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The effects of incidental anger, contempt, and disgust on hostile language and implicit behaviors

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Abstract

Recent studies have suggested that the combination of the emotions anger-contempt-disgust (ANCODI) is associated with intergroup hostility. This study examined if incidental elicitation of this emotion combination causally produces hostile cognitions, language, and behaviors. Members of political groups were primed with either ANCODI, fear + sadness, or no emotion, and then engaged in creativity task in relation to their opponent or a non-opponent outgroup. The ANCODI mix produced more hostile cognitions, language, and implicit behaviors associated with hostility, in some cases specifically toward their opponent outgroups, than individuals primed with other emotions. Multiple mediation analyses indicated that the three emotions and their interactions mediated many of the effects.

Despite the relatively robust research examining emotion and interpersonal aggression (see review in Anderson & Bushman, 2002), there has been surprisingly little research on the role of emotions in intergroup aggression. Two studies in this area point to an important role for anger, and to a lesser extent, fear. Halperin and Gross (2010) conducted two telephone surveys of Jewish-Israeli sentiments and unfairness appraisals, and reported that sentiments of anger toward Palestinians predicted later anger responses, and that this relationship was mediated by perceptions of unfairness. Spanovic, Lickel, Denson, and Petrovic (2010) conducted surveys of Serbian students in Belgrade and Banja Luka about their attitudes toward Albanians and Bosniaks and reported that fear of the outgroup was related to motivation for aggression in both contexts (albeit in opposite directions), even when anger was controlled.

More recent work in this area has suggested that three emotions, anger, contempt, and disgust, may work collectively in facilitating intergroup aggression (Matsumoto, Hwang, & Frank, 2013a,,b). These studies examined the words and nonverbal behaviors produced by leaders of political groups that subsequently committed either an act of aggression or non-violent resistance against an opponent outgroups. Speeches of leaders as they talked about their opponent outgroups were obtained at three points in time leading up to the identified acts. Appraisals, metaphors, and nonverbal behaviors associated with multiple emotions were assessed. Leaders of groups that eventually committed acts of aggression expressed words, language-based metaphorical appraisals, and nonverbal behaviors related to anger, contempt, and disgust toward their opponent outgroups; other emotions did not differentiate groups that committed acts of aggression from those that did not.

These latest findings suggested that the combination of anger, contempt, and disgust (hereafter, referred to as ANCODI) is an emotional mix that fuels intergroup hostility (for a more comprehensive review and discussion of the ANCODI hypothesis, see Matsumoto, Frank, & Hwang, 2015). Although these emotions are often related to each other, they are also distinct, with unique appraisals that elicit them and with different social functions when elicited. In terms of appraisal processes (Ellsworth & Scherer, 2003; Lazarus, 1991), anger is triggered by appraisals of goal obstruction, injustice, self-relevance, and violations of norms, individual rights, and autonomy. Contempt is about status and moral superiority, and is elicited by violations of communal codes and hierarchy, and appraisals of other's incompetence or lack of intelligence. Disgust is the emotion of contaminant elimination and is elicited by violations of codes for purity and sanctity, and appraisals of other's moral untrustworthiness (Hutcherson & Gross, 2011; Rozin, Lowery, Imada, & Haidt, 1999). In terms of social functions, the function of anger is to remove obstacles, while the function of contempt is to make a statement about inherent moral

superiority; the function of disgust is to eliminate or repulse contaminated objects (Rozin, Lowery, et al., 1999). Anger is associated more with short-term attack responses but long-term reconciliation, whereas contempt is longer lasting, characterized by rejection, derogation, and social exclusion of others in both short and long term, implying more negative and permanent changes in beliefs about another person (Fischer & Roseman, 2007). Anger is related to normative social actions, such as participating in demonstrations, signing petitions, or participating in acts of civil disobedience, whereas contempt is related to non-normative social actions, such as sabotage, violence, or terrorism (Tausch et al., 2011). Contempt has also been implicated in theories of prejudice (Brewer, 1999), and disgust has been central to theories and empirical work on dehumanization (Buckels & Trapnell, 2013; Cortes, Demoulin, Rodriguez, Rodrigues, & Leyens, 2005; Demoulin et al., 2004).[1]

There are several ways to consider the mechanisms by which ANCODI (or any other) emotions may facilitate intergroup aggression and hostility. The research reviewed above posited a role for these emotions when they are directly tied to the actions of an opponent outgroup (i.e., when they are "integral" to the object of judgment: the opponent outgroup). From an applied standpoint, however, it is also important to consider the possible effect of emotions on intergroup hostility when the emotions are only indirectly or incidentally related to the object of judgment. If ANCODI produces hostile cognitions, feelings, or behaviors toward opponent outgroups even when those emotions are only incidentally aroused, that would contribute to a broader understanding of the potential mechanisms by which emotions contribute to intergroup relations (for discussion of the distinction between integral and incidental affect, see reviews by Bodenhausen, 1993; Loeswenstein & Lerner, 2003; Schwarz, 2012).

In fact there is a growing literature that has demonstrated the effects of incidental emotions on intergroup processes extantly related to aggression and hostility. For example, incidental anger increased people's tendencies to overlook mitigating details before attributing blame to others, perceive ambiguous behavior as hostile, discount the role of uncontrollable factors when attributing causality, and punish others for their mistakes (see review in Loeswenstein & Lerner, 2003). People induced to feel incidental anger perceived less risk than individuals induced to feel fear (Lerner & Keltner, 2000, 2004). Incidental anger produced greater rejection of targets with outgroup memberships than did incidental sadness (Kenworthy, Canales, Weaver, & Miller, 2003), and more stereotypic judgments in a social perception task than did sadness (Bodenhausen, Kramer, & Susser, 1994). And negative feelings about outgroups resulted in more negative evaluative reactions even when the negative feelings were supposed to have been considered as "inadmissible information" (Moreno & Bodenhausen, 2001).

Affect as information theories (Loeswenstein & Lerner, 2003; Schwarz, 2012; Wilder & Simon, 2003) explain why incidental emotions may affect intergroup processes. These theories posit that affect, even if only incidentally aroused, may be used as information to interpret the situation when decisions and behaviors are required. Moreover, the more intense the incidental affect, the greater the influence. The Appraisal Tendency Framework (Lerner & Tiedens, 2006) suggests why incidental ANCODI may have specific effects on intergroup aggression. This framework suggests that discrete emotions are associated with specific cognitive appraisals that have certain consequences for informational, motivational, and processing functions (akin to the relevance function of incidental affect posed by Pfister & Bohm, 2008). The specific cognitive appraisals associated with anger, contempt, and disgust described earlier have to do with goal obstruction, moral superiority, and contamination, and their social functions facilitate action, condescension, dehumanization, and elimination. Thus if these emotions are aroused, even incidentally, they may have specific effects on intergroup relations.

Overview of this study

One major limitation concerning the previous studies that examined ANCODI in intergroup aggression is that those findings were correlational; there was no direct evidence for the linkage between those emotions and actual hostile thoughts, feelings, or behaviors (again see review by Matsumoto et al., 2015). Thus it was not clear that the three emotions actually *caused* individuals to produce hostile cognitions or language. The purpose of the current study, therefore, was to examine if ANCODI emotions, when elicited incidentally, causally produce hostile language, cognitions, and implicit behaviors. We were interested in the combined effect of these emotions from an applied perspective; thus we acknowledge at the outset that the combined manipulation of all three emotions confounds any interpretation of the possible effects of any one of these emotions singly. Documentation of their causal effects, however, would provide further evidence for the important role of these emotions in intergroup aggression. Moreover, from an applied standpoint, these three emotions are likely to be combined (and somewhat confused) with each other in real life.

