analytic processing is consistent with the idea of multiple roles articulated in the Elaboration Likelihood Model of persuasion (Petty & Cacioppo, 1986; Petty, Schumann, Richman, & Strathman, 1993): the same cue might serve as a heuristic when processing is constrained to be low, but induce careful processing in less constrained circumstances.

Although previous research has demonstrated that people experiencing anger can engage in both analytic and non-analytic processing, there are reasons why these findings might not directly translate into predictions about how emotion expressions influence processing. For example, an angry expression signals information about the inner state of the source of the persuasive appeal, rather than the inner state of the person receiving the appeal. It is unknown whether such information about the source's inner state has effects on judgments similar to the effects a target's inner state might have. Similarly, inner states are hard to fake, whereas emotion expressions can be feigned strategically. Thus, it is uncertain whether perceivers will assign the same legitimacy to a source's anger as they would to their own. Thus, it remains an open question whether and how angry expressions will influence how a persuasive appeal is considered.

We conducted three experiments to assess the basic effect of angry expressions on analytic and non-analytic processing. Moreover, we began by constraining processing to be low by presenting participants with persuasive appeals of little relevance to them. If angry expressions influence processing in a similar manner as other source cues (e.g., Petty et al., 1993), then they should be used as heuristics under such low-processing conditions and participants will report more (or less) favorable attitudes towards appeals attributed to angry relative to other sources, regardless of appeal quality. However, it is also possible that angry expressions influence judgments differently than do other source cues and, thus, induce analytic processing. If so, then participants should report more favorable attitudes towards strong than weak appeals attributed to angry sources but, because processing is otherwise constrained to be low, report equally favorable attitudes towards strong and weak appeals attributed to sources expressing other emotions. Again, these outcomes are not mutually exclusive: participants could simultaneously use angry expressions as heuristics and also process the persuasive appeal analytically. The first three experiments were designed to assess all of these possibilities.

2. Experiments 1–3: assessment of the anger expression-processing effect

The purpose of Experiments 1–3 was to investigate how angry expressions influence the processing of a persuasive appeal. To test our competing hypotheses regarding the ways in which angry expressions might influence processing, participants read an appeal consisting of strong, compelling statements or weak, specious statements attributed to a source who was pictured expressing anger or other emotions. Because of the similar design of these three experiments, we report them together.

2.1. Participants and design

All participants in Experiments 1–3 were undergraduates at the University of California, Davis (UCD) who participated for partial course credit. In Experiment 1, 233 participants (150 women, three did not report, $M_{age} = 19.85$, $SD_{age} = 2.69$) were randomly assigned to a 5 (Emotion Expression: anger, disgust, fear, sadness, or neutral) \times 2 (Appeal Quality: strong or weak) \times 2 (Emotion Source

¹ Throughout this paper, we primarily use the terms *analytic* and *non-analytic* to refer to the two types of processing described in many dual-process models of cognition. Rather than adopting the terminology of one specific model, we choose these terms for both their generality and neutrality.

Sex: female or male) between-subjects design. In Experiment 2, 216 participants (155 women, three did not report, $M_{\text{age}} = 19.55$, $SD_{\text{age}} = 1.43$) were randomly assigned to a 3 (Emotion Expression: anger, fear, or neutral) \times 2 (Appeal Quality: strong or weak) \times 2 (Emotion Source Sex: female or male) between-subjects design. In Experiment 3, 229 participants (185 women, two did not report, $M_{\text{age}} = 19.82$, $SD_{\text{age}} = 2.59$) were randomly assigned to a 3 (Emotion Expression: angry, happy, or neutral) \times 2 (Appeal Quality: strong or weak) between-subjects design.

2.2. Procedure

Participants in all three experiments were told that their goal was to become familiar with an unknown person by seeing the person's picture and reading the person's opinion on a specific proposal. They first read some brief background information about the proposal, and then were presented with a persuasive appeal regarding the proposal accompanied by a digital image of a person to whom the appeal was attributed.

2.2.1. Manipulation of emotion expression

In Experiment 1, the appeal was randomly attributed to a male or female source expressing anger, disgust, fear, sadness, or a neutral expression using pictures from the UCD Set of Emotional Expressions photoset (UCDSEE: Tracy, Robins, & Schriber, 2009). In Experiment 2, the appeal was randomly attributed to a male or female source expressing anger, fear, or a neutral expression using pictures from Karolinska Directed Emotional Faces photo set (KDEF: Lundqvist, Flykt, & Öhman, 1998). In Experiment 3, the appeal was attributed to a male source expressing anger, happiness, or a neutral expression (Lundqvist et al., 1998). All pictures can be found in the Online Supplement.²

2.2.2. Manipulation of argument quality

Participants were told that a proposal was under consideration at a distant university, and that the person whose picture accompanied the appeal was a member of that community who expressed his or her opinion on the proposal. The persuasive appeals contained either strong, compelling statements or weak, specious statements. The complete text of all of the appeals can be found in the Online Supplement.

In Experiment 1, participants read strong or weak appeals opposing a proposal to create a swimsuit calendar featuring student athletes at the University of Miami (adapted from Debono & Harnish, 1988). Each appeal began with the stem "I feel extremely angry (disgusted, afraid, sad)." followed by the body of the appeal. The neutral condition included no stem. In Experiments 2 and 3, participants read strong or weak appeals supporting a proposal to implement comprehensive exams for college seniors at the University of Miami (Petty, Cacioppo, & Goldman, 1981). In Experiment 2, each appeal began with the stem, "I'm angry (afraid, aware) that..." followed by the body of the appeal. In Experiment 3, each appeal began with the stem "I'm angry (happy) about this." The neutral condition included no stem. The appeal in Experiment 3 also specified that the proposal would not take effect until the Fall of 2024, over 10 years into the future. We set the proposals to take place at distant universities in order to minimize their relevance to our participants and, thus, constrain processing to be low (e.g., Axsom, Yates, & Chaiken, 1987; Petty & Cacioppo, 1979). We additionally specified that the proposal in Experiment 3 would take effect 10 years in the future in order to decrease the relevance even further (e.g., Petty & Cacioppo, 1984; Sorrentino, Bobocel, Gitta, Olson, & Hewitt, 1988).

We varied characteristics of the persuasive appeals across experiments to ensure that any processing effects found were not due to idiosyncrasies of specific messages. Importantly, the appeals used in

Experiment 1 opposed the proposal under consideration, whereas the appeals used in Experiments 2 and 3 supported the proposal under consideration, effectively ruling framing effects out as a possible explanation (Rothman & Salovey, 1997). Additionally, agreement with the appeals used in Experiments 2 and 3 represents support for a proposal (i.e., the implementation of comprehensive exams) that is counterattitudinal in a college population (Claypool, Mackie, Garcia-Marques, McIntosh, & Udall, 2004).

2.2.3. Attitude index

After reading the appeal, participants responded to a series of questions assessing their agreement with the appeal. In Experiment 1, these included "How much do you support the proposal to create a swimsuit calendar featuring student athletes?" (1 = not at all, 7 = very strongly) and 7-point semantic differential scales (bad/good, negative/positive, and foolish/wise) completing the stem "The proposal for a swimsuit calendar featuring University of Miami student athletes is". All items were averaged into an attitude index ($\alpha = 0.94$) that was reverse-coded so that higher scores indicated increased agreement with the persuasive appeal. In Experiments 2 and 3 items included "Should comprehensive exams be implemented?" (1 = strongly disagree, 7 = strongly agree) and 7-point semantic differential scales (bad/good, negative/positive, foolish/wise, and harmful/beneficial) completing the stem "Comprehensive exams are:". All items were averaged into an attitude index (Experiment 2 $\alpha = 0.93$; Experiment 3 $\alpha = 0.93$) such that higher values indicated increased support for comprehensive exams. The attitude index is interpreted as evidence of processing: participants processing analytically are expected to report more favorable attitudes towards strong than weak appeals, and participants processing non-analytically are expected to report more (or less) favorable attitudes towards appeals regardless of argument quality.³ Finally, all participants completed demographics.

3. Results and discussion

3.1. Attitude index

The mean level of agreement with strong and weak persuasive appeals for each of the emotion expressions is presented in Table 1. For Experiment 1, the attitude index was subjected to a 5 (emotion expression) \times 2 (appeal quality) between-subjects ANOVA. The main effect of appeal quality on agreement was not significant, $F(1, 233) = 0.50$, $p = .48$, $\eta^2_{\text{partial}} < 0.01$, nor was the main effect of emotion expression, $F(4, 233) = 1.19$, $p = .32$, $\eta^2_{\text{partial}} = 0.02$. The interaction between appeal quality and emotion expression was also not significant, $F(4, 233) = 1.88$, $p = .12$, $\eta^2_{\text{partial}} = 0.03$. The sex of the participant, the sex of the source of the emotional appeal, and the interaction between participant and source sex did not moderate the relation between emotion expressions and agreement, all $ps > .38$, and thus were not included as factors in subsequent analyses.

