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Others' Anger Makes People Work Harder Not Smarter:

The Effect of Observing Anger and Sarcasm on Creative and Analytic Thinking

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Abstract

We examine whether and how observing anger influences thinking processes and problem-solving ability. In three studies we show that participants who listened to an angry customer were more successful in solving analytic problems, but less successful in solving creative problems compared to participants who listened to an emotionally-neutral customer. In Studies 2 and 3 we further show that observing anger communicated through sarcasm enhances complex thinking and solving of creative problems. Prevention orientation is argued to be the latent variable that mediated the effect of observing anger on complex thinking. Our findings help reconcile inconsistent findings in previous research, promote theory about the effects of observing anger and sarcasm, and contribute to understanding the effects of anger in the workplace.

Key Words: Anger, Sarcasm, Cognitive complexity, Creativity, Prevention orientation, Analytic thinking

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Most available reports on anger take a within-person view, analyzing effects of experienced anger on the angry agent (Berkowitz & Harmon-Jones, 2004). Far less research examines the effects of anger expressed by one person on observers. However, anger is an interpersonal emotion (Hareli, Rafaeli & Parkinson, 2007; Parkinson, 1996), caused by and with consequences for other people. The anger of another person is easily recognized by observers (Banse & Scherer, 1996), more quickly and accurately than other emotions (Ackerman et al., 2006; Hansen & Hansen, 1988). People who observe an angry agent or hear about an agent's anger third-hand are likely to be influenced by this observation (Hareli & Rafaeli, 2008; Miron-Spektor & Rafaeli, 2009).

Furthermore, anger prevails in organizations (Glomb, 2002; Inness, LeBlanc, & Barling, 2008), especially among employees who interact with other people (Grandey, Dickter & Sin, 2004). Angry customers are likely to convey their anger to employees (Grandey, Rafaeli, Ravid, Wirtz & Steiner, 2010), and employees often report such anger experiences to other employees (Rupp & Spencer, 2006), thus eliciting emotional cycles (Hareli & Rafaeli, 2008). Yet little is known about the effect of observing anger on observers' emotional or thinking processes.

The few studies that have examined the consequences of witnessing anger (or related uncivil behavior) report seemingly inconsistent findings. Some studies document negative consequences, such as Porath and Erez (2007, 2009), who showed that witnessing rudeness hindered observers' performance in complex problems. Similarly, Rupp and Spencer (2006), showed that individuals who interacted with an unfair and disrespectful customer felt

negative emotions and found it more difficult to perform their task. Yet others have shown that observing anger can improve problem resolution (cf. Geddes & Callister, 2007; Glomb & Hulin, 1997), compliance and cooperation in negotiations (Van Kleef & Cote, 2007; Van Kleef, De Dreu, & Manstead, 2004), and long-term work relationships with others (Fischer & Roseman, 2007).

The present study attempts to reconcile these inconsistent findings and clarify the interpersonal effects of anger. Drawing on social (Keltner & Kring, 1998) and evolutionary analyses of anger (Dimberg & Ohman, 1996), we suggest that observing anger influences observers' emotions and motivations in ways that limit their ability to deal with complexity and to solve creative problems (Staw, Sanderlands, & Dutton, 1981; Wood, 1986). We further posit that the way anger is expressed is of issue: When anger is communicated through sarcasm its effects on observers are more positive.

Observing Anger and Problem-Solving

Others' anger conveys information on the intentions, dispositions and status of others that can help observers coordinate their social interactions (Keltner & Kring, 1998). Anger can be expressed in an attempt to change or to influence another person's behavior (Glomb & Hulin, 1997; Fischer & Roseman, 2007). Thus, for example, people are more likely to express anger when they feel they have power or control over a target (Fischer & Roseman, 2007; Grandey et al., 2010), and to targets who have lower status (Kuppens, Van Mechelen, & Meulders, 2004). Yet despite increasing knowledge on when and why people express anger in organizations, little is known about the influence of expressed anger on observers. To begin to fill this gap, we focus here on the influence of observing anger on observers' emotions, motivations, and thinking processes.

Evolution has readied human beings to recognize and react to anger (Dimberg & Ohman, 1996). Observing anger may put people into what Higgins' (1997, 1998) regulatory

focus theory labeled as a *prevention orientation,* namely a motivation to seek security and avoid pain. A prevention orientation is automatically activated when people are presented with situational cues that imply a threat to safety and that call to mind one's obligations and potential losses (Neubert, Kacmar, Carlson, Chonko & Roberts, 2008). Research suggests that observing anger expressions automatically elicits a defense reflex in observers, produces prevention-oriented emotions such as fear and anxiety (Baas, De Dreu & Nijstad, 2008) and evokes a sense of threat. For example, a leadership style that emphasizes structure, obligations and punishments for deviant behavior enhances prevention orientation in followers (Kark & Van Dijk, 2007; Neubert et al., 2008).