Because previous research examining ANCODI was generated in studies examining political aggression between groups, and because these emotions differed according to whether the topic being discussed was the opponent outgroup or not, we

[1]Relatedly, see research reported by Salerno and Peter-Hagene (2013) demonstrating the combinatorial effects of anger and disgust on the construct of moral outrage.

recruited individuals who were members of political groups and who had an identified opponent outgroup with a cause that was opposed to the participant's ingroup's cause. We also included conditions in which the target of the participant's hostile cognitions and behaviors was either the opponent outgroup or a non-opponent outgroup.

The conceptual framework that underlies this study is presented in Figure 1, and is based on the concept of neural networks, which represent an interrelated organization of cognitions, emotions, and impulses for behavior around a focal construct in the mind (Bowers, 2009; Cartindale, 1991). We suggest that emotion elicitation consistent with pre-existing neural networks related to the opponent outgroup, even when incidentally triggered, will activate those neural nets and the associated cognitions, language, emotions, and impulses to behavior, whereas emotions inconsistent with pre-existing neural nets will not. Because participants in our study were already members of ideologically motivated groups, they should possess a neural network that connects hostile cognitions, emotions, and impulses to aggressive behavior toward their opponent outgroups. An incidental emotion elicitation consistent with the hostile emotions in the pre-existing opponent outgroup neural net should activate hostile cognitions, emotions, and impulses to behavior toward those groups. Those connections should not exist, however, for non-opponent outgroups; if those same hostile emotions are elicited toward non-opponent outgroups, the elicitation should result in less hostility. If emotions inconsistent with the neural net for opponent outgroups are elicited (e.g., fear and/or sadness), that elicitation should also result in relatively less hostility toward the opponent outgroup.

Language associated with aggression

The main dependent variables in the study were aggression-related language generated when engaging in a "creativity task," which were based on recent research that has elucidated language markers associated with aggression and violence. For example, hostile speech differs in the use of pronouns. Pronouns are function words and one of their functions is to allocate attention (Chung & Pennebaker, 2007). The use of "I" suggests an attention to the self while the use of "we" suggests attention to one's group. In a comparison of linguistic styles expressed in an online discussion forum after 11 September 2001 between individuals who were pro- vs. anti-war, pro-war texts contained more 3rd person pronouns while anti-war texts contained more 1st person plural pronouns (Abe, 2012). Changes in the use of pronouns have been observed in speeches by leaders of political groups as well, and their usage patterns differed according to whether or not their groups committed acts of aggression (Matsumoto & Hwang, 2013).

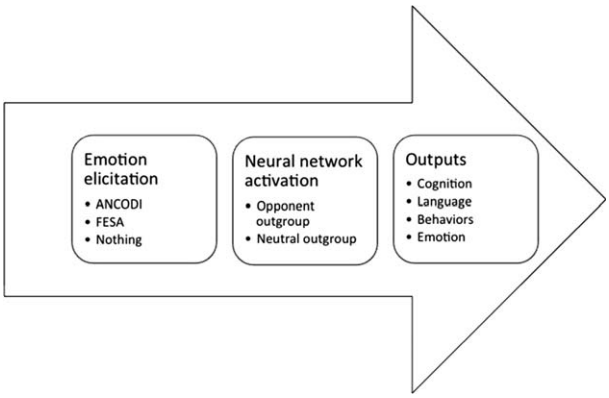

Figure 1 Theoretical framework underlying this study.

Hostile speech also differs from non-hostile speech in cognitive complexity, which refers to the degree to which a person differentiates among multiple competing solutions and attempts to integrate those solutions (Abe, 2012). In the study cited above, pro-war texts contained significantly fewer words related to cognitive complexity than anti-war texts (Abe, 2012). Research on integrative complexity, which refers to the degree to which verbal output reflects the recognition that more than one legitimate viewpoint exists with regard to a particular topic and that differing viewpoints are related to each other (Suedfeld & Bluck, 1988; Suedfeld & Tetlock, 1977; Suedfeld, Tetlock, & Ramirez, 1977), also speaks to this point. Integrative complexity decreases across time in speeches and rhetoric prior to the outbreak of war, conflict, or surprise attacks (Suedfeld & Bluck, 1988). Cognitive complexity decreases across time in speeches associated with acts of aggression (Matsumoto & Hwang, 2013).

Hostile speech also differs from non-hostile speech in language related to infrahumanization and the dehumanization of objects of hatred or aggression (Cortes et al., 2005; Haslam, 2006; Leyens et al., 2000), which is reflected in the words used to refer to social connections with others. Speeches that led to acts of aggression have been shown to contain less words related to social processes than did speeches that led to non-violent acts of resistance (Matsumoto & Hwang, 2013).

Overview and hypotheses

Participants were randomly assigned to incidentally feel one of three combinations of emotions. One group was primed with the target ANCODI combination, which we considered as consistent with the hostile emotions that existed in the pre-existing neural net for opponent outgroups. For the inconsistent emotions we primed a second group using a combination of fear and sadness (FESA); a third group was primed with neutral images (for a Neutral or no emotion condition). The FESA combination was included as a comparison because fear has been implicated in models of

intergroup aggression (e.g., Halperin & Gross, 2010), and sadness has been linked to mood effects on judgments (sadness; e.g., Forgas & Bower, 1987). FESA have also been used as comparison emotions to anger in a number of studies on incidental affect reviewed above (Bodenhausen et al., 1994; Kenworthy et al., 2003; Lerner & Keltner, 2000, 2004). FESA also represented different negative emotions from ANCODI and it was important to distinguish whether the effects produced using the ANCODI elicitation may have been produced with any negative emotions (which would be predicted by the General Aggression Model; see Anderson & Bushman, 2002; Anderson, Deuser, & DeNeve, 1995). If the same effects were observed with the FESA combination, that would provide evidence for a more diffuse "negative affect" view of the role of emotion.

After the emotion elicitation, participants engaged in a "creativity task," which was a modified version of Guilford's Alternative Uses Task (Guilford, 1967). Participants were asked to produce as many uses as possible of a common household item, in this case a brick, in relation to the outgroup they were assigned. The statements were analyzed for their hostile content and language using the Linguistic Inquiry Word Count (LIWC; Pennebaker, Francis, & Booth, 2001). We also obtained measures of implicit hostility: the force by which participants handled the brick and the speed by which they moved through the tasks after the emotion elicitation.

Consistent with the literature and the theoretical framework above, we tested the following hypotheses:

1. Individuals primed with ANCODI will generate relatively more LIWC anger-related words in relation to the opponent outgroups compared to the non-opponent groups than will individuals in the FESA or Neutral conditions.[2] Swear words can also be considered verbal acts of hostility (Jay, 2009); thus we also made the same prediction for swear words (Hypothesis 1).
2. Individuals primed with the ANCODI combination will use relatively fewer 1st person pronouns and relatively greater 3rd person pronouns in relation to their opponent outgroups compared to the non-opponent outgroups than will individuals in the other conditions (Hypothesis 2).
3. Individuals primed with the ANCODI combination will use relatively less verbal markers of cognitive complexity in relation to their opponent outgroups compared to the non-opponent outgroups than will individuals in the other conditions (Hypothesis 3).
4. Consistent with previous work on infra- and dehumanization and social processes, individuals primed with ANCODI will generate less words related to social processes in relation to the opponent outgroups compared to the non-opponent groups than will individuals in the other conditions (Hypothesis 4).

We manually coded the participants' responses in the creativity task, classifying the responses as constructive, destructive, or neutral. We hypothesized that individuals primed with ANCODI will generate relatively less constructive and more destructive uses of the brick in relation to the opponent outgroup compared to the non-opponent outgroup than will individuals in the other conditions (Hypothesis 5). We also predicted that participants primed with ANCODI will use more force when handling the brick (Hypothesis 6) and will move more quickly through the tasks (Hypothesis 7) compared to participants in the FESA or Neutral conditions. (These latter two hypotheses did not involve tests of the moderation by outgroups because these variables were measured after emotion elicitation but before the outgroup manipulation for the other dependents.)

