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Social Psychology

Bad People Alert: The Expression of Disgust Signals Its Target's Bad Moral Character

Daqing Liu, Ph.D.[1,2][a], Roger Giner-Sorolla, Ph.D.[1]

[1] School of Psychology, University of Kent, Canterbury, UK, [2] School of Education, Language, and Psychology, York St John University, York, UK

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Expressions of moral disgust and anger in social situations signal the target's moral failure to third-party observers. But little is known about whether the two emotions have different communication functions in sociomoral contexts. Based on the literature about social factors that actually distinguish between anger and disgust, two experiments investigated the inferences people make about the social target of an angry or disgusted expression. Primarily, we tested whether disgusted expressions aimed at a person convey the inference that the person has a bad moral character, more than angry expressions which communicate that the person did a thing with bad consequences. Together, these two experiments shed light on the functional differences between angry and disgusted expressions, as much as they co-occur in everyday life.

Expressions of emotion carry abundant social information, and people observe others' emotional expressions to navigate social life (Fischer & Manstead, 2008; Giner-Sorolla, 2012; Hareli & Hess, 2012; Keltner & Haidt, 1999; Lange et al., 2021; Parkinson, 2005; Van Kleef, 2009). Emotional expressions fulfil the expressers' goals of social influence by triggering others' cognitive inferences, affective reactions, and behavior (Scarantino et al., 2022; Van Kleef et al., 2011; Van Kleef & Côté, 2021). As sociomoral emotions that work to show disapproval of others, expressions of anger and disgust support the enforcement of shared rules and norms (Haidt, 2001, 2003). To third-party observers, the two condemnatory emotions signal the target social members' moral failure. Through facial and verbal expressions of these emotions, the target individuals' bad reputations are efficiently spread, guiding other social members to avoid or reject these individuals, or to interact with them cautiously (Chapman & Anderson, 2013; Tybur et al., 2013).

Anger and Disgust as Moral Emotions

Both anger and disgust are commonly expressed to condemn moral violations such as lying, cheating, stealing, and unfairness (e.g., Cannon et al., 2011; Chapman et al., 2009; Chapman & Anderson, 2013; Tybur et al., 2009). However, there has been ongoing debate over whether and how they differ from each other in sociomoral contexts. Unlike core disgust whose pathogen-cue elicitors are well established in research, there is little consensus on what distinguishes sociomoral disgust from anger (Giner-Sorolla et al., 2018; Haidt et al., 1997; Rottman et al., 2018; P. S. Russell & Giner-Sorolla, 2013; Tybur et al., 2009, 2013; Yoder et al., 2016). Some researchers have argued that sociomoral disgust is just a rhetorical metaphor for anger (e.g., Lee & Ellsworth, 2013; Nabi, 2002; Piazza & Landy, 2020; Royzman & Sabini, 2001), but other argue that the two are at least partially distinct in their elicitors and outcomes (e.g., Gutierrez et al., 2012; for reviews, see Hanah A. Chapman & Anderson, 2013; Giner-Sorolla et al., 2018).

Several accounts of differences in the elicitors and consequences of moral disgust and anger have been found in experimental research. These accounts have implications for our primary research questions about the kind of things that can be inferred from expressions of disgust and anger. Indeed, our main research rests on the possibility that lay people on some level concur with the anger-disgust featural differences supported in these accounts, and so can reverse-infer these features from expressions of the two emotions. Here we briefly review findings supporting six of these accounts, keeping in mind that they are not by any means mutually exclusive.

1. **Disgust responds to bad character, anger to bad consequences.** A *character hypothesis* of moral disgust has recently been proposed and supported empirically (Giner-Sorolla et al., 2018; Giner-Sorolla & Chapman, 2017). Studies of moral disgust and anger have presented actions, such as displaced animal cru-

a Correspondence concerning this article should be addressed to Daqing Liu, HG212, York St John University, Lord Mayor's Walk, York, YO31 7EX. E-Mail: d.liu1@yorksj.ac.uk.

elty, desire to hurt other individuals, and imagining but not actually conducting sexually deviant acts that have been established in previous research as diagnostic of bad moral character (Giner-Sorolla & Chapman, 2017; Sabo & Giner-Sorolla, 2017; cf. Tannenbaum et al., 2011, Study 1; Uhlmann & Zhu, 2014). Consequently, these negative character cues triggered disgust more than anger. Anger, however, was more closely related to perceptions of harmful consequences, such as other people being bodily injured by acts whether intentionally or not (Giner-Sorolla & Chapman, 2017; Sabo & Giner-Sorolla, 2017).