For Experiment 2, three participants did not complete the attitude measures, and two participants were removed from the analysis for producing scores more than three SD from the mean on the attitude index. All subsequent analyses include the remaining 211 participants. The attitude index was subjected to a 3 (emotion expression) \times 2 (appeal quality) \times 2 (source sex) \times 2 (participant sex) between-subjects ANOVA. A main effect of appeal quality revealed that strong appeals were evaluated more favorably ($M = 4.80$, $SD = 1.02$) than weak appeals ($M = 4.22$, $SD = 1.14$), $F(1, 211) = 8.42$, $p = .004$, $\eta^2_{\text{partial}} = 0.04$. There was no main effect of emotion nor did source emotion

² By representing emotion expressions using different photo databases across Experiments 1–3, we can rule out the possibility that our results were driven by stimulus-specific idiosyncrasies. A more extensive discussion of this point can be found in the Online Supplement.

³ Though there are empirical precedents for relying on differential effects of weak and strong arguments on reported attitudes as evidence of analytic processing (see Briñol, Petty, & Wheeler, 2006), we also assessed message elaboration in Experiment 2 as an additional direct indicator of such processing. See the Online Supplement for further discussion and analysis of this point.

Table 1
Attitude favorability, by emotion expression and appeal quality, Experiments 1–3.

	Anger	Disgust	Fear	Happy	Sad	Neutral
Exp. 1						
Strong	4.90 (1.58)	4.60 (1.35)	4.06 (1.25)		4.41 (1.36)	5.05 (1.55)
Weak	3.91 (1.24)	4.59 (1.32)	4.23 (1.53)		4.53 (1.44)	4.44 (1.49)
Exp. 2						
Strong	5.03 (0.95)		4.64 (0.87)			4.69 (1.19)
Weak	4.04 (1.02)		4.46 (1.00)			4.16 (1.36)
Exp. 3						
Strong	4.88 (1.17)			4.35 (1.29)		4.71 (1.07)
Weak	4.26 (1.19)			4.35 (1.02)		4.65 (1.52)

Note: (Standard deviations).

interact with appeal quality, $F_s < 1.70$. None of the sex of the participant, the sex of the source of the emotional appeal, nor any interactions between participant and source sex moderated the relation between emotion expressions and agreement, $F_s < 1.90$ and, thus, were not included as factors in subsequent analyses.

For Experiment 3, the attitude index was subjected to a 3 (emotion expression) \times 2 (appeal quality) between-subjects ANOVA. There was no main effect of either appeal quality, $F(1, 229) = 2.05, p = .15, \eta^2_{\text{partial}} = 0.01$, or emotion, $F(2, 229) = 1.47, p = .23, \eta^2_{\text{partial}} = 0.01$, and the interaction between appeal quality and emotion expression was not significant, $F(2, 229) = 1.52, p = .22, \eta^2_{\text{partial}} = 0.01$. Even though the same stimuli were used in Experiments 2 and 3, the null effect of argument quality in Experiment 3 is perhaps unsurprising, given that we deliberately decreased the relevance of the appeal in order to further decrease default processing.

In order to test our specific predictions, we conducted a series of follow-up analyses. Across all three experiments, analysis of the simple main effects of emotion expressions collapsed across appeal quality conditions revealed that participants did not report any more (or less) favorable attitudes towards appeals paired with angry expressions than appeals paired with any other emotion expression: Experiment 1, all $t_s < 1.11$; Experiment 2, all $t_s < 0.68$; Experiment 3, all $t_s < 1.68$. This pattern of results suggests that none of the emotion expressions was used as a heuristic.

Analysis of the simple main effects of emotion expression within levels of appeal quality revealed that participants across all three experiments who saw angry expressions reported more favorable attitudes towards the persuasive appeal after reading strong appeals than weak appeals: Experiment 1, $t(46) = 2.36, p = .02, d = 0.70$; Experiment 2, $t(68) = 4.20, p < .001, d = 1.02$; Experiment 3, $t(74) = 2.32, p = .02, d = 0.54$. In Experiment 2, participants who saw neutral expressions reported marginally more favorable attitudes towards comprehensive exams after reading strong appeals than weak appeals, $t(69) = 1.77, p = .08, d = 0.43$. However, in Experiments 1 and 3, participants who saw neutral expressions reported equally favorable attitudes towards strong and weak appeals, all $t_s < 0.23$. Similarly, across all three experiments, participants reported equally favorable attitudes towards strong and weak appeals attributed to disgusted, fearful, happy, or sad sources, all $t_s < 0.82$. This pattern of results suggest that angry expressions elicited analytic processing of the persuasive appeals, in that participants' responses indicate that they were sensitive to the quality of the arguments, but other emotion expressions did not.

3.2. Meta-analyses of Experiments 1, 2, and 3: the anger expression-processing effect

Across all three experiments, participants reported more favorable attitudes towards strong than weak appeals accompanied by angry expressions. However, none of the omnibus analyses reached conventional levels of significance and, thus, these effects should be interpreted cautiously. Cell sizes in these experiments exceeded the best practice

of 20 per group recommended by Simmons, Nelson, and Simonsohn (2011) at the time we began this line of research (average $N_s = 23.3, 36, \text{ and } 38.17$, respectively). Given the consistent pattern of results, but no significant appeal quality \times emotion expression interactions, one possibility is that these experiments all lacked sufficient statistical power to detect reliable effects despite sample sizes that exceeded norms for the field. Thus, to determine the reliability of the effect of angry expressions on how persuasive appeals are considered, we meta-analyzed the effect of angry expressions relative to other expressions using the metafor package in R (Viechtbauer, 2010).

We estimated the size of the difference between the effect of angry and other expressions (i.e., disgust, fear, happiness, sadness) on responses to strong versus weak appeals. For Experiment 1, we compared the effect of angry expressions against disgust, fear, and sadness expressions with a contrast, assigning weights of 3 and -3 to strong and weak appeals paired with angry expressions, respectively, weights of -1 and 1 to strong and weak appeals paired with disgust, fear, and sadness expressions, respectively, and zeroes to neutral expressions, $F(1, 223) = 3.46, p = .06, \eta^2_{\text{partial}} = 0.02$. For Experiment 2, we compared the effect of angry expressions against fear expressions with a contrast, assigning weights of 1 and -1 to strong and weak appeals paired with angry expressions, respectively, weights of -1 and 1 to strong and weak appeals paired with fear expressions, respectively, and zeroes to neutral expressions, $F(1, 205) = 4.89, p = .03, \eta^2_{\text{partial}} = 0.02$. For Experiment 3, we compared the effect of angry expressions against happy expressions with a contrast, assigning weights of 1 and -1 to strong and weak appeals paired with angry expressions, respectively, weights of -1 and 1 to strong and weak appeals paired with happy expressions, respectively, and zeroes to neutral expressions, $F(1, 223) = 2.46, p = .11, \eta^2_{\text{partial}} = 0.01$. Meta-analyzing these three effects revealed a significant summary effect, $Z = -2.25, 95\% \text{ CI } [-1.11, -0.08], SE = 0.26, p = .02$. A more conservative meta-analytic test which includes neutral expressions along with disgust, fear, happiness, and sadness in the three contrasts against anger resulted in an identical pattern of results, $Z = -2.27, 95\% \text{ CI } [-1.90, -0.14], SE = .45, p = .02$. Thus, these results indicate a reliable effect of angry expressions inducing analytic processing of persuasive appeals.

This meta-analysis also allowed us to test two possible mechanisms underlying the anger expression-processing effect. The first mechanism was the valence of the emotion expressed by the person to whom the persuasive appeal was attributed. According to Schwarz (1990) model of emotions as information, the experience of negative emotion such as anger indicates that something is wrong and processing resources must be engaged to deal effectively with the situation. Conversely, the experience of positive emotion indicates that all is well and effortful processing is unnecessary. If this perspective can be extended from experienced emotions to emotion expressions, then the expression of a negative emotion might signal to the perceiver that the source of the emotion regards something to be wrong. Thus, a negative emotion expression accompanying a persuasive appeal might induce the perceiver to scrutinize the content of the appeal in order to understand and potentially resolve the

situation. Conversely, a positive emotion expression accompanying a persuasive appeal might signal that all is well and reduce effortful scrutiny of the appeal. The meta-analysis revealed no evidence that the valence of the emotion expressed by the appeal source reliably influenced analytic processing (see the Online Supplement for more details).