Methods

Experimental design

The design of the study was a 2 (Outgroup: Opponent vs. Non-Opponent) × 3 (Emotion Prime: ANCODI vs. FESA vs. Neutral) between-subjects design. Participants were randomly assigned to one of these six cells prior to their arrival in the laboratory and assignments were conducted in blocks of six to ensure equal distributions across the cells as the experiment progressed.

Participants

Individuals were recruited for the study if (1) they were members of an ideologically-motivated group (i.e., groups with a political, religious, or ideological cause); (2) there were other groups in existence that were opposed to the participant's group's cause; and (3) there was evidence of past conflict between the groups, either as reported in the news or self-reported by potential participants. Potential participants were recruited from university and college campus groups located in the San Francisco Bay Area and from the surrounding communities, and they responded to an ad for "emotion and intergroup relations study." Individuals who were interested in participating were screened according to the inclusion criteria and those who met criteria were scheduled for participation. At that time they also named their group as well as their opposition group. These procedures resulted in a total N of 278 participants (132 males, 144 females, 2 reporting as "Other"; $M_{age} = 29.05$, $SD = 13.77$). Participants were provided $10 compensation.

[2]We consider LIWC Anger as a proxy for hostile language, as it encompasses all such hostile affect terms in its dictionary.

Self-report measures

Individual difference measures

Participants completed the NEO-Five Factor Inventory (Costa & McCrae, 1992), the Aggression Questionnaire (Buss & Perry, 1992), Social Dominance Orientation (Pratto, Sidanius, Stallworth, & Malle, 1994), a Machiavellianism Scale (Christie, 1970), and the Self-Monitoring Scale (Snyder, 1974). They also completed a standard demographic questionnaire that asked age, sex, marital status, household living situation, and religious background and practices. These measures were not analyzed in this study; thus no further mention of them will be made.

Emotion checklist

Participants rated how much of each of 14 emotions they were currently experiencing using a 9-point scale labeled 0 (*none*), through 4, (*moderate amount*), to 8 (*extremely strong amount*). The 14 emotions were guilt, fear, anger, embarrassment, worry, contempt, excitement, disgust, amusement, nervousness, surprise, interest, sadness, and pride. These ratings were done at three points in time: Pre-, Mid-, and Post-Session.[3]

Stereotype content model (SCM) emotion ratings (Fiske, Cuddy, Glick, & Xu, 2002)

Participants rated how much of each of 25 emotions were felt by their group about either their opponent or non-opponent outgroup "as viewed by society and your organization." Ratings were completed using 5-point scales labeled 1 (*not at all*) to 5 (*extremely*) and included the following emotions: disappointed, fearful, sympathetic, envious, uneasy, proud, angry, disgusted, respectful, pitying, hateful, frustrated, jealous, admiring, resentful, inspired, contemptuous, compassionate, tense, ashamed, comfortable, fond, anxious, secure, and sadness. According to the procedures described by Fiske et al. (2002), an Admiration scale was produced using the mean of admiring, fond, inspired, proud, and resentful; a Contempt scale used the mean of angry, ashamed, contemptuous, disgusted, frustrated, hateful, resentful, uneasy; an Envy scale used the mean of envious and jealous; and a Pity scale used the mean of pity and sympathetic. Reliabilities were acceptable for Admiration, Contempt, and Envy (Cronbach's $\alpha = .87$, .92, and .73, respectively, but low for Pity ($\alpha = .46$); readers are cautioned to interpret the results for this scale below with this caveat. (Fiske et al., 2002, had reported αs = .86, .93, .89, and .82, respectively.)

[3]Although single-item emotion ratings are common in the literature, they very likely have low reliabilities, which may affect the size of their effects on the variables of interest reported below. Readers are cautioned to interpret the findings below that use the emotion ratings with this caveat.

Emotion elicitation stimuli

We used images from the International Affective Pictures System (IAPS; Lang, Bradley, & Cuthbert, 1997) to elicit emotions. The IAPS involves images of situations, objects, and people normed to elicit particular emotions. Mikels et al. (2005) obtained ratings of anger, disgust, fear, and sadness from the negative pool of IAPS images, and awe, excitement, contentment, and amusement from the positive set. Because contempt was not rated in Mikels et al. (2005), we conducted a pilot study in which a convenience sample ($N = 34$) was shown 10 images that had the highest anger ratings in Mikels et al. (2005) and 10 that had the highest combination of FESA. Raters were shown each of the images singly and in a random order and rated how much each image made them feel on seven emotion categories (anger, contempt, disgust, fear, joy, sadness, and surprise) using 7-point scales anchored 1 (*not at all*) to 7 (*a great amount*).

Ratings for anger, contempt and disgust were combined into a single ANCODI category, as were the FESA ratings into a FESA category. T-tests comparing the ANCODI vs. FESA means were computed and the differences between the two sets of means were rank ordered according to Cohen's *d* effect sizes. We also computed ANOVAs testing the interaction between the ratings and gender because males and females may have reacted differently to the stimuli, and followed significant interactions with simple effects analyses of ratings. For the ANCODI images we selected for use in the main study 6 images with the highest positive Cohen's *d*s (i.e., ANCODI > FESA; images 9810, 6360, 9800, 9252, 6540, and 6212) and with interactions that were either not significant or significant but indicating differences in degree but not direction.[4] For the FESA images we selected 6 images with the highest negative Cohen's *d*s (i.e., FESA > ANCODI; images 9600, 9620, 9611, 2205, 9050, and 3230) and the same criterion for the interactions.

We also selected Positive and Neutral images for use in the study. The Neutral images served as a control comparison to the ANCODI and FESA elicitations. The positive images were used to elicit positive emotions at the end of the various procedures to insure the participants left the experiment in the same or better mood than when they arrived. To select these images, we conducted a second pilot study involving 20 images, 10 of which had the highest summed positive ratings (across awe, excitement, contentment, and amusement) and

[4]The FESA (and to a lesser extent surprise) ratings were not negligible. Mikels et al. (2007) also reported similar elevations. Thus it may be very difficult to obtain stimuli that elicit anger, contempt, and disgust without also elevating other negative emotions such as FESA. We will return to this point in the General Discussion.

Table 1 Descriptive Statistics (Means and *SD*) for Emotion Ratings for the Four Sets of IAPS Images from the Pilot Studies

	Anger	Contempt	Disgust	Fear	Joy	Sadness	Surprise
ANCODI	4.25 (2.20)	4.11 (2.47)	4.46 (2.25)	3.24 (2.26)	1.08 (.33)	3.65 (2.29)	2.84 (1.83)
FESA	1.61 (1.39)	1.57 (1.41)	1.62 (1.25)	3.17 (2.19)	1.11 (.45)	4.79 (1.91)	2.52 (1.62)
Positive	1.02 (.42)	1.01 (.23)	1.00 (.34)	2.46 (1.86)	4.25 (1.90)	1.15 (.87)	2.63 (1.83)
Neutral	1.10 (.35)	1.06 (.23)	1.09 (.38)	1.18 (.56)	1.62 (1.14)	1.28 (.90)	1.39 (.88)

10 of which had the lowest total sum of all emotions in Mikels et al. (2005). Participants ($N = 35$) were shown the images in the same manner as above and made the same ratings. For the Positive images we selected the six images with the highest joy ratings (5910, 8190, 5480, 5626, 5621, and 8185). For the Neutral images we selected the six images with the lowest total summed emotion ratings (7012, 7003, 7041, 2214, 7000, and 7160). See Table 1 for descriptive averaged across the six images for each of the four sets from both pilot studies.