The activation of a prevention orientation has survival value as it promotes adaptation of a person's processing style to the situation (Friedman & Forster, 2001). Adaptation includes narrowing the scope of conceptual attention, focusing only on relevant information, and excluding unrelated and distracting issues (Derryberry & Tucker, 1994). It also increases relying on systematic and detailed information rather than general criteria when making a decision (Parker & Isbell, 2010; Tiedens & Linton, 2001). Friedman and Forster (2000, 2001, 2005), demonstrated that activation of a prevention orientation limited individuals' attentional scope and memory-search processes to highly accessible mental representations, and hindered access to novel reactions and creative insights. Similarly, prevention-oriented emotions such as a sense of threat focuses human attention on stimuli related to safety and danger and increases rigidity and dichotomist thinking (De Dreu & Nijstad, 2008; Van Kleef et al., 2004). Specifically, felt threat leads to restricted information processing, consideration of a smaller number of alternative solutions to a problem, a narrowed attention span and a tendency to draw on familiar and well trained responses (Derryberry & Reed, 1998; Staw et al., 1981).

The narrowed attention and dichotomist thinking produced by a prevention orientation may hinder the ability of anger observers to process complex information and to solve creative problems. Complex thinking is defined in terms of the number of alternatives considered by a decision maker and the number of attributes on which each alternative is evaluated (Campbell, 1988, Payne, 1976). Bieri et al. (1966, p. 185) suggested the construct of *cognitive complexity* to capture individuals' "capacity to construe social behavior in a multidimensional way". Cognitive complexity is known to be positively related to mental flexibility, abstract reasoning, ability to deal with complex and abundant information (Streufert, 1970), and capacity to integrate incongruent information (Spengler & Strohmer, 1994). It is negatively related to the tendency to rely on simplification strategies and to make judgment errors (Rafaeli & Hiller, 2010; Spengler & Strohmer, 1994).

Solving a creative problem requires the solver to process multiple and uncertain alternatives as well as unknown means-end connections, and to integrate remotely associated cognitive material (Baas et al., 2008; Campbell, 1988). In contrast, the solving of analytic problems – problems that involve low levels of ambiguity and that can be handled through routine procedures which have been tried before – may benefit from the narrow focus of attention ignited by the sense of threat. The narrowed attentional scope created by observing others' anger can promote a focus on the most important information relevant to a simple task (De Dreu & Nijstad, 2008; Staw et al., 1981) and thus can improve performance in analytic problems that require accuracy and adherence to standards (Kark & Van Dijk, 2007). Indeed, Friedman and Forster (2005) showed that compared to the activation of a promotion focus, the activation of a prevention focus improved performance in GRE analytic problems that benefit from a constricted scope of attention and concentration on the given information, and

hindered performance in creative problems where expanded attention focus and going beyond the given information is a benefit. Similarly, exposure to others' anger may inspire narrow, less complex and more rigid thinking processes, and enhance performance in analytic tasks while hindering performance in creative tasks, which require consideration of alternative and novel responses.

Observing Sarcasm and Complex Thinking

Anger can be communicated indirectly using sarcasm (Gibbs, 1986; Gibbs, Leggitt & Turner, 2002). Sarcasm relies on language with a literal positive meaning to communicate a negative message. For example, a customer who has waited for a long time can comment "What great service you have!!" so that the literal meaning of "great service" contradicts the intended message of "you have terrible service!" Because sarcasm involves humor and figurative speech, it is presumed to communicate anger in a less threatening fashion (Gibbs, 2000; Sperber & Wilson, 1986) and to have a diluted impact on observers' emotions compared to direct anger (Dews & Winner, 1995).

Comprehending sarcastic expressions requires more cognitive effort and complex thinking than understanding direct anger (Smith & White, 1965). Cognitive effort is required both to decode the literal meaning of the words and to interpret the nuances of the speaker's intended and often contradictory meaning. In encounters with sarcasm, observers must bear in mind the specific context, along with pragmatic information – beliefs, knowledge, and norms – of the speaker and the situation (Gibbs, 1986; McDonald, 1999). In this vein, Gibbs (1986) showed that participants remembered sarcastic remarks much better than non-sarcastic equivalents, because sarcastic remarks echoed established beliefs or social norms. Clinical studies using brain-injured patients have showed that poor comprehension of sarcasm is typically due to poor inferential reasoning and difficulty dealing with complexity (McDonald, 1999).

Another line of research has shown that priming people with ambivalent or inconsistent information (e.g., paradoxes) elicits complex thinking processes, increases attention span and sensitivity to peripheral cues, and enhances performance in creative and insight problems (Fong, 2006; Miron-Spektor, Gino & Argote, 2008). Similarly, sarcastic team members hindered team members' defensiveness and enhanced team creativity (Smith & White, 1965). Integrating these findings with the hampered cognitive processing created by observing anger and the potentially enhanced cognitive processing induced by observing sarcasm, we suggest that compared to observing anger, observing sarcasm will elicit less-negative emotional reactions and more effective complex thinking, evidenced in improved solving of creative problems.

Hypotheses and Overview of the Present Research

Our goal in this paper is to unravel the effects of observing anger on thought processes and the mechanisms that may underlie these effects. Consistent with prior research (Dimberg & Ohman, 1996; Friedman & Forster, 2005; Staw et al., 1981), we hypothesize that observing anger impedes complex thinking and the solving of creative problems, but enhances the solving of simple analytic problems (Hypothesis 1); that the effect of observing anger on complex thinking is mediated by prevention orientation (Hypothesis 2); and that observing sarcasm enhances complex thinking and the solving of creative problems (Hypothesis 3).

We test these predictions in three studies. We first identify the effects of observing anger and sarcasm on the solving of creative and analytic problems. We replicate these findings with different creative and analytic problems and with different samples. We then examine the psychological mechanisms underlying these effects (Baron & Kenny, 1986; Preacher & Hayes, 2008) to document the mediating role of prevention orientation in the relationship between observing anger and complex thinking.