2. **Disgust is more likely when relationships are distant than close.** Fischer and Roseman (2007,Study 1) reported that anger is a more likely response to offenses by close others and contempt is more likely when strangers are involved. As disgust shares some characteristics with contempt (Fischer & Giner-Sorolla, 2016), we might expect a similar outcome: disgust should be less likely than anger when existing relationships are close. This account is compatible with the character hypothesis (account #1), because we are unlikely to maintain close relationships with people we see as having bad character.
3. **Disgust resists change and reconciliation more so than anger.** A number of studies have shown that it is more difficult to change or revise the appraisals underlying disgust compared to anger, for example, by presenting novel information that might allow people to revise their judgments and emotions, or by studying the malleability of emotions to variations in morally relevant factors such as intentionality (Hutcherson & Gross, 2011; Piazza et al., 2013; P. S. Russell & Giner-Sorolla, 2011). This difference also indirectly supports the character hypothesis (account #1). People should presume that the emotion of disgust is resistant to change, even if the wrongdoer takes reparative actions, since moral character is perceived as relatively consistent and stable across contexts (T. R. Cohen et al., 2014; Sabini & Silver, 2005; also see Ross & Nisbett, 1991), which is especially true for bad character (Anderson et al., 2023; Baumeister et al., 2001; Klein & O'Brien, 2016; but also Siegel et al., 2018).
4. **Disgust motivates indirect action; anger motivates direct action.** In parallel, a social-functional account of moral disgust and anger suggests that the two emotions are not only distinct in their antecedent appraisals but also motivational functions and action outputs. Hutcherson and Gross (2011) found that participants' report of their own emotional experiences revealed that only experienced anger at the time of an event, not disgust, correlated with actions taken to stop a perpetrator. Subsequent research has further found that whereas anger is associated with high-cost, direct aggression such as insults and confrontation, disgust is also associated with a particular kind of action: low-cost, indirect aggression such as social exclusion and gossip (Molho et al., 2017, 2020; Tybur et al., 2020). Indirect evidence for this hypothesis comes from Kemper and Newheiser (2018), in that bodily-moral violations (associated with disgust; see account #6) are more likely to produce avoidant action tendencies than other types of moral violations are.
5. **Disgust is more concerned with moral norms; anger is more concerned with the self.** The previously mentioned studies also found that anger was more likely to be elicited from offenses against the self, compared to disgust which was more likely when offenses were against a third party (Hutcherson & Gross, 2011; Molho et al., 2017; Tybur et al., 2020). Extending these findings to cases of harm inflicted on siblings, Lopez et al. (2021) found offenses against oneself or one's sibling versus acquaintance equivalently evoked greater anger, whereas offenses against acquaintances evoked greater disgust. Thus, disgust is more likely in situations of disinterested, moral judgment as opposed to self-interested situations. This account is concordant with account #3 regarding distant and close others, given that close others are metaphorically included in the self-concept (Aron et al., 1991).
6. **Disgust responds to bodily norms, anger to harm.** Rozin et al. (1999) first empirically investigated three other-critical emotions, contempt, disgust, and anger, and proposed the CAD triad hypothesis in which each emotion maps onto a different moral code. The CAD hypothesis proposed that moral disgust is linked to violations of Divinity, such as degradation of the soul and sexual norm violations, whereas anger is linked to violations of Autonomy such as violating individual rights and freedom. This inspired a large amount of research establishing links between disgust and divinity (renamed "purity" in Moral Foundations Theory) and between harm and anger (Graham et al., 2009; Haidt, 2007; Horberg et al., 2009). However, scenarios used to study this purity-disgust link have mainly centered around food, body hygiene, and sexuality (e.g., Clifford et al., 2015; for a review, see Giner-Sorolla et al., 2018). Moreover, the concept of "purity" has not been implemented in a coherent way that relies on a single conceptual definition (Gray et al., 2022). For this reason we adopt the more precise category label "bodily-moral violations" to characterize this common disgust elicitor (P. S. Russell & Giner-Sorolla, 2013). There has been evidence that bodily-moral violations are perceived as indicative of bad character, further linking it to account #1 (Chakroff & Young, 2015).