Outgroup manipulation

A pool of opponent outgroups was created by participants in the recruiting and screening phase of the study, where participants named opponent outgroups that were opposed to the participant's ingroup and where there was evidence of conflict between the groups in the past. Participants were assigned to either the *Opponent Outgroup* or *Non-Opponent Outgroup* conditions. The *Opponent Outgroup* was the outgroup specifically named by the participant as the group opposed to the participant's ingroup. The *Non-Opponent Outgroup* was a randomly selected outgroup from the pool of opponent outgroups that was *not* the outgroup named by the participant. This was group was not known to the participant, and this was confirmed in debriefing.

Procedures

Upon arrival participants were told that they would complete some questionnaires and then go to another room where they will see an object that will be used in a creativity task. They were told that their task was to take the object with them to the first station, place it down, view a slide show, and complete some ratings about the images. Then they were to take the object to a second station in the same room, place it down, and do a creativity task that required them to come up with as many uses for the object as they can in one minute. After the creativity task they were to return to the first station, view more images, and then alert the experimenter, who was waiting outside the room, by ringing a bell.

Participants then completed the Pre-session Emotion Checklist and the remaining individual difference measures. The last measure was the Stereotype Content Model ratings, which participants completed in relation to their assigned outgroup after confirming whether they knew the outgroup and if it was an opponent or not.

They then moved to the other room, where they saw a box on a table. The box was removed and participants saw for the first time that the object was a brick. They took the brick to the first station and placed the brick on a table with a force plate (unlabeled). They then sat at a computer and saw two neutral images (not used elsewhere in the study) from the IAPS used for practice, and then the six images corresponding to their emotion elicitation condition. Each image was presented for 10 seconds, after which participants were given 30 seconds to state orally "the most salient aspects of the image" into a speaker on the computer. After presentation of all images, participants then completed the Mid-Session Emotion Checklist.

Participants then took the brick to the second station in the room, placed the brick down on another table with a force plate (unlabeled), and then sat at another computer terminal. Here they were asked to produce as many uses as possible of the brick in relation to the outgroup they were assigned, that is, either to the *opponent* or *non-opponent* outgroup. The computer instructed the participant to orally state as many uses of the object as possible in one minute. A timer counted 10 seconds, after which a beep noted the participant to start. After a minute a second beep sounded, marking the end of the one minute. All statements were captured on audio and video by a computer webcam and were transcribed for coding.

Participants then went back to the first station, saw the positive emotion images, and rang a bell to call the experimenter. The experimenter entered the room and escorted the participant back to the first room, where the participant completed a Post-Session Emotion Checklist, was debriefed, paid, and excused.

Measurement of hostility-related language in the statements produced

Linguistic inquiry and word count

We used the LIWC (Pennebaker, Francis, & Booth, 2001) on the transcribed texts of the responses produced during the creativity task. LIWC is a widely used and well-validated program that counts the number of words in a body of text that correspond to various categories of meaning and converts the tallies into percentages of the total text. The program uses

an internal dictionary comprised of several word categories to classify how much a group of words relate to a particular topic (the 2007 dictionary was used here). This dictionary is composed of about 4,500 words and word stems, each of which defines one or more non-mutually exclusive word categories in a hierarchical order (e.g., anger words are categorized as anger, negative emotion, and overall emotion words). The LIWC word categories have been shown previously to have adequate psychometric properties (Pennebaker et al., 2001).

Each word in the source document is compared with words in the dictionary file, and if a match occurs the appropriate category(ies) for that word is tallied; various structural composition elements (e.g., word count and sentence punctuation) are also counted. Output categories include general descriptors (total word count, words per sentence, percentage of words captured by the dictionary, and percent of words longer than six letters), linguistic dimensions (e.g., pronouns, articles, auxiliary verbs, etc.), psychological constructs (e.g., affect, cognition, biological processes), personal concerns (e.g., work, home, leisure activities), paralinguistic dimensions (assents, fillers, nonfluencies), and punctuations (periods, commas, etc.). For a more complete description of the LIWC processing procedures and its development, see Pennebaker, Chung, Ireland, Gonzales, and Booth (2007).

We selected variables directly related to our hypotheses. For Hypothesis 1 we used Anger (LIWC does not differentiate among anger, contempt and disgust words) and Swear Words. For Hypothesis 2 we used 1st Person Singular, 1st Person Plural, 3rd Person Singular, and 3rd Person Plural Pronouns. For Hypothesis 3, we computed Cognitive Complexity as the sum of Exclusive words and Negations, per Chung and Pennebaker (2007; variables were standardized prior to summing). For Hypothesis 4, we used Social Processes (e.g., *talk*, *they*, *child*, *daughter*, *husband*, *friend*, *adult*, *baby*).

Coding of the verbal responses

The uses produced by the participants were coded as constructive, destructive or neutral depending on their tone and intent. Two coders coded the responses from all participants. To determine interrater reliability, the first 30 and last 30 cases were also coded by a third coder. All coders were blind to the conditions of the transcripts when coding. Interrater reliability was calculated on 60 cases using Intraclass Correlations (computed for consistency); ICCs were .91, .94, and .71 for constructive, destructive, and neutral codes, respectively.

Measurement of implicit hostility

Force plate

Two Vernier Force Plates were placed on the tables on which participants placed the brick. These allowed us to measure the force (in Newtons) by which participants handled the brick. The force plates were each connected to a computer at the two stations and were calibrated to the same resting force for the brick. The plates were set to allow for measurement of pressure against the plate at 0.02 seconds intervals. We calculated the acceleration of the brick using the following formula: (maximum force – minimum force)/(elapsed time to maximum force) separately for both placements. Force and time values were obtained from the software accompanying the force plates.

Speed of body movement

We measured the speed of body movement in two intervals, the first from the time participants entered the experimental room until they placed the brick on the first force plate, and the second from the time after the emotion elicitation until the placing of the brick on the 2nd force plate.

Results

Manipulation checks

Self-reported emotion

We computed a 3 (Time: pre-, mid-, and post-session) × 14 (Emotion: 14 emotion terms) × 3 (Emotion Prime: ANCODI vs. FESA vs. Neutral) mixed ANOVA. As expected the Time × Emotion × Emotion Prime interaction was significant, $F(52, 7124) = 17.42$, $p < .001$, $\eta_p^2 = .113$. We decomposed this interaction by computing planned simple effects tests on each of the five target emotions (anger, contempt, disgust, FESA) in the three emotion prime conditions from pre- to mid-session (Table 2). As intended, anger, contempt and disgust each increased in the ANCODI condition, FESA increased in the FESA condition, and anger, contempt, fear, and sadness decreased in the Neutral condition. But sadness also increased in the ANCODI condition and disgust increased in the FESA condition. The elevation in sadness in the ANCODI condition was consistent with our pilot data and that reported by Mikels et al. (2005).[5]

Additionally, the Emotion Prime main effect was significant, $F(2, 274) = 4.03$, $p = .019$, $\eta_p^2 = .029$. Simple contrasts indicated that the ANCODI condition produced higher emotion ratings overall ($M = 3.54$, $SE = .12$) than did the Neutral condition ($M = 3.12$, $SE = .12$), $p = .012$, but there was no difference between the FESA ($M = 3.14$, $SE = .12$) and Neutral conditions on overall emotionality, $p = .888$. The Time main effect was also significant, $F(2, 548) = 23.46$, $p = .000$,

[5]We believe that the increase in disgust in the FESA condition occurred because of sampling error. Disgust was not elevated in our pilot data nor did it increase in the same IAPS manipulation reported in another study (Matsumoto, Hwang, & Frank, 2014a). Thus no further mention of it will be made.