Specifically, in Study 1 we show the effect of observing anger on the solving of analytic and creative problems. In Studies 2 and 3 we then compare the effects of observing anger and observing sarcasm on solving a different set of analytic and creative problems. In Study 3 we also confirm prevention orientation (measured by two indicators -- felt threat and prevention focus) as a latent variable mediating between observing anger and complex thinking.

Study 1 -- Methods

Participants and Procedure

Undergraduate engineering students in Israel (n=72, 39% female; M_{age} = 24.5) received partial course credit for participating in a 2 (observed emotion: anger vs. neutral) by 2 (problem complexity: analytic vs. creative) between-subjects study. Participants were randomly assigned to one of four conditions, determined by the computer at which they were seated. All participants received the following initial instructions:

> This experiment simulates a customer service center. As a Customer Service Representative you will be asked to perform several tasks, and will be compensated based on your performance. You will be asked to listen to a recorded conversation between a customer and another Customer Service Representative. After that you will be asked to perform a problem-solving task and to respond to a short survey.

After these instructions participants heard a pre-recorded conversation through headphones. They were then asked to solve a set of either analytic or creative problems.

Anger manipulation. The recording, simulating a conversation between a customer and a customer service representative (CSR), provided the setting for the anger manipulation. Half the participants heard a conversation in which the customer was overtly hostile (anger condition), and half heard a conversation in which the customer expressed no particular emotion (neutral condition). The conversations were identical in all other respects. Specifically, in both conversations the customer raised the same issue and the CSR narratives were identical. Since anger is better recognized when expressed by males than females (Goos

& Silverman, 2002), the customer in both conversations was male and the CSR was female. The narratives were based on transcripts of service interactions obtained from a local cellular provider (see Appendix A for the full text).

Tasks and Measures

Creative and analytic problems. All participants were asked to solve 12 problems. The *creative problems* were Hebrew insight problems developed by Kimor (2005); they are similar to problems used by Duncker (1945), Isen, Daubman and Nowicki (1987), and Kaufmann and Vosburg (1997). These problems require participants to reconstruct the information they receive, to switch between different alternative representations of the problem, and to engage an unconventional and non-intuitive perspective (Baas et al., 2008; Rietzschel, De Dreu & Nijstad, 2007). Insight problems can be solved either though heuristic processing or through effortful processing of different alternative paths to a solution (De Dreu, Baas, & Nijstad, 2008). The *analytic problems* comprised Israeli SAT-type problems (Gross, 2001) that require systematic, analytic thinking, and following a well-rehearsed path to reach a correct solution (Friedman & Forster, 2000, 2005). All our participants were engineering students who therefore had the appropriate mathematics background to approach and solve the problems systematically. Instructions in both conditions were to solve as many problems as possible within 25 minutes, with a reward of 50 cents for each correct answer. The performance score was the proportion of correct answers. Appendix B includes sample problems and solutions.

Manipulation check. Participants were asked to rate the anger of the customer they heard (5 point Likert scale, 1= very slightly or not at all to 5= extremely).

Control. The problems and the recorded conversations were in Hebrew, so to eliminate any concern that language mastery may have influenced performance, all

participants indicated whether Hebrew was their first language and how many years they had lived in Israel. In all analyses the effects of these variables were insignificant. Therefore, for brevity they are not reported in the results below.

Study 1 -- Results

The manipulation worked as intended: participants in the anger condition rated the customer as significantly angrier than participants in the neutral condition (see Table 1). Table 2 presents the means, standard deviations and intercorrelations of Study 1 variables.

An analysis of variance (ANOVA) with the IV's of observing anger and problem complexity and a DV of performance confirmed a significant main effect of problem complexity ($F[1, 70] = 68.43$, $p<.001$, $\eta^2=.51$), with higher performance in the analytic problems than in the creative problems ($M_{analytic}= .71$, $SD_{analytic}=.15$; $M_{creative}= .36$, $SD_{creative}=.22$). Observing anger itself did not influence performance *(*F [1, 70] < 1, *ns),* but the interaction between observing anger and problem complexity was significant (F [3, 70] = 6.43, $p < .01$, $\eta^2 = .09$), supporting Hypothesis 1. As evident in the means presented in Table 2 and in the graphic depiction in Figure 1, our prediction that observing anger hinders problem-solving for creative problems and enhances it for analytic problems was supported. In all the other possible planned comparisons, performance in the analytic problems was significantly better than in the creative problems ($p< .01$).

Study 1 -- Discussion

Study 1 supported our prediction that observing anger hinders the solving of creative problems and enhances the solving of analytic problems, providing initial support for our assertion that observing anger influences complex thinking. In Study 2 we test these assertions with a different set of analytic and creative problems, and we examine whether the way anger is expressed influences observers' success in problem solving. That is, beyond our

original prediction, we predict that observing sarcasm will enhance complex thinking and increase success in solving creative problems.

Study 2 -- Methods

Participants and Procedure

Undergraduate Israeli engineering students (n=184, 46% females; M_{age}= 25) received partial course credit for participating in a between-subjects study with a 3 (observed emotion: anger vs. sarcasm vs. neutral) by 2 (problem complexity: analytic vs. creative) study design. In a procedure otherwise similar to Study 1, participants listened to a message supposedly recorded by a customer on an organizational message system. They were then asked to solve a set of problems that were either analytic or creative.