Anger and Disgust in Communication

The communication function of anger has received much more attention than that of disgust, although not always in moral contexts. Anger has been studied as a way of communicating attention-getting motives such as competition, rejection, hostility, and other-blame (e.g., Averill, 2012; Dimberg & Öhman, 1996; Heerdink et al., 2015; Van Doorn et

al., 2012, 2015). People often employ angry expressions to impose change upon others in social settings such as negotiation (e.g., van Dijk et al., 2018; Van Doorn et al., 2015; Van Kleef et al., 2004, 2006).

In sociomoral contexts, expressions of anger facilitate individuals' social norm acquisition and guide their normative and moral conduct. Rottman et al. (2017, Study 1) found seven-year-old children are more likely to judge seemingly harmless action as "wrong" after being presented adults' verbal description about the action as "angering" and "irritating" (as well as "disgusting"), compared with when there is no adults' description. Similarly, observing an ambiguous norm transgression, people are better able to infer the norm correctly when a group responds with anger versus sadness or neutral emotions (Hareli et al., 2013). Group members' expressions of anger can also lead a member who holds a deviating opinion to feel rejected and more likely to conform (Heerdink et al., 2013).

Despite that moral disgust has often been compared with anger in terms of their elicitors, little is known about whether moral disgust has different communication functions from anger. We structure the current, incomplete literature on this topic into six hypotheses derived from the six accounts listed above.

1. **Disgust communicates the target's bad character; anger communicates the action's bad consequences.** To our knowledge this communication function, the focus of the present studies, has not been studied directly. However, a recent study that investigated the implicit persuasive messages in a number of discrete emotions, separately from emotion elicitors and outcomes, may lend support to this function (Scarantino et al., 2022). From witnessing others' facial expressions of disgust or anger, Scarantino et al. (2022) found that people infer that an expression of disgust primarily appeals to empathize with persons harmed but also to be warned about the situation, while an expression of anger only primarily appeals to empathy. In a social context, these findings are compatible with the character hypothesis (Giner-Sorolla et al., 2018; Giner-Sorolla & Chapman, 2017). To reinforce this connection, in both experiments we measure inferences of moral character directly, and also measure the inference that the expression was warning other people about the target's bad character. We expect that in a sociomoral harm context, disgust expressions would be seen as a warning to third-party observers about the target's shady moral character. However, angry expressions would be more seen as appealing to care and empathy concerns, because they focus on the consequences of the act and the harm caused.
2. **Disgust, compared to anger, signals that relationships are more distant than close.** This signaling hypothesis is novel and not yet tested in the literature. It was tested in both experiments with measures of inferences about the relationship.
3. **Disgust communicates that condemnation is less changeable compared to anger.** This is also a novel hypothesis, which is tested differently in the two experiments. Experiment 1 measured inferences about how likely to last over time the signaled emotion is, and how likely the expresser and the wrongdoer are going to reconciliate. Manipulating the wrongdoer's reparation action, Experiment 2 measured inferences about how likely to be mitigated the signaled emotion is, and how the expresser interprets the wrongdoer's reparation (e.g., whether the apology it is sincere).
4. **When communicated, as when felt, disgust motivates indirect action; anger motivates direct action.** Without distinguishing between types of actions, Horstmann (2003) found that people associate angry faces with requests of action more, compared with facial expressions of disgust. Fan et al. (2023) has provided direct evidence for the emotion-action inference mechanism by asking about inferences of the angry or disgusted expresser's direct and indirect action tendencies. In Experiment 1, we conceptually replicated Fan et al. (2023) and tested participants' inferences about the expressers' action tendencies. In Experiment 2, we further tested the related question of whether expressions motivate action tendencies in observers (that is, participants).
5. **Disgust communicates moral motives; anger communicates more selfish motives.** This communication function was studied by Kupfer and Giner-Sorolla (2017) who found that people infer more moral motivation from observing an expression of disgust but more self-interested motivation from an expression of anger (Study 1 and 2, Kupfer & Giner-Sorolla, 2017). We included measures to conceptually replicate this finding in Experiment 1.
6. **Disgust communicates that bodily-moral norms have been violated; anger communicates that harm/fairness norms have been violated.** Heerdink et al., (2019) found that given a target's ambiguous behavior, such as snacking with friends (Study 1), drinking outside a classroom (Study 2), or even unspecified behavior communicated between two colleagues (Study 3), disgusted reactions towards the target led people to infer the unspecified norm to be more bodily-moral-based such as someone being dirty, repulsive, and distasteful, whereas angry reactions were relatively more associated with more autonomy-based norm inferences such as someone bothering or causing trouble to other people. Similar inferences from angry and disgusted reactions also emerged as a secondary finding in Giner-Sorolla and Espinosa (2010).