Table 2 Differences Between Pre- and Mid-Session Target Emotion Means

Primed emotion	Emotion	Pre-session *M(SE)*	Mid-session *M(SE)*	*df*	*F*	*p*	η_p^2
ANCODI	Anger	2.42 (.21)	4.91 (.23)	1, 92	72.22	.000	.44
	Contempt	3.03 (.24)	3.52 (.24)	1, 92	4.44	.050	.05
	Disgust	2.50 (.20)	6.07 (.23)	1, 92	108.95	.000	.52
	Fear	3.34 (.23)	3.52 (.22)	1, 92	.41	ns	.004
	Sadness	2.75 (.23)	5.53 (.26)	1, 92	76.37	.000	.45
FESA	Anger	2.09 (.21)	2.28 (.23)	1, 90	.82	ns	.01
	Contempt	2.78 (.24)	2.51 (.24)	1, 90	1.41	ns	.02
	Disgust	1.97 (.20)	2.52 (.23)	1, 90	5.12	.026	.05
	Fear	2.96 (.23)	3.36 (.23)	1, 90	3.07	.050	.05
	Sadness	2.31 (.24)	5.60 (.26)	1, 90	103.62	.000	.54
Neutral	Anger	2.36 (.21)	1.66 (.23)	1, 92	12.53	.001	.12
	Contempt	3.02 (.24)	2.53 (.24)	1, 92	6.03	.016	.06
	Disgust	1.90 (.20)	1.57 (.23)	1, 92	2.42	ns	.03
	Fear	2.98 (.23)	1.72 (.22)	1, 92	36.03	.000	.28
	Sadness	2.95 (.23)	1.84 (.26)	1, 92	21.12	.000	.18

$\eta_p^2 = .08$ Repeated contrasts indicated that overall emotionality decreased from pre- ($M = 3.51$, $SE = .09$) to mid-session ($M = 3.26$, $SE = .08$), $F(1, 274) = 9.96$, $p = .002$, $\eta_p^2 = .04$, and decreased further from mid- to post-session ($M = 3.02$, $SE = .07$), $F(1, 274) = 21.60$, $p = .000$, $\eta_p^2 = .07$. These changes in overall emotionality stood in contrast to the increases in the target emotions in the emotion prime conditions.

Outgroup ratings

The non-opponent outgroups were rated significantly higher on Admiration, $F(1, 275) = 42.26$, $p < .001$, $\eta_p^2 = .13$ whereas the opponent outgroups were rated higher on Contempt, $F(1, 275) = 142.06$, $p < .001$, $\eta_p^2 = .34$. Thus the outgroup manipulations worked as intended. The Opponent outgroups were also rated higher on Pity, $F(1, 275) = 19.05$, $p < .001$, $\eta_p^2 = .07$. There were no differences on ratings of Envy.

Hostility-related language

Because we had separate hypotheses for specific dependent variables, we followed the recommendations of Huberty and Morris (1989) in conducting separate, univariate analyses on each. Each analysis included Emotion Prime (3 levels: ANCODI vs. FESA vs. Neutral) and Outgroup (2 levels: Opponent vs. Non-Opponent) as factors. Hypotheses 1, 2, and 5 included multiple dependent variables that were treated as multiple levels of a repeated-measures factor in an overall ANOVA. Because the hypotheses were of moderation (i.e., effects of emotion prime being different for opponent and non-opponent outgroups), we focused on effects involving the Emotion Prime by Outgroup interactions in the overall analyses. Significant interactions were decomposed by simple interactions (when appropriate) and then single-*df* interaction contrasts (using *dfs* and error rates from the overall ANOVA) comparing Emotion Prime (ANCODI vs. FESA) by Outgroup type (Opponent vs. Non-Opponent), which were interpreted in their own right (Keppel, 1991; Rosenthal & Rosnow, 1985). If the Emotion Prime main effect was significant, we decomposed that main effect using orthogonal Helmert contrasts comparing ANCODI vs. a combined FESA and Neutral, and then FESA vs. Neutral (because these tested the effects of the emotion prime conditions regardless of the outgroup manipulation). Other effects from the overall ANOVAs are also reported below.

Hypothesis 1: LIWC anger and swear words. We computed a 2 (Scale: LIWC Anger vs. Swear words) by 3 (Emotion Prime: ANCODI vs. FESA vs. Neutral) by 2 (Outgroup: Opponent vs. Non-Opponent) three-way, mixed ANOVA. No effect involving the target Emotion Prime by Outgroup interaction was significant. The Emotion Prime main effect, however, was significant, $F(2, 271) = 3.90$, $p = .021$, $\eta_p^2 = .03$. Helmert contrasts indicated that participants in the ANCODI condition produced more anger and swear words ($M = .38$, $SE = .05$) than the combined FESA and Neutral conditions ($p = .006$), and that there was no difference between the FESA ($M = .20$, $SE = .04$) and Neutral conditions ($M = .22$, $SE = .05$), $p = .76$. Thus Hypothesis 1 was partially supported without regard to the type of outgroup (see Table 3).

Additionally, the main effect of Scale was significant, $F(1, 271) = 83.44$, $p < .001$, $\eta_p^2 = .24$, indicating that participants produced more anger words than swear words ($M = .49$, $SE = .05$; $M = .04$, $SE = .01$, respectively). No other effect was significant.

Hypothesis 2: Pronouns. We computed a 4 (Scale: LIWC 1st Person Singular vs. 1st Person Plural vs. 3rd

Table 3 Descriptive Statistics (Means and *SD*) for LIWC Anger, and Swear Words

	Condition		
	ANCODI	FESA	Neutral
Anger	.67 (.96)	.38 (.73)	.42 (.88)
Swear words	.09 (.37)	.02 (.15)	.01 (.08)

Note. ANCODI = anger-contempt-disgust condition; FESA = fear-sadness condition.

Person Singular vs. 3rd Person Plural Pronouns) × 3 (Emotion Prime: ANCODI vs. FESA vs. Neutral) by 2 (Outgroup: Opponent vs. Non-Opponent) three-way, mixed ANOVA. The Emotion Prime × Outgroup interaction was not significant, but the three-way interaction was, $F(6, 813) = 3.49$, $p = .002$, $\eta_p^2 = .03$. We thus computed the simple interactions of Emotion Prime by Outgroup separately for each of the four scales. The interactions were not significant for 3rd Person Singular or 3rd Person Plural Pronouns (Fs < 1.0), but they were for 1st Person Singular and 1st Person Plural pronouns, $F(2, 813) = 6.79$, $p = .001$, $\eta_p^2 = .03$; and $F(2, 813) = 4.79$, $p = .009$, $\eta_p^2 = .03$, respectively. We decomposed these by computing single-*df* interaction contrasts comparing the ANCODI and FESA conditions and the two outgroup conditions. The interaction contrast for 1st Person Singular was significant, $F(1, 813) = 8.86$, $p < .001$, $\eta_p^2 = .03$, indicating that the ANCODI condition produced relatively less 1st Person Singular pronouns in the Opponent outgroup condition compared to the Non-opponent outgroup condition, whereas the FESA condition produced the opposite effect (Figure 2a). The interaction contrast for 1st Person Plural Pronouns was not significant, $F < 1.0$, but the relative differences were in the same direction. Thus Hypothesis 2 was partially supported for 1st Person Singular Pronouns.

In the overall ANOVA, the Scale main effect was also significant, $F(3, 813) = 54.34$, $p < .001$, $\eta_p^2 = .17$. Orthogonal difference contrasts indicated that 1st Person Singular and Plural Pronouns occurred more frequently than the overall mean of all pronouns, whereas 3rd Person Singular Pronouns occurred less frequently, $F(1, 271) = 52.92$, $p < .001$, $\eta_p^2 = .17$; $F(1, 271) = 9.92$, $p = .002$, $\eta_p^2 = .04$; and $F(1, 271) = 420.70$, $p < .001$, $\eta_p^2 = .61$, respectively. No other effects from the overall ANOVA were significant.

Hypothesis 3: Cognitive complexity. We computed a 3 (Emotion Prime: ANCODI vs. FESA vs. Neutral) by 2 (Outgroup: Opponent vs. Non-Opponent) two-way, between-subjects ANOVA on cognitive complexity.