The second mechanism we tested was the certainty associated with the emotion expressed by the appeal source. Tiedens and Linton (2001) demonstrated that participants experiencing relatively low-certainty emotions (e.g., fear) processed persuasive appeals more carefully than participants experiencing relatively high-certainty emotions (e.g., anger). The heuristic-systematic model of persuasion proposes that analytic processing is triggered when one's actual level of confidence in a judgment falls below one's desired level of confidence (the *sufficiency threshold*; Chen & Chaiken, 1999). If this perspective can be extended from experienced emotions to emotion expressions, then the expression of a high-certainty emotion paired with a persuasive appeal might decrease the perceiver's confidence gap and reduce scrutiny of the appeal. Conversely, a low-certainty emotion expression paired with a persuasive appeal might increase the perceiver's confidence gap and induce the perceiver to scrutinize the content of the appeal. However, given that anger is associated with high certainty (Smith & Ellsworth, 1985), this mechanism predicts the opposite of what we found in Experiments 1–3, and the meta-analysis produced no evidence that certainty of expressed emotion influenced analytic processing (see the Online Supplement for more details).

4. Experiment 4

Experiments 1, 2, and 3 demonstrated that angry expressions reliably induced analytic processing of persuasive appeals, compared with disgusted, fearful, happy, sad, or neutral expressions. In addition, various conditions in those experiments allowed us to eliminate emotion expression valence and certainty as explanations of this effect. However, angry expressions differ in other ways from other emotion expressions. For example, anger also signals threat (Ekman & Friesen, 1975). Perhaps the threat signaled by angry expressions induces perceivers to carefully scrutinize the contents of the appeal made by angry sources. Thus, the main purpose of Experiment 4 was to test perceptions of threat as the mechanism by which angry expressions influence how a persuasive appeal is considered.

Experiment 4 also allowed us to confirm the power of the effect of angry expressions to induce processing. In Experiments 1, 2, and 3, angry expressions induced college students to analytically process persuasive appeals, even when the appeal is of low relevance. However, college students differ from the general population in several important ways: they have been pre-selected for their above average cognitive proclivities but, at the same time, are more easily influenced than older adults because they have less crystallized social attitudes (Sears, 1986). In Experiment 4, we collected data from an adult sample with greater cognitive variability than the college student samples used in Experiments 1, 2, and 3. Dispositional tendencies to engage in and enjoy effortful cognitive endeavors were measured using the Need for Cognition scale (NFC; Cacioppo & Petty, 1982). People who are high in NFC chronically pay attention to appeal quality and, therefore, generally report more favorable attitudes towards strong than weak arguments. Conversely, people who are low in NFC do not typically pay as much attention to appeal quality and, therefore, report equally favorable attitudes towards strong and weak arguments (Cacioppo et al., 1983). The power of the effect of angry expressions to trigger extensive processing will be obvious if it induces such processing even among people with low NFC. We thus anticipated that, in response to an appeal attributed to a source expressing fear, high NFC participants would report more favorable attitudes towards strong than weak appeals but low NFC participants would not. In contrast, if angry expressions override even low NFC participants' predisposition to superficially consider an appeal, our key prediction was that participants who evaluated persuasive appeals

attributed to a source expressing anger would report more favorable attitudes towards strong than weak appeals, regardless of NFC.

4.1. Participants and design

Participants were 207 U.S. residents (106 women; $M_{age} = 39.50$, $SD_{age} = 14.70$) recruited through Amazon's Mechanical Turk in exchange for \$0.50. Participants were randomly assigned to a 2 (Emotion Expression: anger or fear) \times 2 (Appeal Quality: strong or weak) between-subjects design. Thus, the average number of observations per cell was 51.75, almost double the average sample size used in Experiments 1–3.

4.2. Materials and procedure

4.2.1. Need for cognition

First, all participants read an introduction screen which stated that they would be completing a series of unrelated tasks which had been bundled together. Next, all participants completed the NFC scale (Cacioppo & Petty, 1982), which was averaged into a composite score ($\alpha = 0.94$).

4.2.2. Threat index

Participants were told that the purpose of the next task was to investigate what information people can glean from just a photograph. Then they viewed one of the male faces from Experiment 2 expressing either anger or fear (Lundqvist et al., 1998), which they evaluated on three items measuring cognitive appraisals of threat: "How dangerous is this person?", "How threatening is this person?", and "How menacing is this person?" Responses were made on 7-point scales (1 = not at all, 7 = very much). These items were averaged into a threat index ($\alpha = 0.95$).

4.2.3. Manipulation of appeal quality

Next, in an ostensibly unrelated task, participants were told that their goal was to become familiar with an unknown person by seeing the person's picture and reading the person's opinion on a specific proposal. Participants were presented with a strong or weak persuasive appeal in favor of a tax increase to improve highways (Weisbuch, Mackie, & Garcia-Marques, 2003). The appeals started with "I am angry (scared)..." followed by the body of the appeal. The appeal was presented with and attributed to the same digital image of a male source expressing anger or fear that participants had viewed previously in the threat evaluation task. The complete text of the persuasive appeals can be found in the Online Supplement.

4.2.4. Attitude index

After reading the appeal, participants responded to a series of questions assessing their agreement with the appeal. These included, "Taxes to help repair highways should be increased." (1 = strongly disagree, 7 = strongly agree) and 7-point semantic differential scales (bad/good, negative/positive, foolish/wise, and harmful/beneficial) completing the stem "A tax increase to help repair highways is". All items were averaged into an attitude index ($\alpha = 0.96$). Finally, participants completed demographics.⁴

5. Results and discussion

Using Cook's Distance and $4 / (N - k - 1)$ as a criterion, we first removed 14 multivariate outliers on the attitude index, eight on the threat appraisal index, and four participants who failed an attention check

⁴ After the attitude index items and before the demographics, we also measured participants' perceptions of the source's intelligence, positivity, as well as the personal relevance of the source (e.g., "What this person has to say is relevant to me."), the value of the source as a person (e.g., "This person deserves to be heard."), and the informational value of the appeal (e.g., "How valuable is the information that was conveyed in these remarks?"). None of these exploratory perceptions varied as a function of emotion expression and appeal quality and are not discussed further.

screening question. All subsequent analyses include the remaining 181 participants.

5.1. Anger expression inducing analytic processing

A significant 3-way interaction among emotion expression, appeal quality, and NFC emerged on the attitude index, $b = 0.39, p = .004$ (Fig. 1). Participants who saw a fearful source showed the typical 2-way interaction between appeal quality and NFC, $b = 0.73, p < .001$. Specifically, low NFC participants reported equally favorable attitudes towards strong and weak appeals, $b = -0.23, p = .26$, but high NFC participants reported more favorable attitudes towards strong than weak appeals, $b = 0.89, p < .001$, indicating that fearful expressions neither induced extensive processing among low NFC participants nor inhibited extensive processing among high NFC participants. In contrast, and consistent with predictions, responses from participants who saw an angry source revealed only a marginal main effect of appeal quality, $b = 0.27, p = .08$, with no appeal quality by NFC interaction, $p = .74$. Both low and high NFC participants reported more favorable attitudes towards strong than weak appeals, which suggests that angry expressions induced low NFC participants to extensively process the appeal.

5.2. Perceptions of threat

In order to test whether perceptions of threat induced analytic processing, we first confirmed that angry sources ($M = 5.34, SD = 1.15$) were appraised as more threatening than fearful sources ($M = 2.88, SD = 1.32$), $t(179) = 13.35, p < .001, d = 1.98$. Next, we regressed the attitude index on threat appraisal, appeal quality, and NFC, and a significant 3-way interaction emerged, $b = -0.16, p = .03$ (Fig. 2). Regardless of emotion expression, participants who appraised the source as non-threatening ($-1SD$) showed the typical 2-way interaction between appeal quality and NFC, $b = 0.61, p = .001$. Specifically, low NFC participants reported equally favorable attitudes towards strong and weak