The Current Experiments

Despite considerable effort to distinguish the inputs and actions involved in sociomoral disgust from anger, comparisons of their roles in social communication are scarce. This research focused on one framing of the question: Do people make different inferences from observing others expressing moral disgust versus anger? Table 1 presents the research

hypotheses, their existing support, and how they were distributed across the two experiments.

Our theoretical focus is on the as-yet unstudied question of character disgust (account #1, above). To be specific, if moral disgust versus anger is more closely associated with judgments of someone's bad moral character, then when observing a condemnatory expression of disgust, people would be more likely to infer that the expression's target has bad moral character than if the expression had been anger. To our knowledge, there has not been any research testing this prediction. Our research also tested whether anger versus disgust communicates the information predicted by the other accounts, at times conceptually replicating other studies, at other times testing inferences related to character, such as resistance to change.

To provide an overview of the current research, two experiments investigated whether people make different inferences from observing expressions of disgust versus anger from a third-party perspective, focusing on the character hypothesis. Experiment 1 investigated whether a condemnatory expression of disgust versus anger in an ambiguous workplace context led third-party observers to more strongly impute bad moral character to the target of the emotion, to attribute the action to dispositional rather than situational forces, and to be alert to the target's poor character in line with character reasoning (three measures testing hypothesis #1). It also compared people's inferences about the distance of the relation between the expresser and the target (hypothesis #2) and the chance of their reconciliation in the two emotion conditions (hypothesis #3). Conceptually replicating previous findings, hypothesis #4 about action tendencies, hypothesis #5 about motives, and hypothesis #6 about violation of norms were also tested.

Experiment 2 (Registered Report) further experimentally tested the greater resistance of disgust to changes in the social situation concerning inferences about emotion intensity and character judgment (hypothesis #3), beyond the measurement of this variable as emotion duration in Experiment 1. Specifically, it tested how much describing the target of disgust vs. anger as performing reparation can mitigate the assumptions about the target's bad moral character and related inferences. In line with hypotheses #1 and #3, feelings of disgust, versus anger, should be more persistent due to negative character perception. Further, we tested whether the two condemnatory emotions have different direct influences on third-party observers' own avoidance tendency towards the target of condemnation in parallel with their inferences about the expresser's behavior (hypothesis #4).

Experiment 1

In an ambiguous social situation in which a person expresses disgust versus anger in their condemnation of another person, Experiment 1 tested how participants in the role of a third party made inferences about the situation, the condemner, and the target of the condemning emotion. Our main hypotheses propose that disgust (vs. anger) is more closely related to three measures relevant to bad-moral-character judgments (H1a, b and c). We also test the differences of social-relation inference (H2) and the inferred course of change (H3a and b) between the disgust and anger. Moreover, we expected to conceptually replicate Fan et al. (2023) on aggression-tendency inference (H4); Kupfer and Giner-Sorolla (2017) on motive inference (H5); and Heerdink et al. (2019) on offense type inferences (H6).