Anger manipulation. Participants listened to one of three versions of a customer message, all of which reported reception and service problems with the customer's cellular line. In the ***anger*** condition the customer narrative featured hostile language and negative intonation (e.g., "Your service is extremely inefficient! You make deliveries only between 9:00 am and 12:00 pm! This is an outrage!"). In the ***sarcasm*** condition the customer narrative combined positive language and negative intonation (e.g., "Your service is "fast as a turtle." You make deliveries only between 9:00 am and 12:00 pm! These hours are just "perfect" for working people"). In the ***neutral*** condition the narrative was limited to neutral language with no particular intonation (e.g., "You make deliveries only between 9:00 am and 12:00 pm. I am at work during those hours).[1]

[1] As in Study 1, all messages were recorded by a male customer. They were identical in length, and lasted approximately one minute. All messages can be obtained from the first author upon request.

Tasks and Measures

Manipulation check. We asked participants to rate the extent to which the customer expressed various emotions, including happiness, anger, sarcasm, irony, and contempt (on a 5-point Likert scale, 1= very slightly or not at all to 5= extremely).

Creative and analytic problems. The *creative problems* were 15 items from the RAT (Remote Association Task; Mednick, 1962), which require participants to identify associations between three seemingly unrelated words (e.g., envy, golf, beans). To come up with the correct solution, one must abandon dominant responses and break up the presented material, identifying complex and unconventional relations between the words (Baas et al., 2008; Fong, 2006). The *analytic problems* comprised items from the CAB-S Psychological Exams Kit (Hakstian & Cattell, 1982) that require comparisons of 25 pairs of meaningless letter strings (e.g., wmxrtspydwjsg and wmxrtmpydwjsg). Participants must determine whether members of each pair are identical or not. These problems require attention to detail and a systematic yet simple comparison of strings. Participants' scores in both cases were the proportion of items solved correctly in the allotted time. The Hebrew versions of the problems were used, and as in Study 1 preliminary analyses confirmed no effects of language history on any of the analyses.

Study 2 -- Results

Manipulation Check

As evident in Table 1, the manipulation worked as expected: participants in the anger and sarcasm conditions rated the customer as expressing more anger and less happiness than participants in the neutral condition. Participants in the anger condition rated the customer as angrier than those in the sarcasm condition. The ratings of sarcasm and irony confirmed that the customer in the sarcasm condition was perceived as more sarcastic and ironic than the customer in the anger condition, with no differences in rated irony and sarcasm between the

anger and neutral conditions. Ratings of contempt were higher in the anger and sarcasm conditions than in the neutral condition, with no difference between the anger and sarcasm conditions. The anger and sarcasm conditions therefore differed in the intensity of the perceived anger and in the way that anger was expressed. Table 2 presents the means, standard deviations and intercorrelations of Study 2 variables.

An ANOVA testing the effect of observed anger and sarcasm on the solving of the different problems (see Table 3) confirmed that the way anger was expressed (anger vs. sarcasm vs. neutral) had a significant effect (F [2,181] = 2.87, $p<.05$, η^2=.03), and that participants solved the analytic problems significantly better than the creative problems (F [2,181] = 675.21, $p<.001$, η^2=.79). Supporting our prediction, there was a significant interaction between the anger conditions and problem complexity (F [2,181] = 4.85, $p<.001$, η^2=.05). As seen in Table 3, observing anger enhanced analytic problem-solving but hindered the solving of creative problems, in further support of Hypothesis 1. Supporting Hypothesis 3, observing sarcasm improved the solving of creative problems. In all other planned comparisons, performance in the analytic problems was significantly better than performance in the creative problems (p<.01). Figure 1 graphically depicts this effect.

Study 2 -- Discussion

Studies 1 and 2 supported two of our predictions: Observing another person's anger influenced observers' thinking processes, and the way anger is expressed shaped this effect. Observing anger hindered the solving of creative problems and enhanced the solving of analytic problems. The replication afforded by Study 2 is important because the effects are shown to occur with a different manipulation and a different set of analytic and creative problems. Additionally, Study 2 showed that observing sarcastic expressions of anger enhanced the solving of creative problems, as we had predicted.

Study 3 had three important goals. First, while Studies 1 and 2 showed consistent effects of observing anger on the solving of creative and analytic problems, they did not directly measure observers' complex thinking. Second, Studies 1 and 2 did not examine the effect of observing anger on observers' prevention orientation, leaving unclear the mechanism driving the effects of observing anger on complex thinking. Third, participants' problem solving scores in Studies 1 and 2 suggest that the creative problems may be more difficult, which may mean that complexity was confounded with difficulty.

Thus, in Study 3, we directly measure participants' complex thinking; we use a set of creative and analytic problems that are similar in terms of difficulty; and we test the mediating role of prevention orientation. To measure complex thinking we rely on Kelly (1955), who noted that people use various personal constructs in perceiving their environment, and that these constructs vary in their consistency, rigidity, and complexity. Complex thinking in this paradigm involves a large and differentiated system of constructs governing perceptions (Bieri et al., 1966; Carraher & Buckley, 1996).

To fully test our theory and extend our findings in Studies 1 and 2, Study 3 suggests that observing anger increases people's prevention orientation, which in turn limits the number of different constructs on which people rely in their construction of others' behavior. Study 3 further suggests that observing anger conveyed through sarcasm has weaker effects on observers' prevention orientation, and elevates (rather than hampers) complex thinking.