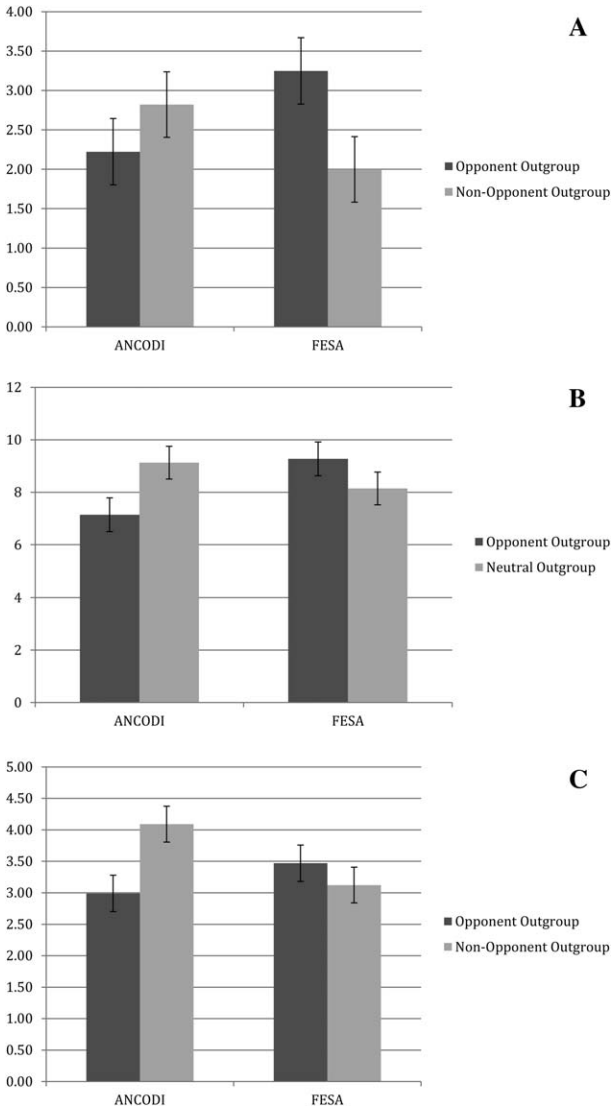

Figure 2 (a) Interaction contrast between primed emotion and outgroup for 1st person singular pronouns (error bars are standard errors). (b) Interaction contrast between primed emotion and outgroup for social words. (c) Interaction contrast between primed emotion and outgroup for constructive uses of the brick.*Note*. *y*-axes refer to the following: Figure 2a: percentage of words that were 1st person plural pronouns; Figure 2b: percentage of words that referred to social processes; Figure 2c: amount of coded constructive uses of the brick.

No effects were statistically significant (all Fs < 1.0); thus Hypotheses 3 was not supported.[6]

Hypothesis 4: Social processes. We computed a 3 (Emotion Prime: ANCODI vs. FESA vs. Neutral) by 2

[6]We also recomputed these analyses using the LIWC Exclusive and Negation words as two levels of a single factor in an overall 3 (LIWC: Exclusive vs. Negation) by 3 (Emotion Prime) by 2 (Outgroup) mixed, three-way ANOVA. No effect was significant in these analyses either.

(Outgroup: Opponent vs. Non-Opponent) two-way, between-subjects ANOVA on LIWC Social Processes. Neither main effect was significant (Fs < 1.0). The target interaction, however, was significant, $F(2, 271) = 3.03$, $p = .050$, $\eta_p^2 = .02$. The follow-up, single-*df* interaction contrast comparing the ANCODI and FESA conditions and the two outgroup conditions was significant, $F(1, 271) = 5.98$, $p = .015$, $\eta_p^2 = .03$, indicating that the ANCODI condition produced relatively less Social words in the Opponent outgroup condition compared to the Non-opponent outgroup condition, whereas the FESA condition produced the opposite effect (Figure 2b). Thus Hypothesis 4 was supported.

Hypothesis 5: Response content. We computed a 3 (Usage Type: Constructive, Destructive, and Neutral) by 3 (Emotion Prime: ANCODI vs. FESA vs. Neutral) by 2 (Outgroup: Opponent vs. Non-Opponent) three-way, mixed ANOVA. The target three-way interaction was significant, $F(4, 542) = 4.35$, $p = .002$, $\eta_p^2 = .03$. We thus computed the simple interactions between Emotion Prime and Outgroup separately for each of the three coded usages. For Constructive uses, this interaction was significant, $F(2, 542) = 9.39$, $p < .001$, $\eta_p^2 = .03$. The follow-up, single-*df* interaction contrast comparing Emotion Prime (ANCODI vs. FESA) by Outgroup (Opponent vs. Non-Opponent) produced a significant effect, $F(1, 542) = 15.36$, $p < .001$, $\eta_p^2 = .03$, indicating that the ANCODI condition produced relatively less constructive uses of the brick with the opponent outgroup compared to the non-opponent outgroup, whereas the FESA condition produced relatively more of the opposite trend (Figure 2c). The simple interactions were not significant for either Destructive or Neutral uses of the brick. Thus Hypothesis 5 was partially supported for constructive uses of the brick.

In the overall ANOVA, the Usage Type main effect was significant, $F(2, 542) = 507.45$, $p < .001$, $\eta_p^2 = .65$. Simple comparisons indicated that there were significantly greater constructive and destructive uses of the brick compared to neutral uses, $F(1, 271) = 766.07$, $p < .001$, $\eta_p^2 = .74$; and $F(1, 271) = 73.55$, $p < .001$, $\eta_p^2 = .21$, respectively. The Usage Type by Outgroup interaction was also significant, $F(2, 542) = 6.74$, $p = .001$, $\eta_p^2 = .02$, but indicated differences in degree, not direction, of the main effect differences. No other effects were significant in the overall ANOVA.

Implicit hostility measures

Hypothesis 6: Force plate analyses. We computed a 2 (Time: 1st placement vs. 2nd placement) × 3 (Emotion Prime: ANCODI vs. FESA vs. Neutral) two-way, mixed ANOVA on brick acceleration (it was not necessary to include Outgroup as a factor in this analysis because the outgroup manipulation occurred after the second placing of the brick). The interaction was not significant, $F(2, 234) = 1.45$, $p = .236$, $\eta_p^2 = .01$ which likely occurred because of the relatively larger error rates in the Neutral condition. To wit, a single-*df*, Time × Emotion Prime two-way, mixed ANOVA without the Neutral condition did indeed produce a significant interaction, $F(1, 160) = 5.09$, $p = .025$, $\eta_p^2 = .031$, indicating that the ANCODI condition produced relatively faster acceleration on the 2nd force plate compared to the first, whereas the FESA and Neutral conditions produced decreases in acceleration; see Table 4). Neither main effect was significant. Thus Hypothesis 6 was supported.

Hypothesis 7: Speed of body movement. We computed a 2 (Time: 1st interval vs. 2nd interval) by 3 (Emotion Prime: ANCODI vs. FESA vs. Neutral) two-way, mixed ANOVA on the speed of body movement (it was not necessary to include Outgroup as a factor in this analysis because the outgroup manipulation occurred after the second interval). The interaction was marginally significant, $F(2, 274) = 2.51$, $p = .083$, $\eta_p^2 = .02$. We decomposed this interaction by computing a single-*df* interaction contrast comparing Emotion Prime (ANCODI vs. FESA) by Outgroup (Opponent vs. Non-Opponent), which was marginally significant, $F(1, 182) = 2.91$, $p = .090$, $\eta_p^2 = .02$, indicating that participants in the ANCODI condition moved relatively slower at the beginning of the experiment prior to the emotion elicitation than did the participants in the FESA condition ($M = 52.93$, $SE = 1.25$ vs. $M = 50.78$, $SE = 1.26$, respectively). After emotion elicitation, however, participants in the ANCODI condition moved relatively faster than did participants in the FESA condition ($M = 23.83$, $SE = .79$ vs. $M = 25.60$, $SE = .80$, respectively).[7] These findings supported Hypothesis 7, and indicated that the relatively faster body speeds after the emotion elicitation for participants in the ANCODI condition did not occur because they were just naturally faster than participants in the other conditions.