> H1a. (character, focus measures) For both forced-choice and scaled measures of focus-of-condemnation inferences, there would be a significant interaction between emotion expression and focus inference. For moral-disgust expressions, inferences would be more about bad moral character of the target condemned than harmful consequences the target caused. But this simple effect in the anger-expression condition should be weaker, or even reversed.
> H1b. (character, attribution measures) For both forced-choice and scaled measures of attribution inferences, we made identical predictions to H1a, substituting dispositional (vs. non-dispositional) inferences about the wrongdoing for bad character.
> H1c. (character, appeal measures) For both forced-choice and scaled measures of appeal inferences, we made identical predictions to H1a, substituting warning (vs. care) appeal inferences for bad character.
> H2. (closeness): The relationship between the condemner and the target condemned would be seen as less close in the disgust- versus anger-expression condition.
> H3a. (change, reconciliation measure) The condemner and the target would be expected to be less likely to reconcile in the future in the disgust- versus anger-expression condition.
> H3b. (change, duration measure) The condemner would be expected to feel the emotion for a longer time in the disgust- versus anger-expression condition.
> H4. (action) There would be a significant interaction between emotion expression and expected action tendency. Participants would expect the condemner to be more likely to act indirectly versus directly in the disgust expression condition, but more likely to act towards the target directly versus indirectly in the anger expression condition.
> H5. (motives) For both forced-choice and scaled measures of motive inferences, there would be a significant interaction between emotion expression and motive inference, as H5a) participants would infer more self-interested motivation versus moral-concern motivation from an angry expression, but H5b) more moral-concern motivation versus selfish motivation from an expression of disgust.
> H6. (offense type). Participants would be more likely to infer bodily-moral offenses from disgust expressions and harm offenses from anger expressions.[1]

1 This hypothesis, although following straightforwardly from previous literature, was unintentionally omitted from our pre-registration.

Table 1. Summary of hypotheses across Experiment 1 and registered Experiment 2.

Disgust vs. anger featural differences	Hypotheses: Because disgust has this feature (accounts 1-6), then expressing disgust vs. anger signals…	Existing evidence for signaling effect	Hypothesis tested in present research	Hypothesis supported in present research
account #1	1. Bad character (focus, attribution and appeal measures)	None known	Experiment 1 & 2	Experiment 1, partially in Experiment 2
account #2	2. Distant relationship	None known	Experiment 1 & 2	Experiment 1 & 2
account #3	3. Resistant to change (Experiment 1: reconciliation, emotion duration; Experiment 2: mitigation of emotion, and interpretation of reparation)	None known	Experiment 1 & 2	Partially supported in Experiment 1
account #4	4. Less direct and more indirect action (Experiment 1 and 2: inference about the expresser; Experiment 2: observers' own avoidance tendency)	Fan et al. (2023)	Experiment 1 & 2	Experiment 1 & 2 (only inference about the expresser's action)
account #5	5. Less selfish and more moral motivation	Kupfer & Giner-Sorolla (2017)	Experiment 1	Experiment 1
account #6	6. Bodily-moral rather than harm violation	Giner-Sorolla & Espinosa (2010); Heerdink et al. (2019)	Experiment 1	Experiment 1

Methods

Design

This pre-registered experiment used a 2 x 2 mixed design: emotion expression (disgust vs. anger) as a between-subjects factor and inferences (e.g., focus of condemnation: bad moral character vs. harmful consequence) as a within-subjects measure (registration at https://osf.io/szyxv). Participants were randomly assigned to the disgust-expression condition or the anger-expression condition and then completed a few dependent measures of inferences.

Participants

The online worker platform Prolific was used to recruit 231 participants, leaving a sample size of 224 (113 males, 107 females, and 4 other, M_{age} = 26.38, *SD* =7.75) after exclusion of seven participants who failed either one of the attention check items, one of which instructed participants not to choose any scale point and the other asking about a detail in the stimulus. Using G*Power 3.1, a-priori power analysis showed that a sample size of 206 is needed to detect a medium-sized effect (η^2_p = .06) as in Cohen (1988) with 95% power in repeated measures analysis of variance (ANOVA) (emotion as a between-subjects factor and one of the DVs as a within-subjects measure) with alpha at .05. The medium effect size was conservatively determined, referring to Kupfer and Giner-Sorolla (Study 1, 2017) which has a similar design as our experiment and found a large-sized interaction between emotional expression (anger vs. disgust) and motive inferences (self-interested vs. other-concern vs. moral concern) interaction (η^2_p = .14) and Fischer and Roseman (2007, Study 1) which compared character appraisals between experiences of anger and contempt and found a medium effect size (Cohen's *d* = 0.68).