Study 3 -- Methods

Participants and Procedure

Undergraduate engineering students in Israel (n=119, 48% females; M_{age}= 24.07) participated in the study either for partial course credit or for payment. Participants were

randomly assigned to one of three observed anger conditions (anger vs. sarcasm vs. neutral) and were then asked to solve both analytic and creative problems. The procedure and manipulation were similar to Study 2, but in a within-subject design that controls for individual differences in complex thinking.

After listening to a recorded message supposedly left by a customer, participants were asked to report the sense of threat and anxiety they personally felt, and to complete measures of prevention focus and of cognitive complexity. They then performed both the analytic and the creative problem solving tasks, with the order of the tasks counterbalanced between participants.

Tasks and Measures

Manipulation check. Participants rated the extent to which the customer in the recorded message was angry, sarcastic or happy (5-point Likert scale, 1= very slightly or not at all to 5= extremely).

Creative and analytic problems. All participants were asked to solve both the analytic and creative problems used in Study 2. To control for the difficulty of the problems we used a subset of problems from Study 2, namely five relatively easy RAT items (Mednick, 1962), and 10 relatively difficult items from the CAB-S Psychological Exams Kit (Hakstian & Cattell, 1982). Difficult and easy problems were identified according to participants' success in solving the problems in Study 2.

Complex thinking. Complex thinking was measured using the Role Construct Repertory Test (RCRT) developed by Kelly (1955) and used by Bieri (1955), which received support for its construct validity (Carraher & Buckley, 1996; Schneier, 1979; Seaman & Koenig, 1974). Participants were asked to list a few people in their social environment; to consider three of them at a time; and to indicate in what way the two of them are alike and different from the third. Repeating this process several times created a matrix. The degree of

differentiation in the constructs representing people in the matrix is an indicator of complex thinking, with higher differentiation indicating a higher degree of complexity (for a comprehensive description of the measure see Bieri, 1955). Scores on this measure can range from -20 to 0.[2]

Prevention orientation. We presume that a prevention orientation includes a motivational and an emotional element, and therefore measured it using two indices: (a) the motivational element, which we label prevention focus, and measured with the 9-item scale developed by Lockwood, Jordan and Kunda (2002) (9-point Likert scale, 1= not at all true to 9 = very true); (b) the emotional element, which we label felt threat (Baas et al., 2008), asked participants to report their sense of threat and anxiety on a 5-point Likert scale, 1= very slightly or not at all to 5= extremely.[3]

Study 3 -- Results

Manipulation Check

The manipulation worked as expected: Customers in the anger and sarcasm conditions were rated as more angry and as less happy than those in the neutral condition, and ratings in the anger condition indicated more anger and less sarcasm than in the sarcasm condition (see Table 1). Table 2 presents the means, SD's and intercorrelations of the Study 3 variables.

An ANOVA testing the effects of the experimental conditions (observed anger, sarcasm or neutral) confirmed our prediction that observing sarcasm would lead to higher scores in the complex thinking measure compared to the anger and neutral conditions (see Table 3), with no significant differences between the anger and neutral conditions. Moreover, similar to Study 2, observing sarcasm led to improved performance in the creative problems, while observing anger and sarcasm led to better performance in the analytic problems, with

[2] Due to technical problems, 7 participants did not complete the cognitive complexity questionnaire.
[3] Our theoretical prediction regarded the role of sense of threat as the emotional element of the prevention orientation. For greater measurement reliability we collected data on two items (sense of threat and anxiety). We analyzed the data both with sense of threat alone and with the 2-item index, and there was no difference. Because sense of threat was our primary theoretical interest we report only the analysis with felt threat.

no significant difference between the anger and sarcasm conditions. Figure 1 graphically depicts these effects.

We tested the mediation hypothesis of prevention orientation using bootstrapping procedures, which establish a confidence interval for multiple indirect effects; following Preacher & Hayes, (2008) we can presume that mediation is established when the confidence interval of the indirect effect does not include zero. The effect of observing other's anger on complex thinking was reduced to non-significance (from β=-.17, p<.05, to β=-.09, p=.32) when the two mediators (felt threat and prevention focus) were included in the equation, and both the felt threat (β=-.24, p<.01) and prevention focus (β=-.16, p<.1) were significant predictors of complex thinking. Additional analyses confirmed the total indirect effect as significant. A bootstrap analysis showed that the 95% bias-corrected confidence interval for the size of the total indirect effect (of observing anger through felt threat and prevention focus) excluded zero [-2.29, -.12], suggesting a significant indirect effect (Preacher & Hayes, 2008). Additional analyses revealed that the specific indirect effect through felt threat excluded zero [-2.06, -.02], while the specific indirect effect though prevention focus did not exclude zero [-1.26, .03]; following Preacher & Hayes, (2008), these results suggest that the motivation element of prevention orientation (prevention focus) did not significantly contribute to complex thinking above and beyond the emotional element (of felt threat). As in Studies 1 and 2, preliminary analyses confirmed no effects of language history on any of the analyses. Figure 2 provides a graphic depiction of the mediation analysis.