[7]Because the interaction contrast was marginally significant, we also computed the simple effects of Emotion Prime using orthogonal Helmert contrasts comparing ANCODI vs. a combined FESA and Neutral, and then FESA vs. Neutral, separately for the two intervals. For the 1st interval, there were no differences between the conditions. For the 2nd interval, the ANCODI condition produced significantly faster body speeds than the combined FESA and Neutral conditions ($p = .036$), and there was no difference between the FESA and Neutral conditions. These additional findings corroborated those reported for the marginally significant interaction contrast.

Table 4 Descriptive Statistics (Means and *SD*) for Force Plate Data

	1st force plate	2nd force plate
ANCODI	71.34 (132.45)	108.15 (260.24)
FESA	106.07 (240.87)	64.07 (89.39)
NEUTRAL	137.30 (423.64)	100.47 (253.24)

Emotion contributions

To examine whether anger, contempt, and disgust were individually associated with the dependent variables, we computed correlations between the three emotions and their two- and three-way interactions assessed right after the IAPS manipulation with each of the dependent variables. Anger, contempt, and disgust were significantly correlated with eleven, eight, and nine dependent variables, respectively. Their two- and three-way interactions were also correlated with most of the dependent variables. For good measure we also correlated mid-session FESA with the same dependent variables; only one was significant. Anger, contempt, and disgust were intercorrelated, $M_r = .44$, .72, .38 for anger-contempt, anger-disgust, and contempt-disgust, averaged across pre-, mid-, and post-sessions, respectively, and these intercorrelations should be considered when interpreting the findings.

To deal with the multicollinearity among the target emotions and to assess their possible meditational effects on the positive findings reported above, we computed the indirect effects of the target emotions and their interactions on the relationship between the emotion prime conditions and the dependent variables using a multiple mediator analysis with bootstrapping (Preacher & Hayes, 2008; 10,000 bootstrap samples were computed). The analyses were done separately for each of the dependent variables that produced significant effects in the tests of Hypotheses 1–7 above, and in a manner that corresponded to the effect that was reported (i.e., main effect of Emotion Prime or interaction with Outgroup Type). Total indirect effects were computed and tested according to the procedures described by Preacher and Hayes (2008).

The results for are reported in Table 5. For LIWC Anger and Swear, the total indirect effects of all the mediators were significant for both dependents, $z = 5.22$, $p < .001$; and $z = 2.19$, $p < .001$, respectively. Bias corrected 95% CIs that did not include zero indicated that all interactions between anger, contempt, and disgust uniquely mediated LIWC Swear.

The analyses for LIWC 1st Person Singular and Social Processes were computed only on the opponent outgroup data, corresponding to the effects reported above. The total indirect effects of all the mediators were significant for all both dependents, $z = 2.53$, $p < .001$; and $z = 3.68$, $p < .001$, respectively. Bias corrected 95% CIs that did not include zero indicated that the anger × disgust interaction uniquely mediated 1st Person Singular Pronouns, and that anger, disgust, and the anger × disgust interaction uniquely mediated Social Processes.

For Constructive uses (of the brick), the total indirect effects of all the mediators was significant, $z = 2.56$, $p < .001$. Bias corrected 95% CIs that did not include zero indicated that the disgust uniquely mediated this dependent variable.

For differences in force plate acceleration, the total indirect effects of all the mediators was significant, $z = 2.94$, $p < .001$. Bias corrected 95% CIs that did not include zero indicated that the anger × contempt interaction uniquely mediated this dependent variable. For speed of body movement after emotion elicitation to the second placement of the brick, the total indirect effects of all the mediators was significant, $z = 2.29$, $p < .001$. Bias corrected 95% CIs that did not include zero indicated that anger and the anger × contempt interaction uniquely mediated this dependent variable.

Additionally, we recomputed all of the original analyses reported above in the main hypothesis tests including participant sex as an additional factor; sex did not affect or interact with any of the findings.

Discussion

Individuals primed with the target ANCODI mix produced more anger and swear words, providing partial support for Hypothesis 1. Individuals primed with ANCODI also produced relatively fewer 1st person singular pronouns, social words, and constructive uses of the brick when talking about their opponent outgroups relative to non-opponent outgroups, providing support for Hypotheses 2, 4, and 5. They also handled the brick more forcefully and moved faster through the trials than participants in the other conditions, supporting Hypotheses 6 and 7. Anger, contempt, disgust, and their interactions were associated with a bulk of the dependent variables, and mid-session levels of anger, contempt, disgust, and their interactions mediated most of these effects, with specific variables providing unique mediation. Importantly, FESA did not produce hostile cognitions and behaviors, and were not correlated with the dependent variables. Thus this study produced initial experimental evidence for a causal effect of incidental anger, contempt, and disgust on intergroup-based hostile cognitions, language, and behaviors.

These findings were not produced without limitations, one of which concerned the emotions that were self-reported. Anger, contempt, and disgust means indeed increased in the ANCODI conditions, as did the FESA means in the FESA conditions.[8] But sadness also increased in the

[8]In reality the ANCODI slide manipulation produced strong anger and disgust effects, and relatively weaker contempt effects. The outgroup manipulation, however, clearly varied contempt. Taken together we interpret the manipulation as generating high anger, contempt, and disgust.

Table 5 Mediation of the Effects of Emotion Prime Conditions on LIWC Negative Emotion, LIWC Anger, and LIWC Swear through Mid-Session Anger, Contempt, Disgust and their Interactions

Dependent variable	Effect	Bootstrapped indirect effect	SE	Bias corrected 95% confidence intervals	
				Lower	Upper
LIWC anger	Anger	−.092	.094	−.280	.089
	Contempt	−.094	.336	−.870	.494
	Disgust	.055	.257	−.228	.050
	Anger × Contempt	.224	.348	−.435	1.010
	Anger × Disgust	.118	.456	−.793	1.004
	Contempt × Disgust	.204	.324	−.461	.797
	Anger × Contempt × Disgust	.304	.480	−.636	1.243
LIWC swear	Anger	−.045	.030	−.115	.002
	Contempt	−.157	.122	−.429	.023
	Disgust	−.014	.013	−.045	.003
	Anger × Contempt	.180	.139	.003	.520
	Anger × Disgust	.179	.133	.042	.444
	Contempt × Disgust	.094	.068	.011	.258
	Anger × Contempt × Disgust	.259	.160	.025	.600
LIWC 1st person singular	Anger	1.974	1.798	−1.059	6.034
	Contempt	−0.025	0.397	−0.896	0.755
	Disgust	−0.011	1.067	−2.275	2.022
	Anger × Contempt	−0.979	2.645	−7.071	3.379
	Anger × Disgust	2.138	2.283	1.807	7.285
	Contempt × Disgust	0.487	1.441	−2.653	3.064
	Anger × Contempt × Disgust	0.914	2.820	−3.654	7.860
LIWC Social processes	Anger	4.622	3.100	1.515	10.715
	Contempt	0.658	0.773	−0.518	2.689
	Disgust	2.767	2.089	1.253	7.068
	Anger × Contempt	−3.648	4.791	−12.840	5.633
	Anger × Disgust	5.940	3.917	1.812	13.698
	Contempt × Disgust	−2.919	2.673	−8.704	2.099
	Anger × Contempt × Disgust	4.437	5.208	−4.981	15.384
Constructive uses of the brick	Anger	0.201	0.249	−1.171	2.453
	Contempt	−0.033	0.141	−0.330	0.256
	Disgust	0.971	0.689	0.365	2.344
	Anger × Contempt	0.024	0.991	−1.717	2.184
	Anger × Disgust	0.700	1.113	−1.639	2.785
	Contempt × Disgust	0.669	0.830	−0.981	2.260
	Anger × Contempt × Disgust	−0.624	1.192	−3.086	1.695
Force plate	Anger	58.439	114.401	−123.754	334.454
	Contempt	29.253	35.417	−13.528	144.304
	Disgust	−73.864	67.304	−240.716	33.143
	Anger × Contempt	180.507	203.291	79.150	787.412
	Anger × Disgust	79.377	165.543	−209.926	454.958
	Contempt × Disgust	15.840	65.698	−104.621	158.133