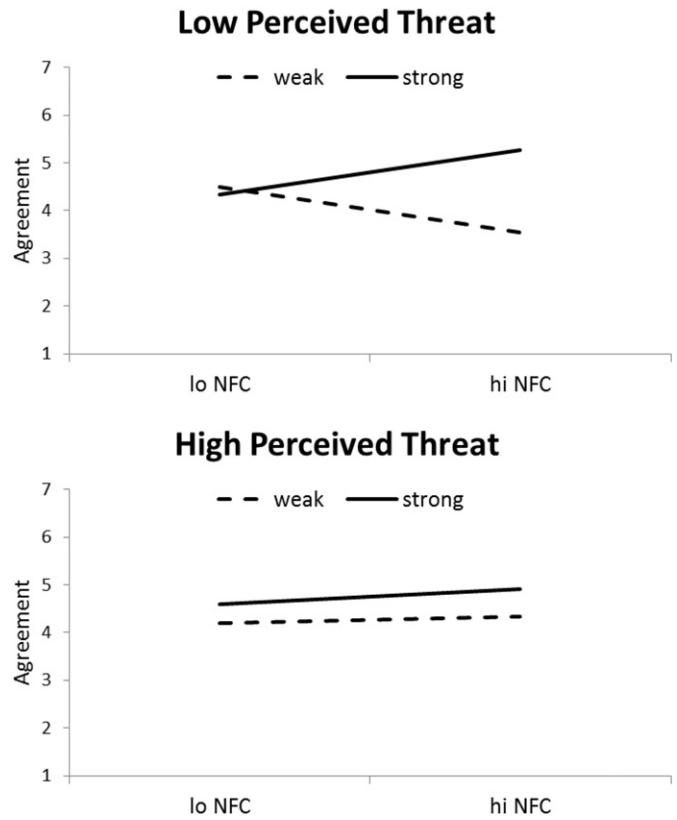


Fig. 2. Mean attitude favorability as a function of threat appraisal, appeal quality, and NFC, Experiment 4.

appeals, $b = -0.08, p = .70$, but high NFC participants reported more favorable attitudes towards strong than weak appeals, $b = 0.87, p < .001$. These results show that expressions that were appraised as non-threatening did not induce extensive processing among low NFC participants nor did they inhibit extensive processing among high NFC participants. In contrast, for participants who appraised the source as threatening ($+1SD$) there was only a main effect of appeal quality, $b = 0.24, p = .05$, with no appeal quality by NFC interaction, $p = .76$. Both low and high NFC participants reported more favorable attitudes towards strong than weak appeals, suggesting that threatening expressions induced low NFC participants to extensively process the appeal.⁵

5.3. Mediation by threat

Following the recommendations of Rucker and colleagues (Rucker, Preacher, Tormala, & Petty, 2011), we tested the indirect effect which

⁵ It is also theoretically plausible to decompose these data by NFC, rather than by emotion expression or perceived threat. When doing so, there is a marginally significant interaction between emotion expression and argument quality for low NFC participants, $b = 0.55, p = .06$. When arguments are attributed to an afraid source, low NFC participants report equally favorable attitudes towards strong and weak appeals, as would be expected by default from such participants. In contrast, when arguments are attributed to an angry source, low NFC participants report more favorable attitudes towards strong than weak appeals. This pattern of results is consistent with our characterization of angry expressions motivating analytic processing. There is also a significant interaction between emotion expression and argument quality for high NFC participants, $b = -0.67, p = .02$. When arguments are attributed to an afraid source, high NFC participants report more favorable attitudes towards strong than weak appeals, as would be expected by default from such participants. In contrast, when arguments are attributed to an angry source, high NFC participants report equally favorable attitudes towards strong and weak appeals. The pattern of results is similar, but weaker, when perceived threat rather than emotion expression is used in the analysis: Low NFC $b = 0.08, p = .32$; High NFC $b = -0.17, p = .05$. We know of no theoretical perspective or precedent in the literature that would predict or explain why angry expressions would constrain the motivation (or ability) of high NFC participants to process analytically, and it warrants further study.

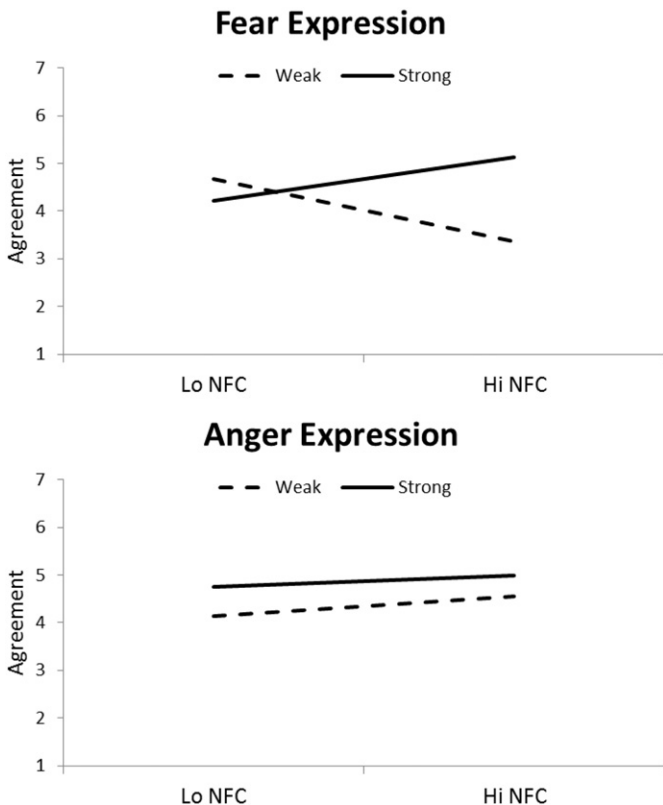


Fig. 1. Mean attitude favorability as a function of emotion expression, appeal quality, and NFC, Experiment 4.

consisted of 1) the emotion expression effect on threat appraisals and 2) the interaction of threat appraisals, appeal quality, and NFC on attitudes. This indirect effect was significant, $Z = 2.14$, $p = .03$, consistent with the idea that threat appraisals mediated the interactive effect of expression, appeal quality, and NFC on recipients' attitudes.

6. Experiment 5

Experiment 4 suggested that threat is the mechanism by which angry expressions induce extensive processing of persuasive appeals. However, traditional mediation analyses are not the only way, nor always the best way, to demonstrate causality. An alternate method to establish causation is to manipulate the proposed psychological process in order to demonstrate the proposed causal chain (Spencer, Zanna, & Fong, 2005). Based on the accumulated evidence, we propose a causal chain in which (A) angry expressions (B) signal threat which, in turn, (C) induces extensive processing of persuasive appeals. Experiments 1–4 demonstrated that (A) angry expressions (C) induce extensive processing. Experiment 4 also demonstrated that (A) angry expressions are perceived as (B) more threatening than other emotion expressions (i.e., fear). The remaining piece of this causal chain is to manipulate the proposed mechanism (i.e., threat) in order to demonstrate that (B) threat (C) induces extensive processing.

One way in which the threat conveyed by an angry expression can be manipulated is through gaze direction (Dimberg & Öhman, 1983; Lundqvist, Esteves, & Öhman, 1999). An angry expression has different functional significance when it is directed at the perceiver versus when it is directed away from the perceiver. For example, a direct angry gaze can signal that the source of the emotion has encountered a surmountable obstacle (Scherer, 2000), whereas an averted gaze can indicate appeasement or submission (Argyle & Cook, 1976). Thus, participants in Experiment 5 evaluated strong or weak persuasive appeals from angry sources pictured either looking directly at them or off to the side. Threat should only be conveyed by the direct angry gaze, which we expected to induce participants to extensively process the persuasive appeal. However, averted angry gaze should not convey threat, which we expected to not induce extensive processing.

Experiment 4 demonstrated the strength of the influence of angry expressions by inducing extensive processing in people who are not predisposed to do so. One final purpose of Experiment 5 was to further probe the strength of angry expressions inducing processing by measuring the influence of angry expressions on attitudes of higher relevance to participants. In Experiments 1–4, we measured attitudes towards proposals of relatively low relevance to participants, taking place in the distant future, at a distant location, or at an unspecified location. Because the default response to low relevance information is non-analytic processing (Petty et al., 1981), Experiments 1–4 have demonstrated that angry expressions induce careful processing and subsequent attitude change when the personal stakes are somewhat low. It remains unclear whether angry expressions can similarly influence processing and attitudes towards topics of higher relevance. However, it is not sufficient to simply have participants evaluate a highly-relevant appeal because the default response to such information should be to process carefully, regardless of what emotion expression accompanies it. Instead, in Experiment 5, we had participants read an appeal advocating comprehensive exams at a distant university 10 years in the future (i.e., low relevance) but then measured their attitudes towards comprehensive exams at their own university (i.e., high relevance). If angry expressions can influence highly-relevant attitudes in the same way that they influenced attitudes towards less relevant information, then we expected participants to report more favorable attitudes towards comprehensive exams at their own university after reading a strong versus weak appeal accompanied by a direct angry gaze, but report equally favorable attitudes towards comprehensive exams at their own university after reading strong and weak appeals accompanied by an averted angry gaze.

6.1. Participants and design

Participants were 166 UCD undergraduates (129 women, 2 did not report, $M_{age} = 19.75$, $SD_{age} = 2.41$) who participated for partial course credit. Participants were randomly assigned to a 2 (Angry Gaze: averted or direct) \times 2 (Appeal Quality: strong or weak) between-subjects design, with an average of more than 40 participants per cell.