Study 3 – Discussion

Study 3 replicates Study 2, adding insights into mediating mechanisms and ruling out potential confounds of individual differences in complex thinking. As we predicted, observing sarcasm enhanced cognitive complexity compared to observing anger, and improved performance in creative problem solving. Observing anger or sarcasm led to

improved solving of analytic problems. In addition, observing anger increased prevention-oriented emotions (i.e., felt threat and anxiety) and motivation (prevention focus) compared to other conditions, and prevention-oriented emotions fully mediated the relationship between the anger condition and complex thinking.

General Discussion

Although anger is an inherent interpersonal emotion (Sloan, 2004), research on anger has focused primarily on the effects of felt anger on the feeling agent. Influences beyond the angry agent have received only scant attention, and the predictions that can be drawn from the limited research that is available are confusing. Our research is the first to demonstrate that displays of anger can have both positive and negative effects on other people. We show that anger displays can influence observers' emotions, regulatory focus and thinking processes. Our findings provide initial empirical support for recent theoretical proposals on emotion cycles (Hareli & Rafaeli, 2008), and establish the importance of understanding and perhaps containing episodes of anger in organizations.

Building on the work of Higgins' (1997, 1998), Staw et al. (1981) and others, we predicted and confirmed that others' anger is a situational cue that activates prevention-oriented motivation and emotions, which in turn restricts people's ability for complex thinking. Our findings continue the stream of work that shows the influence of regulatory focus on cognitive processing and creativity (Baas et al., 2008; Friedman & Forster, 2000, 2001, 2005), and adds other people's anger as a situational variable that evokes this focus.

In support of recent claims (cf. Geddes & Callister, 2007; Young, Tiedens, Jung & Tsai, 2010), our research suggests that anger episodes are not invariably negative in their effects – and in this, our findings shed clarifying light on the mixed results of previous research. First, we show that effects may differ depending on whether people who observed anger are asked to solve analytic or creative problems. The solving of creative problems was

hampered by observing anger. By extrapolation, observing anger may interfere with people's ability to perform complex tasks and more broadly handle situations involving high levels of ambiguity. Exposure to anger, and the prevention orientation thereby created, may disable one's ability to integrate information that is seemingly unrelated to the situation at hand. Threat-rigidity dynamics may also make alternative courses of action less accessible to memory, and therefore less likely to be used.

At the same time, observing anger seems to enhance people's performance in analytic problems, which may generalize to a positive effect of observing anger on performance in relatively simple and well-rehearsed tasks that require a narrowed scope of attention. Others' anger may also be effective in motivating people to apply dominant responses to well-known problems and situations, perhaps consistent with the popular notion that "displays of anger get people going." Unfortunately the popular conception is limited because anger seems to get people going only in simple, well-known and uncreative routes.

Second, our findings highlight the importance of the way anger is expressed. Anger expressed indirectly – through sarcasm – elicits a weaker prevention orientation in observers. Sarcastic expressions of anger, in contrast to direct expressions, can have a positive effect on complex thinking and on solving of creative problems. The incongruent information inherent in sarcasm appears to stimulate complex thinking and to attenuate the otherwise negative effects of anger.

As always, our research has limitations. Clearly caution is called for in generalizing our findings since all our data were conducted in a laboratory setting and on Israeli engineering students. Anger in organizations is much more complex, involves subjective and temporal elements (who, why, when), and is governed by display rules (Geddes & Callister, 2007) and cultural norms (Elfenbein & Shirako, 2006; Kitayama, Mesquita & Karasawa, 2006). Yet the high internal validity afforded by the experimental control of a lab study

allows us to validly document the causal relationship between observing anger and complex thinking. As others have argued, the experimental setting is an essential first stage for validating new theoretical claims (Rupp & Spencer, 2006; Van Den Bos, 2001).

Practical Implications

Anger and hostility abound in organizations (cf. Glomb, 2002), especially in customer service (Grandey et al., 2004, 2010; Inness et al., 2008). We suggest that displays of anger in organizations require close scrutiny because their effects may backfire: displays intended to lead to improvements may actually hamper employee performance, if employee tasks require complex and creative thinking.

The effects we show are relevant to a much broader audience than is at first obvious. People who merely hear someone displaying anger without being the actual target are shown by our analyses to be influenced by the anger displays. These could be employees whose peers are the target of an anger episode, for example (cf. Rupp & Spencer, 2006). It is improbable that anger can be completely removed from organizations, so our findings call for careful attention of supervisors (Glomb & Hulin, 1997) and customers (Grandey et al., 2004, 2010) to the way that felt anger is expressed. The potentially positive effects of sarcastic expressions suggest that with some irony and humor, an anger-evoking situation can be turned into better employee performance even if the problem at hand is complex.

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Table 1

Manipulation Checks in Studies 1, 2 and 3

	Experimental Conditions				
	Neutral	Anger	Sarcasm		
Rating of emotion expressed by customer	Mean (SD)	Mean (SD)	Mean (SD)	*F* (*df*)*	η^2
Study 1					
Anger	1.32[b] (.64)	4.11[a] (.70)		305.71 (1, 70)	.82
Study 2					
Anger	1.63[c] (.86)	4.69[a] (5.3)	3.91[b] (.98)	232.48 (2, 181)	.72
Sarcasm	2.20[c] (1.38)	3.63[b] (1.06)	4.64[a] (.68)	79.08 (2, 181)	.47
Irony	2.33[c] (1.42)	3.24[b] (1.15)	4.66[a] (.63)	67.83 (2, 181)	.43
Contempt	1.60[b] (.14)	3.40[a] (.13)	4.00[a] (.13)	90.71 (2, 181)	.76
Happiness	2.93 [a] (.90)	1.17 [b] (.52)	1.17 [b] (.42)	148.79 (2, 181)	.62
Study 3					
Anger	1.55[c] (.80)	4.75[a] (.49)	3.87[b](.84)	211.51 (2, 119)	.78
Sarcasm	1.76[c] (1.02)	3.33[b] (.94)	4.61[a] (.82)	92.16 (2, 199)	.61
Happiness	2.57[a] (.94)	1.03[b] (.16)	1.18[b] (.51)	73.97 (2, 199)	.56

Note. Means not sharing a similar subscript differ at $p<.01$.
* All the effects are significant at $p<.001$ significance level.