Scenario

Modeled on Kupfer and Giner-Sorolla's (2017, Study 1) ambiguous social situation, we asked participants to imagine a scenario in which they hear and see a colleague condemn an absent party's wrongdoing by expressing anger or disgust. However, we gave minimal information about the incident such as what the wrongdoing is and who the perpetrator and victim are. As a previous study found stronger effects of emotional expression (anger versus disgust) on motive inferences for a male protagonist (Kupfer & Giner-Sorolla, 2017, Study 2), we described the condemner as male. The vignette read as below (word changes for the anger condition in brackets). We chose a picture of a White male's facial expression of disgust or anger from the Radboud Faces Database (RaFD, Langner et al., 2010) as an illustration after the vignette (see the stimulus at https://osf.io/wjvy6). This database is well-validated and commonly used in research (e.g., Mishra et al., 2018).

> You are at work in a job that you have only just started and you are sitting in the breakroom during your break. Two of your colleagues come into the room and sit at the table at the other end of the room. After a few minutes you overhear one of your colleagues talking and, although you do not know him well, you recognize the voice as belonging to your colleague Robert.
> You can't hear all of the conversation from where you are but from what you hear, you can tell that they are talking about someone else who has done something wrong. You can tell from Robert's voice that he sounds disgusted (angry). A minute later, you overhear the words "I am disgusted (angry)." You decide to glance up at him and you see his facial expression as follows.

Measures

To check our emotion expression manipulation, we asked participants how strongly they think the condemner felt disgusted and angry, from 1 = *not at all* to 7 = *very much*. Then they were asked to make inferences about the condemner's focus of condemnation, appeal, attribution, motives, action tendencies, and emotion time course, as well as the relation between the condemner and wrongdoer. For the first four variables, participants saw two statements and made a forced choice of the one they thought was more likely to be true, and then completed parallel Likert-scale measures. An attention check item with a seven-point scale was included in the middle of the questionnaire, which instructed participants not to choose any scale point so we could screen random clicking, and at the end of questionnaire we asked a fact-check question about who were the two persons in the scenario (e.g., your colleagues, or friends) The questionnaire materials are available at https://osf.io/wjvy6.

Moral-character Inference. We measured character inferences in three ways.

Focus of Condemnation. The forced-choice measure of focus inference asked whether participants think the condemner was mainly condemning "the wrongdoer's bad moral character" or "the harm the wrongdoer has caused". Participants then rated the two statements on seven-point scales from *not at all likely* to *very likely* (this scale was applied to all likelihood measures unless otherwise specified).

Dispositional Attribution. The two items of the forced-choice measure of attribution inference were whether the condemner thinks the wrongdoer did the thing "because that is how they are" or "by mistake". We then had six scaled items of dispositional attribution. The two statements in the forced-choice measure were turned into scaled questions, and four more questions were included, such as how likely the condemner thinks "the wrongdoer's behavior shows they are bad," and "the wrongdoer intends to cause harm" (six items, α = .82). An exploratory factor analysis of the six items (KMO = .77) using unweighted least squares method and Promax (oblique) rotation yielded two factors which explained 61.20% of the variance in total. The first factor consisted of four dispositional-attribution items (α = .85), and the second consisted of two items measuring non-dispositional attribution in the reverse direction (Spearman's ρ = .67). The two factors were negatively correlated (*r* = -.41).

Appeal. The forced-choice question of appeal inference asked whether participants think the condemner "wants

other people to care about the harm caused" or "wants to warn other people about the wrongdoer's bad character".

Besides these two items which we turned into scaled questions, another question asking how likely the condemner "wants other people to empathize with him" was added in the scaled measures. This item was positively but only moderately correlated with the appeal to care, (Spearman's ρ = .33), so we analyzed it as a separate measure from the other two.