6.2. Materials and procedure

First, all participants read that they would be completing a series of unrelated tasks for different experiments. Next, participants were shown a digital image of a male expressing anger (Lundqvist et al., 1998). The same male was pictured in both conditions, either at half left profile or directly facing the participant (see Online Supplement). Participants were asked: "What emotion is this person displaying?" with the following answer choices: sadness, anger, disgust, fear, and I'm not sure. Because an averted gaze is potentially a non-normative expression, the "I'm not sure" option was included to ensure that participants were able to correctly identify anger in both the direct and averted faces.

Participants then read the persuasive appeals from Experiment 3 advocating the implementation of comprehensive exams for graduating seniors at the University of Missouri in 2024. In contrast to previous experiments, the appeals included no verbal expression of emotion. The appeal was presented with and attributed to the same picture of the male as previously seen in the emotion identification task expressing either direct or averted anger. The image was positioned to the left of the appeal, as it had been for all previous experiments. Because of the positioning, the source with the averted gaze appeared to be looking away from the appeal.

After reading the appeal, participants responded to two items assessing their attitudes towards the implementation of comprehensive exams for graduating seniors at the University of California, Davis. These items varied in relevance to participants. The first read: "I want comprehensive exams to be implemented at UC Davis in 10 years." and the second read: "I want comprehensive exams to be implemented at UC Davis now." (1 = strongly disagree, 7 = strongly agree). Next, participants responded to a behavioral intention item gauging their support for comprehensive exams: "I would sign a petition in favor of implementing comprehensive exams at UC Davis." (yes/no). Finally, participants completed demographics.

7. Results and discussion

Five participants were first removed from the analysis for failing an attention check screening question. Fifty-six participants were also removed for failing to correctly identify the angry expression.⁶ All subsequent analyses include the remaining 104 participants.

⁶ Misidentification did not vary by gaze direction, $p > .47$. That such a relatively large proportion of participants did not correctly identify the emotion expression in Experiment 4 is surprising, given that these stimuli are well-validated (Goeleven, De Raedt, Leyman, & Verschuere, 2008). However, we included the recognition check in this experiment specifically because of the potential non-normativity of the averted angry gaze, so the decision to exclude the data of participants who failed to correctly identify the expression from the analyses was made a priori. Of course, the emotion being expressed needs to be correctly recognized in order for it to have predictable effects on processing. Indeed, it is a testament to the robustness of the phenomenon of angry expressions inducing extensive processing that it reliably emerged in Experiments 1–4, even though we did not screen out participants who failed to accurately recognize the emotion expressions. Had we checked for and excluded such participants, the likely outcome would have been to reduce noise in the data, ultimately strengthening the effect. Nevertheless, the pattern of results in Experiment 5 is largely the same if we retain participants who failed to correctly identify the angry expression in the analyses. Specifically, the effect of angry expressions on support for comprehensive exams at UC Davis 10 years in the future is marginal, $F(1, 159) = 2.96$, $p = .09$, $\eta^2_{partial} = 0.02$; support for comprehensive exams at UC Davis is non-significant, $F(1, 159) = 1.04$, $p = .31$, $\eta^2_{partial} = 0.01$; and willingness to sign a petition in favor of comprehensive exams remains significant: averted gaze $\chi^2(1, N = 80) = 0.57$, $p = .45$, direct gaze $\chi^2(1, N = 80) = 8.36$, $p = .004$.

Mean levels of support for comprehensive exams to be implemented at UC Davis in 10 years is presented in Table 2. A 2 (gaze direction) \times 2 (appeal quality) between-subjects ANOVA revealed a main effect of appeal quality, $F(1, 103) = 16.13, p < .001, \eta^2_{\text{partial}} = 0.14$, which was qualified by the gaze direction by appeal quality interaction, $F(1, 103) = 4.69, p = .03, \eta^2_{\text{partial}} = 0.05$. Participants who saw an averted angry gaze reported equal (lack of) support for comprehensive exams to be implemented at their university in 10 years after evaluating strong and weak appeals, $t(52) = 1.23, p = .22, d = 0.34$. In contrast, participants who saw a direct angry gaze reported the greatest support for comprehensive exams to be implemented at their university in 10 years after evaluating strong appeals and the least support after evaluating weak appeals, $t(47) = 4.82, p < .001, d = 1.41$.

The same pattern of results emerged for mean levels of support for comprehensive exams to be implemented at UC Davis now. A 2 (gaze direction) \times 2 (appeal quality) between-subjects ANOVA revealed a main effect of appeal quality, $F(1, 103) = 6.14, p = .02, \eta^2_{\text{partial}} = 0.06$, which was qualified by the gaze direction by appeal quality interaction, $F(1, 103) = 3.89, p = .05, \eta^2_{\text{partial}} = 0.04$. Participants who saw an averted angry gaze reported equal (lack of) support for comprehensive exams to be implemented at their university now after evaluating strong and weak appeals, $t(52) = .33, p = .74, d = 0.09$. In contrast, participants who saw a direct angry gaze reported the greatest support for comprehensive exams to be implemented at their university now after evaluating strong appeals and the least support after evaluating weak appeals, $t(47) = 3.31, p = .003, d = 0.97$.

Finally, a similar pattern of results emerged for participants' reported willingness to sign a petition in favor of implementing comprehensive exams at UC Davis. In the averted angry gaze condition, 6 out of 26 participants who evaluated weak appeals reported that they would sign the petition and 6 out of 28 participants who evaluated strong appeals reported that they would sign the petition, $\chi^2(1, N = 54) = 0.02, p = .88$. However, in the direct gaze condition, 3 out of 28 participants who evaluated weak appeals reported that they would sign the petition but 9 out of 22 participants who evaluated strong appeals reported that they would sign the petition, $\chi^2(1, N = 50) = 6.16, p = .01$.

In Experiment 5, the threat conveyed by an angry expression was manipulated through gaze direction. Participants reported more favorable attitudes and behavioral intentions towards comprehensive exams at their own university after reading a strong than weak appeal accompanied by a direct angry gaze. In contrast, participants reported equally unfavorable attitudes and behavioral intentions towards comprehensive exams at their own university after reading strong and weak appeals accompanied by an averted angry gaze. A direct angry gaze signals threat but an averted angry gaze does not, so this pattern of results provides further evidence that the threat signaled by an angry expression induces analytic processing of persuasive appeals.

Table 2

Attitude favorability, behavioral intentions, and correlations by emotion expression condition, Experiment 5.

	Direct anger	Averted anger
Support in 10 years		
Strong	4.41 (1.44)	3.57 (1.60)
Weak	2.63 (1.15)	3.04 (1.59)
Support now		
Strong	3.55 (1.22)	2.71 (1.36)
Weak	2.33 (1.33)	2.58 (1.55)
Would sign a petition		
Strong	41%	23%
Weak	11%	22%
Correlations		
Now	In 10 years	Now
Petition	0.82***	–0.63***
	–0.63***	

Note: (Standard deviations).

*** $p < .001$.

Moreover, Experiment 5 demonstrates that the processing induced by threatening gazes can influence attitudes towards issues of relatively high relevance. Even though the persuasive appeals made no mention of implementing comprehensive exams at participants' own university, direct but not averted angry gaze induced enough scrutiny of the appeals to apparently inform their attitudes towards a related issue that could realistically impact them. Thus, the influence of angry expressions on how persuasive information is considered does not appear to be limited to topics of low relevance. Taken together with the results of all previous experiments, Experiment 5 completes the causal chain and demonstrates that threat – either measured or manipulated – that is conveyed by an angry expression induces extensive processing of persuasive appeals.

8. General discussion

We experience persuasive appeals every day, and these appeals are rarely made dispassionately. When a suspect argues for his innocence, a romantic partner claims her fidelity, or a politician courts supporters, their persuasion attempts are often accompanied by expressions of anger. The present research demonstrated that angry expressions lead to more favorable attitudes towards strong than weak arguments by signaling threat which induces extensive processing of a persuasive appeal. Moreover, angry expressions can override dispositional tendencies to process non-analytically, and the impact of angry expressions on processing can carry over to related issues beyond what is specifically advocated in the appeal (e.g., lateral attitude change; Glaser et al., 2015).