Table 2

Means, Standard Deviations and Inter-Correlations in Studies 1, 2 and 3

Study 1	Mean	SD	1					
1. Observing Anger[a]								
2. Analytic Problems	.71	.15	.28†					
3. Creative Problems	.36	.22	-.29†					
N=71 $N_{Analytic}$ = 35 $N_{Creative}$=36								
Study 2	Mean	SD	1	2				
1. Observing Anger[a]								
2. Observing Sarcasm[b]								
2. Analytic Problems	.92	.10	.24*	-.08				
3. Creative Problems	.23	.24	-.17	.29**.				
N= 184 $N_{Analytic}$ = 90 $N_{Creative}$= 94								
Study 3	Mean	SD	1	2	3	4	5	6
1. Observing Anger[a]								
2. Observing Sarcasm[b]								
3. Felt Threat	1.25	.63	.20**	-.04				
4. Prevention Focus	3.25	1.11	.16†	-.06	.22*			
5. Cognitive Complexity	-14.08	5.33	-.17†	.20*	-.30**	-.21*		
6. Analytic Problems	.71	.21	.09	.11	-.11	.07	.01	
7. Creative Problems	.60	.28	.01	.17†	-.01	-.02	.07	-.11
N=119								

† p<.1. * p <.05. ** p<.01. ***p<.001.

[a] Dummy variable in which Observing anger =1 else =0

[b] Dummy variable in which Observing sarcasm =1 else =0

Table 3

Solving Analytic and Creative Problems in Different Experimental Conditions, Studies, 1, 2 and 3

		Experimental Conditions				
		Neutral	Anger	Sarcasm		
		Mean (SD)	Mean (SD)	Mean (SD)	*F* (*df*)	η^2
Study 1						
	Analytic Problems	.67[b] (.16)	.75[a] (.18)		2.73[†] (1, 34)	.08
	Creative Problems	.42[a] (.27)	.30[b] (.20)		4.35* (1, 35)	.12
Study 2						
	Analytic Problems	.90[b] (.12)	.96[a] (.07)	.91[b] (.11)	3.04* (2, 181)	.06
	Creative Problems	.19[b] (.21)	.17[b] (.20)	.33[a] (.28)	3.79* (2, 181)	.08
Study 3						
	Cognitive Complexity	-14.28[a/b] (5.88)	-15.53[b] (5.51)	-12.32[a] (4.09)	3.33* (2, 111)	.06
	Analytic Problems	.65[b] (.18)	.76[a] (.21)	.74[a] (.23)	3.42* (2, 118)	.06
	Creative Problems	.55[b] (.26)	.57[b] (.28)	.68[a] (.27)	3.10* (2, 118)	.05

Note. Means not sharing a similar subscript differ at $p < .05$.
† p<.1. * p <.05. ** p<.01. ***p<.001

Figure 1

The Effect of Observing Anger and Sarcasm on the Solving of Analytic and Creative Problems in Studies 1, 2 and 3