Social-relationship Inference. Two questions asked about the closeness of the relationship between the condemner and the wrongdoer: how close they are and how well they know each other (Spearman's ρ = .58).

Reconciliation Inference. Four items measured participants' inferences of the chances of reconciliation between the condemner and wrongdoer, such as how likely it is that they are going to make up, or talk it over (α = .83).

Inference of Duration of Emotion. Two questions asked how likely it is that the condemner would be disgusted, and angry, after a couple of days.

Action-tendency Inference. Measures of action-tendency inferences were adapted from Molho et al. (2017), tapping indirect punishment (how likely the condemner is to "exclude the wrongdoer from their social network," "share negative information about the wrongdoer to others," and "avoid contact with the wrongdoer", α = .80) and direct punishment (how likely the condemner is to "confront," "yell at or argue with the wrongdoer" and "insult the wrongdoer to their face", α = .65).

Motive Inference. The forced-choice measure of motive inference asked whether participants think the condemner is mainly concerned about "something bad happening to someone else" or "about himself". They then rated these two scaled items and three more items measuring moral concern (how likely it is the condemner thinks the wrongdoer "behaved unethically," "violated a moral principle", the condemner "worried someone else's feelings might be hurt," α = .71), and one more item measuring self-interested concern (the condemner "feels that he has been wronged", Spearman's ρ = .52)

Offense Inference. An open-ended question asked participants what incidents they imagine caused the condemner's emotion. We then listed seven items that tapped onto two types of offense and participants rated how likely each item would be the reason for the condemner's emotion: four items measuring harm and fairness (e.g. "Robert or someone else was harmed," "Robert's or someone else's right was violated," , α = .76), three items measuring bodily-moral violation ("someone violated a code of proper hygiene"; "someone violated rules about what people can and can't eat"; and "someone violated norms of sexual conduct"; Spearman's ρ = .54 for the first two items). The final sexual-misbehavior item was excluded from this measure, as suggested by the exploratory factor analysis reported later. We also included three items on value conflict, which we thought might reflect inferences on moral character through a socio-political lens (e.g., "Robert disagrees with someone on important values," someone's values on important socio-political issues conflicts Robert's," α = .67). To avoid leading participants to interpret the vignettes in terms of certain types of incidents, these questions were asked at the end of the questionnaire.

An exploratory factor analysis of the ten items (KMO = .78) using unweighted least squares method with Promax (oblique) rotation yielded three factors which explained 48.18% of the variance in total. All items fell into the factor to which we expected them to belong, except for the sexual-misbehavior item, which loaded on the factor of harm and fairness. Due to the common theoretical separation of sexual and sociomoral domains in the disgust literature (e.g. Olatunji et al., 2012; Tybur et al., 2013), this sexual-misbehavior item was analyzed separately.

Results

Manipulation Check

A two-way mixed analysis of variance (ANOVA) with emotion expression as a between-subjects factor and ratings of emotional intensity (disgust, anger) as a repeated measure was performed to check whether our manipulation of emotional expression was successful. There was a significant main effect of emotion expression, $F(1, 222) = 17.09$, $p < .001$, $\eta^2_p = .07$, no main effect of intensity rating, $F(1, 222) = 2.77$, $p = .10$, $\eta^2_p = .01$, and a significant interaction between emotion expression and emotion intensity rating, $F(1, 222) = 276.15$, $p < .001$, $\eta^2_p = .55$. Pairwise comparisons with Sidak adjustment showed that in the disgust expression condition, intensity of disgust (M = 6.38, SD = 0.77) was higher than anger (M = 4.84, SD = 1.31), $p < .001$, and in the anger expression condition, intensity of anger (M = 5.74, SD = 0.87) was rated higher than disgust (M = 4.48, SD = 1.33), $p < .001$. The manipulation of emotional expressions was successful.