Although emotion has been closely linked to persuasion throughout the centuries since Aristotle penned *Rhetoric*, scientific research has almost exclusively focused on the emotion experienced by the recipients of persuasive appeals. In the present research, threat was identified as the mechanism by which angry expressions induce analytic processing, even though appraisals of threat were made in the absence of any real threat to the perceiver. Moreover, despite the well-established role of experienced emotion in processing, we did not find any evidence of affective reactions in any of our experiments. After participants completed all the attitude indices, but before they completed demographics, they reported the extent to which they were currently experiencing a series of common emotions. These measures assessed the possibility that angry expressions influence processing by way of affective reactions, e.g., emotion contagion. Across all five experiments, we found no evidence that participants' current emotional state was influenced by the emotion expressed by the message source. Participants who evaluated persuasive appeals from angry sources did not report feeling angrier (i.e., direct emotion contagion) than participants who evaluated appeals from sources expressing other emotions. Neither did participants who evaluated appeals from angry sources report feeling more afraid (i.e., complementary emotion contagion) than participants who evaluated appeals from sources expressing other emotions. Consequently, the evidence points towards cognitive inferential processes, rather than affective processes, as the central mechanism in emotion expression-induced changes in information processing. See the Online Supplement for more details and analyses of participants' self-reported emotions.

The present research also expands our understanding of the role of threat in persuasion. Threat has been previously identified as an important factor in the effectiveness of persuasive messages. However, such effects of threat on persuasion are often moderated by message framing. For example, threat can make a persuasive appeal more effective when that appeal is framed in terms of loss than when it is framed in terms of gains (Rothman, Bartels, Wlaschin, & Salovey, 2006; Rothman & Salovey, 1997). Additionally, previous research has manifest threat through the content of the appeal (e.g., health or safety threats) of varying relevance to the perceiver. In the present research, the threat itself (i.e., the angry source) was unrelated to the content of the appeal and posed no realistic danger to the perceiver. Even under such minimally

threatening conditions, it appears that cognitive appraisals of angry sources as threatening are sufficient to induce perceivers to carefully evaluate the merits of the source's appeal.

This research also expands our understanding of angry expressions by separating threat from anger. To be sure, angry expressions are generally perceived to be more threatening than other emotions, as Experiment 4 demonstrates. However, as illustrated in Experiment 5, not all angry expressions are perceived as threatening. A direct angry gaze can signal dominance, whereas an averted gaze can signal submission (Argyle & Cook, 1976). Thus, it appears that expressing anger is not sufficient to induce analytic processing. In order to induce processing, angry expressions must also signal threat, though it is not necessary for this threat to be directly relevant to the perceiver.

It is important to note that the effects of angry expressions on analytic processing demonstrated here are unlikely to be due to any idiosyncrasies of the ways in which anger was expressed in the present research. The emotion expressions depicted in Experiment 1 were composed based on a directed facial muscle action task without direct mention of any associated emotion, whereas the emotion expressions depicted in Experiments 2–5 were expressed in a more naturalistic manner. Additionally, the models in Experiment 1 came from the same student population as the participants, whereas the Swedish models in Experiments 2–5 were foreigners to our American-based participants. The verbal expression of emotion varied across studies, as well. In Experiment 1, the persuasive appeal began with an expression of emotion with no reference to the cause of the emotion, whereas in Experiments 2–4 the appeal explicitly stated that the emotion was related to the proposal under consideration, and Experiment 5 included no verbal expression of emotion at all.⁷ Moreover, the effects of angry expressions on analytic processing are unlikely to be due to any idiosyncrasies of the persuasive appeals used in the present research. Of the three different appeals used here, two were framed in favor of the proposal and one was framed in opposition to the proposal, and one of these proposals (i.e., to implement comprehensive exams for graduating college seniors) was counter-attitudinal to the participant population. Taken together, the effect of angry expressions on analytic processing appears to be a generalizable phenomenon.

It is also important to note that the outcome of Experiment 5 is not likely to be due to differences between direct and averted faces in engagement or relevance. The default response to relevant information is to process it more carefully than less relevant information (Petty et al., 1981). In most cases, a person looking directly at you is more likely to engage with you and, thus, be more relevant to you than someone looking away. However, we designed this paradigm to be of low relevance, describing the proposals as taking place at a distant or unspecified location, and in the distant future. As Experiments 1–4 demonstrate, directly-gazing disgusted, fearful, happy, and sad sources did not induce analytic processing in this experimental paradigm. Thus, direct gaze in and of itself is not sufficient to induce analytic processing under these conditions. Consequently, it was not necessary for Experiment 5 to include other emotion expressions with direct and averted gaze. If these other emotion expressions do not induce analytic processing with direct gaze (i.e., Experiments 1–4), then a demonstration that they also do not induce analytic processing under even less relevant conditions (i.e., averted gaze) would not tell us anything about relevance as an alternative mechanism. Moreover, we measured the perceived relevance of several emotion expressions in Experiment 4 as an exploratory variable (see Footnote 4). However, participants' perceptions of the relevance of the source did not vary by emotion expression. Of course, such null results should always be interpreted cautiously, and primarily serve as converging evidence for our broader point. Taken

together, we do not believe that gaze direction as a proxy for engagement or relevance is a viable alternate explanation for why participants analytically process persuasive appeals in this paradigm.

To our initial surprise, we found no evidence that the valence or certainty of an angry expressions influenced processing. We focused on these dimensions of emotion expressions because they had been identified in prior research on experienced emotions and processing to influence responses to persuasive appeals (e.g., Petty & Briñol, 2015; Schwarz & Clore, 1983; Tiedens & Linton, 2001). Of course, valence and certainty are not the only dimensions upon which emotions vary, and the present research allows us to rule out other dimensions as potential mechanisms. For example, the effect of angry expressions on analytic processing cannot be due to the approach-orientation signaled by angry expressions because happiness is also an approach-oriented emotion but did not induce analytic processing. Similarly, the arousal of the emotion expression is not a viable explanation for these effects: anger, disgust, and happiness are all high-arousal emotions but only angry expressions induced analytic processing. Evaluative conditioning also cannot explain the effects of angry expressions on analytic processing. Evaluative conditioning is the process by which the valence of a neutral (conditioned) stimulus is changed through pairing with a valenced (unconditioned) stimulus (e.g., Razran, 1954; C.K. Staats & Staats, 1957; for a review, see Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010). In the context of the present research, the angry expression would be the unconditioned stimulus and the persuasive appeal the conditioned stimulus. If angry expressions influenced attitudes through evaluative conditioning, we would expect that pairing an appeal with a negative angry expression will create a negative association with the topic of the appeal and, consequently, lead to more negative attitudes towards the appeal relative to the same appeal paired with a positive emotion expression (e.g., happiness), regardless of the quality of arguments presented about the topic. However, we found no such pattern across any of these experiments. Thus, extensive processing induced by the threat signaled by angry expressions, as demonstrated in the present research, represents a novel contribution to the persuasion literature.

Though this research makes important theoretical and practical contributions, it is limited in some ways. One limitation is that the emotions here were expressed in a relatively impoverished manner via a static image and a brief description of how the source of the appeal is feeling (e.g., "I'm angry that this proposal might not be implemented.") Emotion can also be expressed through posture and vocal prosody (Van Kleef, van den Berg, & Heerdink, 2014), which are more clearly conveyed via video or in-person interaction than static image or written word. Thus, emotions expressed under such dynamic conditions likely convey a wider array of information and may have different effects on processing. That said, discrete emotion expressions can be recognized at levels far above chance, regardless of the expressive channel through which they are conveyed (Hawk, Van Kleef, Fischer, & Van der Schalk, 2009). The present research demonstrates that even minimal information conveyed by emotion expressions can influence how a persuasive appeal is considered. Moreover, though the paradigm used in the present research – a picture with text – may lack richness of information, it does not necessarily lack external validity. Indeed, this presentation closely resembles the format in which news and advertisements are often presented, and was modeled after opinion editorials as they often appear in newspapers. Thus, the present research has clear implications for how people think about and respond to information as they regularly encounter it.

9. Future directions

Though this research represents a novel contribution to our understanding of angry expressions and persuasion, many questions are left unanswered and represent interesting future directions for study. Of the five emotions used in the present research (anger, disgust, fear,

⁷ Fear was conveyed in Experiment 2 with the stem "I'm afraid that...", which has an alternate, colloquial meaning that does not indicate genuine fear. However, in Experiment 4 fear was conveyed with the stem "I'm scared that...", which more clearly conveys fear, and this change had no discernable effect on the outcomes.

happiness, sadness), we found evidence of only angry expressions inducing extensive processing. It is possible that other emotion expressions might also induce extensive processing, and other conditions under which disgust, fear, happiness, and sadness might do so as well. Similarly, there are likely conditions under which emotion expressions inhibit processing. For example, as mentioned above, presenting emotion expressions in more dynamic formats such as video or in-person interaction may allow additional information to emerge along with the expressed emotion which, in turn, may influence the extent of processing. This represents an interesting direction for future research.