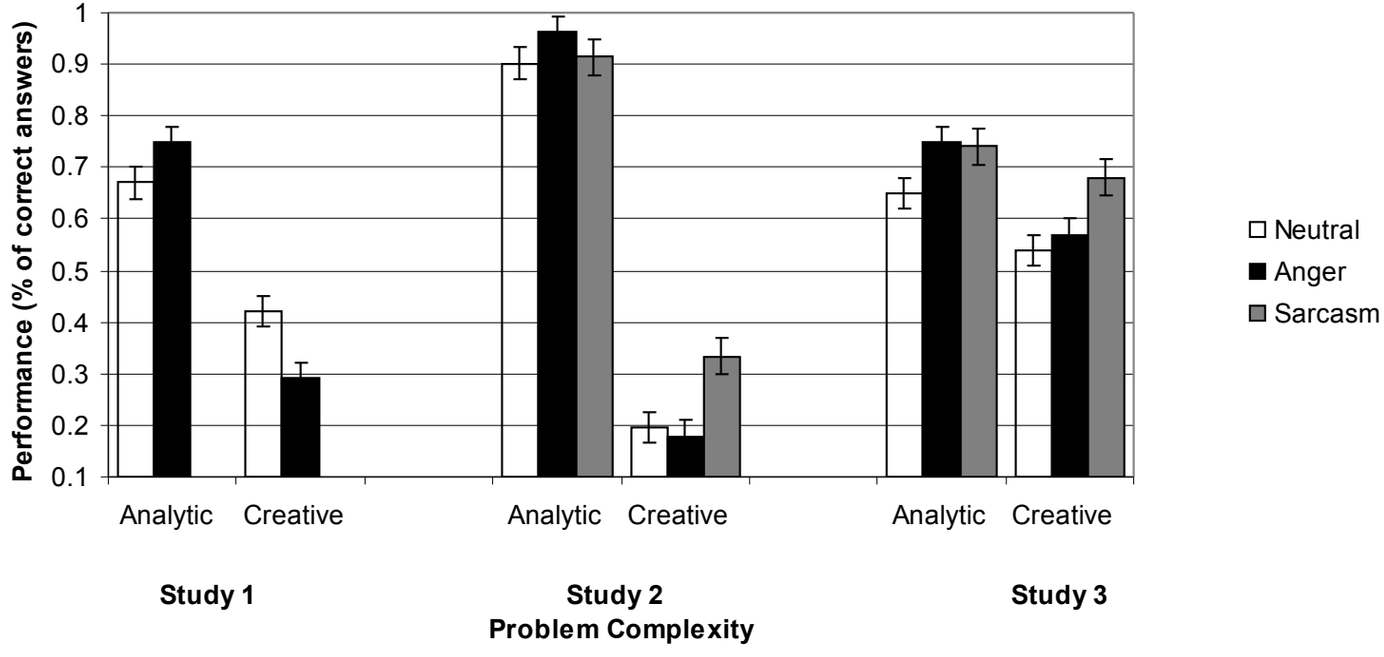
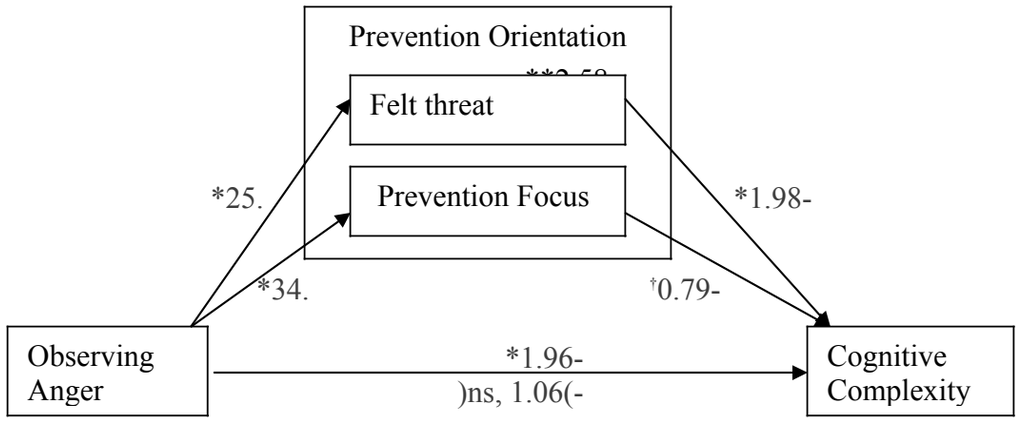


Figure 2

Prevention Oreintated Emotions and Motivation as Mediators Between Observing Anger and Cognitive Complexity, Study 3



Note: Reported above each arrow are the standardized regression coefficients. Below the arrow and in parentheses is the standardized regression coefficient when the mediator is included in the equation.
† p<.1 *p< .05.

Appendix A

Angry versus Neutral Conversations, Study 1[4]

Angry Condition	**Neutral Condition**
CSR: Hi, you've reached the PellCome company. This is Erica speaking.	
Customer: My name is Ron Weiss, and my cell phone number is 059-6851172.	
CSR: How may I help you?	
Customer: Three months ago I had a problem with my cell phone. People couldn't hear me when I was using the speaker. Now the problem has appeared again. People can't hear me.	
CSR: Perhaps the problem occurs in an area with no reception?	
Customer: What?! Do you expect me to know where exactly it happened? Why should I waste my time on your bad quality phones, and your lousy technicians? Every time a new problem pops up!!	**Customer**: I also thought about that. But I think it happens all the time, even when I'm in areas that usually do not suffer from reception problems. It's just anywhere I happen to be.
CSR: We can replace the phone. We have home delivery service every day between 9:00 AM and 12:00 PM. Will someone be home during those hours?	
Customer: Don't you think that people work? Do I need to wait for you at home 3 hours because of your bad service? This is really outrageous! What kind of service is that?	**Customer**: I am usually at work during these hours. But I can check, maybe one of my kids can wait for the delivery person. What again were the hours that you can come?
CSR: Can I transfer you to the delivery center for scheduling a time that works for you?	
Customer: Do I have a choice? I'll talk to them, and let's hope this is the last time the problem occurs.	**Customer**: Sure, I really hope this will solve the problem. Thank you.

[4] All the conversations that participants heard were in Hebrew.

Appendix B

Sample Items in Analytic and Creative Problem Conditions, Study 1

1. Sample item from the analytic problem condition:

> Together three employees were paid $750. The first employee received twice as much as the second employee and $50 less than the third employee. How much money did each of the employees receive?

Correct Answer: $330, $280, $140.

2. Sample item from the creative problem condition:

> A room has three light switches. You can switch them on and off as you wish and then go to another room where there are three light bulbs. How can you identify which switch belongs to which light bulb? You cannot return to the room with the switches, the wall between the rooms is sealed, and the door is closed.

A possible correct solution for this question would be:

> Switch one light on for an hour, one for a minute and don't touch the third. When you go to the next room touch the three light bulbs and identify the hot bulb, the warm bulb and the cold bulb. These will correspond to the switch that was turned on for an hour, the switch that was turned on for a minute, and the switch that was not turned on.