Table 5. Continued

Dependent variable	Effect	Bootstrapped indirect effect	SE	Bias corrected 95% confidence intervals	
				Lower	Upper
	Anger × Contempt × Disgust	69.282	201.813	−231.303	624.155
Speed of body movement	Anger	4.250	3.586	2.591	11.259
	Contempt	−0.112	0.644	−1.264	1.324
	Disgust	−1.044	2.917	−6.452	5.069
	Anger × Contempt	4.416	4.067	1.878	13.819
	Anger × Disgust	4.907	4.731	−4.698	13.590
	Contempt × Disgust	−1.368	3.565	−8.288	5.809
	Anger × Contempt × Disgust	−3.022	5.004	−11.728	6.795

ANCODI condition. This was not surprising, given the elevated levels of sadness in the pilot data and as reported previously (Mikels et al., 2005). To some extent the correlation and mediation analyses mitigated this concern. Even though sadness was elevated in the ANCODI condition, it was not correlated with the dependent variables, suggesting that it did not contribute to hostility. That anger and contempt did not increase in the FESA condition and that all negative emotions decreased in the neutral condition also mitigated concerns about the actual emotions elicited.

Another limitation concerned the nature of the dependent variables tested. Although hostile language, cognitions, and implicit behaviors are important and suggestive of the mindset of an individual primed for aggression, they are not the same as aggressive acts. Future studies will need to include more direct behavioral measures of aggression to address this important issue.

Despite these limitations the findings provided initial evidence that incidental elicitation of ANCODI produces cognitions, language, and behaviors associated with intergroup hostility and aggression. Of particular note in our findings is the fact that for some variables these emotions affected hostility directed toward known opponent outgroups but not to non-opponent outgroups, suggesting that the role of emotions vis-à-vis intergroup hostility may be specific to certain groups and not others. That the ANCODI effects occurred when directed to outgroups that were already disliked suggested that the incidental ANCODI engaged hostile cognitions in the pre-existing neural network concerning the opponent outgroups. Because such hostile cognitions did not exist in the neural net for the non-opponent outgroups, the elicited ANCODI did not have the same effects. Whether ANCODI directed toward neutral, non-opponent outgroups can turn them into hostile opponent outgroup targets is an interesting question for future research.

Not all hypotheses were supported and several non-findings deserve attention. For example, Hypotheses 1 and 5 were partially supported, but were not moderated by outgroup type. It may have been the case that the outgroup instructions for the creativity task were not salient enough to produce a moderating effect for these variables. Also, there was no support for hypotheses concerning cognitive complexity or the use of 3rd person pronouns, and our hypothesis concerning the destructive uses of the brick was not supported (although fewer constructive uses were reported). The creativity task that we employed in this study may have been too simple and short to allow participants to produce language that would allow for an adequate sampling of these variables. For example, cognitive complexity was operationalized as the sum of exclusive words and negations. The creativity task, however, probably did not allow for the production of a range of these types of words because it was timed for only one minute and this may not have been enough time to generate such complexity. The same may have been true for the 3rd person pronouns and destructive uses of the brick. That the task required participants to list uses of the brick in a rushed manner, although intended to generate the foremost thoughts in the minds of the participants - probably did not lend itself to producing a sampling of different types of pronouns and constructive and destructive uses. This has been reported as a limitation of LIWC based analyses, where short descriptions are often difficult to analyze reliably (e.g., Newman et al., 2003).

Although this study addressed one gap in the literature (concerning the causal relationship between incidental ANCODI and hostile intergroup cognitions), it is important to acknowledge what this study did *not* do. A more comprehensive evaluation of the role and function of anger, contempt, and disgust requires a more thorough review of the literature on emotion and aggression, on both the individual- and group-levels, and a theoretical and empirical review of

contempt and disgust. Such an effort also requires consideration about why these three emotions are so volatile, especially compared to other emotions (such as hubris). In line with such efforts, future studies will need to test the orthogonal effects of anger, contempt, and disgust separately to examine whether their combination produces effects that each of the emotions singly do not (which is a very different research question than what was addressed in the current study, and that would require a different experimental design). To be sure, doing so will not be easy because it is very difficult to elicit these emotions singly without an elevation in the others. For example, close inspection of the Mikels et al. (2005) data and our own pilot data indicated that there were no IAPS stimuli that had elevated levels of anger without elevated levels of contempt or disgust as well, despite the fact that the modal rating was anger and thus the stimuli were called "anger." And there were no IAPS stimuli that elicited contempt only without elevated levels of anger and disgust. Future research will also need to test the effects of these, and other emotions, when they are integral to the actions of the outgroup, as opposed to the incidental elicitation we used here.

Another related question for future research is whether different combinations of anger, contempt, and disgust produce different types of intergroup hostility. Years ago, Sternberg (2003) proposed a triarchic theory of hatred that was based on these three emotions, and fear. He proposed that hatred is based on a negation of intimacy (based on disgust), passion (based on anger and fear) and decision-commitment based on devaluation and diminution of others (based on contempt). According to this model, different kinds of hatred can exist based on different combinations of these three components. Because there are three components, they can yield seven different combinations of hatred: cold, cool, hot, simmering, boiling, seething, and burning hatred. The multiple meditational analyses presented in Table 5 begin to approach such a framework by mapping different specific interactions with specific effects. This suggests that different types of combinations, e.g., anger-contempt, contempt-disgust, etc., may be associated with different types of hostility. In Sternberg's (2003) model, the most intense type of hatred was burning hatred, which corresponds to our ANCODI combination.

Our findings also raise interesting questions about the nature of disgust. As others have noted in the past (Ekman, 2003; Lazarus, 1991; Rozin, Haidt, & McCauley, 1999; Rozin, Lowery, et al., 1999), disgust has at least two forms, one visceral, having to do with physical disgust, and the other interpersonal, having to do with disgust directed toward the existence of other people. The disgust referred to in our study is the latter; consequently the disgust portion of the IAPS images used to elicit the ANCODI combination was the interpersonal type of disgust. The visceral, physical type of disgust is actually likely to inhibit aggression because this type of disgust promotes behavioral avoidance (e.g., see Pond et al., 2012). Future studies will need to examine the effects of different types of disgust in intergroup aggression and the ANCODI hypothesis.

Although this article focused on intergroup aggression, there is a large literature on interpersonal aggression that focuses on emotions as well. We believe that ANCODI may have relevance to that literature, but it remains for future studies to test this notion empirically. Because interpersonal aggression and violence takes many forms and has many different underlying perspectives, we would not be surprised to find if these three emotions are one of many factors that provide the emotional basis of interpersonal aggression. Future research will also need to examine the important role of individual differences in the propensity for hostility and the enactment of aggression. Such studies can examine the role of variables such as motivation for aggression, as well as personality traits such as social dominance orientation (Pratto et al., 1994) or aggressiveness (Buss & Perry, 1992). One interesting individual level variable to examine especially in relation to intergroup aggression may be the need for social affiliation or group identity.

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