The present research demonstrates through both mediation analysis and causal chain design that the threat signaled by an angry expression induces analytic processing of persuasive appeals. Future research should investigate why threat induces careful processing of persuasive information. One possible mechanism is the well-known ability of angry faces to grab and hold attention (Hansen & Hansen, 1988). Recent research has demonstrated that this attention advantage generalizes to other signs of facial threat (e.g., low eyebrow ridge, which is associated with propensity for aggression), even in the absence of explicit displays of anger (Shasteen, Sasson, & Pinkham, 2015). However, this explanation requires that the message recipient's attention first be directed to the source of the angry expression, and then disengage from the angry person in order to carefully attend to the content of the persuasive appeal. Though we are unaware of any research demonstrating that angry expressions can not only attract but also redirect attention in such a manner, this mechanism represents an interesting direction for future research.

It is perhaps surprising that angry expressions induced analytic processing under conditions that constrain processing, i.e., low relevance (Petty & Cacioppo, 1986; Petty et al., 1993). From the multiple roles perspective of source cues, angry expressions should serve as a heuristic under such conditions. Instead, it appears that angry expressions signal information (i.e., threat) that increases the extent to which perceivers analytically process persuasive appeals. Analytic processing depends on both the ability and motivation to engage processing resources (Cacioppo et al., 1983; Petty & Cacioppo, 1984). Given that it is unlikely that perceptions of threat increase processing ability, the present research suggests that threat can play an important motivational role in analytic processing. Additional research is warranted to investigate the relationship between threatening source cues, such as angry expressions, and processing.

Another topic for further exploration is the importance of the relationship between the person expressing anger and the persuasive appeal. In the present research, the appeals were attributed to the people whose pictures appeared alongside and, thus, the two stimuli were directly related. It remains an open question whether we would see similar effects if the pictured person were unrelated to the appeal. Similarly, it is possible that any stimulus that signals threat, such as a picture of a gun or spider, would have similar effects on processing. However, previous research suggests that an emotion expression needs to be relevant to the information under consideration in order to influence judgments. Van Kleef et al. (2014) found that participants formed more favorable impressions of a proposal when a happy versus sad person was pictured alongside, but only when that person was described as relevant to the proposal. Whether extensive processing of persuasive appeals also depends on such a relationship between stimuli should be examined in future research.

The relationship between the perceiver and source of a persuasive appeal also represents an interesting future direction for research. To our knowledge, the influence of emotion expressions on analytic processing has never been examined in the intergroup domain. In related work, though, Weisbuch and Ambady (2008) demonstrated that the intergroup relationship between the perceiver and source of an emotion expression can interact to imply different adaptive meaning for different emotions. If this logic can be extended to persuasive appeals, it is possible that different adaptive meaning is attached to emotion

expressions from ingroup versus outgroup members which consequently leads to differential processing of the appeal. For example, happiness expressed by an oppositional outgroup member may signal threat to the perceiver and, consequently, induce effortful processing of relevant information. In contrast, happiness expressed by a fellow ingroup member may signal that all is well to the perceiver and that effortful processing is unnecessary. Future research should investigate this.

Though we have framed this research in terms of angry expressions inducing analytic processing, we make no claim that angry expressions influence *only* analytic processing. Though the strong/weak appeal paradigm we employed is generally regarded to detect systematic/analytic/system 2 processing (e.g., Cacioppo & Petty, 1989; Petty & Cacioppo, 1986; Petty et al., 1981), it is likely that no judgment is process-pure (Sherman, Krieglmeier, & Calanchini, 2014). Instead, most judgments reflect the influence of multiple processes which traditional persuasion paradigms, such as the ones used here, are ill-suited to detect. Research using process-dissociating mathematical models has successfully estimated the contribution of multiple processes across a host of domains, such as judgments and decision-making (Ferreira, Garcia-Marques, Sherman, & Sherman, 2006), prejudice (Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005; Payne, 2001), stereotyping (Krieglmeier & Sherman, 2012), and moral decision-making (Conway & Gawronski, 2013). Future research should apply process-dissociation models to the questions of attitude formation and change addressed in the present research in order to more precisely determine which processes are influenced by angry expressions.

10. Conclusion

Across five studies, we demonstrated that angry expressions are meaningful interpersonal cognitive cues that can influence the degree to which persuasive information is scrutinized. Returning to our jurors from *12 Angry Men*, the present research helps explain why expressing anger made Juror 8's strong arguments even more convincing but hurt Juror 10's already-weak case. These findings have potential implications across a variety of domains in which persuasion attempts regularly include expressions of emotion. Fields like advertising, sales, marketing, and politics may clearly benefit from such knowledge to develop more persuasive campaigns. Conversely, these findings could be used to develop programs to resist the influence of such campaigns. Given that emotion and persuasion often go hand-in-hand in close relationships, this research could have clinical applications to family and couples counseling. Similarly, this research could be applied to other interpersonal domains, such as leadership and organizational behavior. Taken together, the present research can inform both theoretical models of emotion and attitude formation and change and a multitude of real-world persuasion techniques and strategies.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jesp.2016.02.004>.

References

- Argyle, M., & Cook, M. (1976). *Gaze and mutual gaze*. Cambridge, England: Cambridge University Press.
- Axson, D., Yates, S., & Chaiken, S. (1987). Audience response as a heuristic cue in persuasion. *Journal of Personality and Social Psychology*, 53(1), 30–40.
- Barsade, S. G. (2002). The ripple effect: Emotional contagion and its influence on group behavior. *Administrative Science Quarterly*, 47(4), 644–675.
- 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, 45–62.
- Briñol, P., Petty, R. E., & Wheeler, S. C. (2006). Discrepancies between explicit and implicit self-concepts: Consequences for information processing. *Journal of Personality and Social Psychology*, 91(1), 154–170.

- Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology*, 42(1), 116.
- Cacioppo, J. T., & Petty, R. E. (1989). Effects of message repetition on argument processing, recall, and persuasion. *Basic and Applied Social Psychology*, 10(1), 3–12.
- Cacioppo, J. T., Petty, R. E., & Morris, K. J. (1983). Effects of need for cognition on message evaluation, recall, and persuasion. *Journal of Personality and Social Psychology*, 45(4), 805.
- Chaiken, S. (1987). The heuristic model of persuasion. In M. P. Zanna, J. Olson, & C. P. Herman (Eds.), *Social influence: The Ontario symposium*, Vol. 5. (pp. 3–39). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Chen, S., & Chaiken, S. (1999). The heuristic-systematic model in its broader context. In S. Chaiken, & Y. Trope (Eds.), *Dual-process theories in social psychology* (pp. 73–96). Guilford Press.
- Claypool, H. M., Mackie, D. M., Garcia-Marques, T., McIntosh, A., & Udal, A. (2004). The effects of personal relevance and repetition on persuasive processing. *Social Cognition*, 22(3), 310–355.
- Conrey, F. R., Sherman, J. W., Gawronski, B., Hugenberg, K., & Groom, C. J. (2005). Separating multiple processes in implicit social cognition: The quad model of implicit task performance. *Journal of Personality and Social Psychology*, 89(4), 469.
- Conway, P., & Gawronski, B. (2013). Deontological and utilitarian inclinations in moral decision making: A process dissociation approach. *Journal of Personality and Social Psychology*, 104(2), 216.
- DeBono, K. G., & Harnish, R. J. (1988). Source expertise, source attractiveness, and the processing of persuasive information: A functional approach. *Journal of Personality and Social Psychology*, 55(4), 541–546.
- Dimberg, U., & Öhman, A. (1983). The effects of directional facial cues on electrodermal conditioning to facial stimuli. *Psychophysiology*, 20(2), 160–167.
- Ekman, P. (1993). Facial expression and emotion. *American Psychologist*, 48, 384–392.
- Ekman, P., & Friesen, W. V. (1975). Unmasking the face: A guide to recognising emotions from facial expressions. *Consulting Psychologists Press CA*, 19, 75.
- Ferreira, M. B., Garcia-Marques, L., Sherman, S. J., & Sherman, J. W. (2006). Automatic and controlled components of judgment and decision making. *Journal of Personality and Social Psychology*, 91(5), 797.
- Fitness, J. (2000). Anger in the workplace: An emotion script approach to anger episodes between workers and their superiors, co-workers and subordinates. *Journal of Organizational Behavior*, 21(2), 147–162.
- Fridlund, A. J. (1994). *Human facial expression: An evolutionary view*. San Diego, CA: Academic Press.
- Frijda, N. H. (1986). *The emotions*. Cambridge, UK: Cambridge University Press.
- Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology*, 62, 451–482.
- Glaser, T., Dickel, N., Liersch, B., Rees, J., Süßenbach, P., & Bohner, G. (2015). Lateral attitude change. *Personality and Social Psychology Review*, 19(3), 257–276.
- Goeleven, E., De Raedt, R., Leyman, L., & Verschuere, B. (2008). The Karolinska directed emotional faces: A validation study. *Cognition and Emotion*, 22(6), 1094–1118.
- Hansen, C. H., & Hansen, R. D. (1988). Finding the face in the crowd: An anger superiority effect. *Journal of Personality and Social Psychology*, 54(6), 917.
- Hawk, S. T., Van Kleef, G. A., Fischer, A. H., & Van der Schalk, J. (2009). “Worth a thousand words”: Absolute and relative decoding of nonlinguistic affect vocalizations. *Emotion*, 9(3), 293.
- Hess, U., Blairy, S., & Kleck, R. E. (2000). The influence of facial emotion displays, gender, and ethnicity on judgements of dominance and affiliation. *Journal of Nonverbal Behaviour*, 24(4), 265–283.
- Hofmann, W., De Houwer, J., Perugini, M., Baeyens, F., & Crombez, G. (2010). Evaluative conditioning in humans: A meta-analysis. *Psychological Bulletin*, 136(3), 390.
- Keltner, D., & Haidt, J. (1999). Social functions of emotions at four levels of analysis. *Cognition and Emotion*, 13(5), 505–521.
- Knutson, B. (1996). Facial expressions of emotion influence interpersonal trait inferences. *Journal of Nonverbal Behaviour*, 20(3), 165–182.
- Krieglmeyer, R., & Sherman, J. W. (2012). Disentangling stereotype activation and stereotype application in the stereotype misperception task. *Journal of Personality and Social Psychology*, 103(2), 205.
- Lazarus, R. S. (1991). *Emotion and adaptation*. New York: Oxford University Press.
- Lundqvist, D., Esteves, F., & Öhman, A. (1999). The face of wrath: Critical features for conveying facial threat. *Cognition & Emotion*, 13(6), 691–711.
- Lundqvist, D., Flykt, A., & Öhman, A. (1998). *The Karolinska directed emotional faces – KDEF, CD ROM from department of clinical neuroscience*. Psychology section, Karolinska Institutet (ISBN 91-630-7164-9).
- Payne, B. K. (2001). Prejudice and perception: The role of automatic and controlled processes in misperceiving a weapon. *Journal of Personality and Social Psychology*, 81(2), 181.
- Petty, R. E., & Briñol, P. (2015). Emotion and persuasion: Cognitive and meta-cognitive processes impact attitudes. *Cognition and Emotion*, 29(1), 1–26.
- Petty, R. E., & Cacioppo, J. T. (1979). Issue involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. *Journal of Personality and Social Psychology*, 37(10), 1915–1926.
- Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*, 46(1), 69.
- Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. New York: Springer-Verlag.
- Petty, R. E., Cacioppo, J. T., & Goldman, R. (1981). Personal involvement as a determinant of argument-based persuasion. *Journal of Personality and Social Psychology*, 41(5), 847–855.
- Petty, R. E., Schumann, D. W., Richman, S. A., & Strathman, A. J. (1993). Positive mood and persuasion: Different roles for affect under high- and low-elaboration conditions. *Journal of Personality and Social Psychology*, 64(1), 5.
- Razran, G. (1954). The conditioned evocation of attitudes (cognitive conditioning?). *Journal of Experimental Psychology*, 48(4), 278–282.
- Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, 121(1), 3–19.
- Rothman, A. J., Bartels, R. D., Wlaschin, J., & Salovey, P. (2006). The strategic use of gain- and loss-framed messages to promote health behavior: How theory can inform practice. *Journal of Communication*, 56(s1), S202–S220.
- Rucker, D. D., Preacher, K. J., Tormala, Z. L., & Petty, R. E. (2011). Mediation analysis in social psychology: Current practices and new recommendations. *Social and Personality Psychology Compass*, 5(6), 359–371.
- Scherer, K. (2000). Emotion. In M. Hewstone, & W. Stroebe (Eds.), *Introduction to social psychology: A European perspective* (pp. 151–191) (3rd ed.). Oxford: Blackwell.
- Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In E. T. Higgins, & R. M. Sorrentino (Eds.), *The handbook of motivation and cognition*, Vol. 2. (pp. 527–561). New York: Guilford Press.
- Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology*, 45(3), 513–523.
- Sears, D. O. (1986). College sophomores in the laboratory: Influences of a narrow data base on social psychology's view of human nature. *Journal of Personality and Social Psychology*, 51(3), 515.
- Shasteen, J. R., Sasson, N. J., & Pinkham, A. E. (2015). A detection advantage for facial threat in the absence of anger. *Emotion*.
- Sherman, J. W., Krieglmeyer, R., & Calanchini, J. (2014). Process models require process measures. In J. W. Sherman, B. Gawronski, & Y. Trope (Eds.), *Dual-process theories of the social mind*. Guilford Publications.
- Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, 22(11), 1359–1366.
- Smith, E. R., & DeCoster, J. (2000). Dual-process models in social and cognitive psychology: Conceptual integration and links to underlying memory systems. *Personality and Social Psychology Review*, 4(2), 108–131.
- Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, 48(4), 813–838.
- Sorrentino, R. M., Bobocel, D. R., Gitta, M. Z., Olson, J. M., & Hewitt, E. C. (1988). Uncertainty orientation and persuasion: Individual differences in the effects of personal relevance on social judgments. *Journal of Personality and Social Psychology*, 55(3), 357–371.
- Spencer, S. J., Zanna, M. P., & Fong, G. T. (2005). Establishing a causal chain: Why experiments are often more effective than mediational analyses in examining psychological processes. *Journal of Personality and Social Psychology*, 89(6), 845.
- Staats, C. K., & Staats, A. W. (1957). Meaning established by classical conditioning. *Journal of Experimental Psychology*, 54(1), 74–80.
- Sy, T., Côté, S., & Saavedra, R. (2005). The contagious leader: Impact of the leader's mood on the mood of group members, group affective tone, and group processes. *Journal of Applied Psychology*, 90(2), 295–305.
- Tiedens, L. Z., & Linton, S. (2001). Judgment under emotional certainty and uncertainty: The effects of specific emotions on information processing. *Journal of Personality and Social Psychology*, 81(6), 973–988.
- Tracy, J. L., Robins, R. W., & Schriber, R. A. (2009). Development of a FACS-verified set of basic and self-conscious emotion expressions. *Emotion*, 9(4), 554.
- Van Doorn, E. A., Van Kleef, G. A., & Van der Pligt, J. (2015). How emotional expressions shape prosocial behavior: Interpersonal effects of anger and disappointment on compliance with requests. *Motivation and Emotion*, 39(1), 128–141.
- Van Kleef, G. A. (2009). How emotions regulate social life: The emotions as social information (EASI) model. *Current Directions in Psychological Science*, 18(3), 184–188.
- Van Kleef, G. A., Anastasopoulou, C., & Nijstad, B. A. (2010). Can expressions of anger enhance creativity? A test of the emotions as social information (EASI) model. *Journal of Experimental Social Psychology*, 46(6), 1042–1048.
- Van Kleef, G. A., De Dreu, C. K. W., & Manstead, A. S. R. (2004). The interpersonal effects of anger and happiness in negotiations. *Journal of Personality and Social Psychology*, 86(1), 57–76.
- Van Kleef, G. A., Homan, A. C., Beersma, B., van Knippenberg, D., van Knippenberg, B., & Damen, F. (2009). Searing sentiment or cold calculation? The effects of leader emotional displays on team performance depend on follower epistemic motivation. *Academy of Management Journal*, 52(3), 562–580.
- Van Kleef, G. A., Van den Berg, H., & Heerdink, M. W. (2014). The persuasive power of emotions: Effects of emotional expressions on attitude formation and change. *Journal of Applied Psychology*.
- Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, 36(3), 1–48.
- Walley, R. E., & Weiden, T. D. (1973). Lateral inhibition and cognitive masking: A neuropsychological theory of attention. *Psychological Review*, 4, 284–302.
- Wegener, D. T., & Petty, R. E. (1994). Mood management across affective states: The hedonic contingency hypothesis. *Journal of Personality and Social Psychology*, 66(6), 1034.
- Weisbuch, M., & Ambady, N. (2008). Affective divergence: Automatic responses to others' emotions depend on group membership. *Journal of Personality and Social Psychology*, 95(5), 1063–1079.
- Weisbuch, M., Mackie, D. M., & Garcia-Marques, T. (2003). Prior source exposure and persuasion: Further evidence for misattributional processes. *Personality and Social Psychology Bulletin*, 29(6), 691–700.