Moral-Character Inference (H1)

Focus of Condemnation (H1a). A Chi-square test of association between the forced-choice measure of focus inference and emotion expression condition revealed a significant association between the two, $\chi^2(1, N = 224) = 38.11$, $p < .001$, Cramer's V = .41. Chi-square goodness of fit tests showed that participants more frequently inferred that the focus of condemnation was mainly about the wrongdoer's bad moral character in the disgust expression condition, $\chi^2(1, N = 109) = 23.86$, $p < .001$, Cohen's w = .47, but more frequently inferred that the focus of condemnation was mainly about the harm the wrongdoer caused in the anger expression condition, $\chi^2(1, N = 115) = 14.62$, $p < .001$, Cohen's w = .37 (See Figure 1-a).

A two-way mixed ANOVA with emotion expression condition as a between-subjects factor and inferred focus of condemnation (character, harm) as a repeated measure showed a significant interaction between emotion expression and focus inference, $F(1, 222) = 29.03$, $p < .001$, $\eta^2_p = .12$, and main effect of emotion expression, $F(1, 222) = 13.02$, $p < .001$, $\eta^2_p = .06$, but no main effect of focus inference, $F(1, 222) = 0.12$, $p = .73$, $\eta^2_p = .00$ (see Figure 1-b). To test simple effects of focus inference, we performed a one-

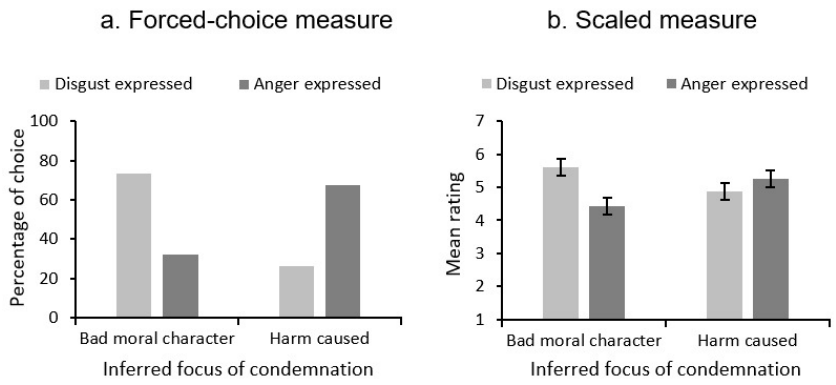

Figure 1. Inferences of Focus of Condemnation by Emotion Expression Condition

Note. Error bars represent 95% confidence intervals.

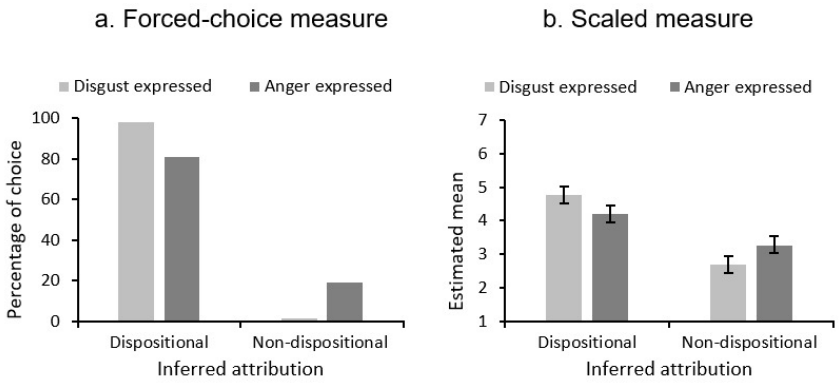

Figure 2. Inferences of Attribution by Emotion Expression Condition

Note. Error bars represent 95% confidence intervals.

way repeated measures ANOVA at each emotion level, using the pooled error sum of squares (*SSE*) and degrees of freedom (*df*) from the first two-way mixed ANOVA model. From the expression of disgust, participants inferred that the focus of condemnation was more likely the wrongdoer's bad moral character (M = 5.62, SD =1.29) than harm caused by the wrongdoer (M = 4.89, SD = 1.38) $F(1, 222) = 12.38$, p = .001, η^2_p = .05, but from the expression of anger, they inferred that the focus of condemnation was more likely harm caused (M = 5.27, SD = 1.32) than bad moral character (M = 4.43, SD = 1.50), $F(1, 222) = 16.89$, $p < .001$, η^2_p = .07.

Dispositional Attribution (H1b). There was a significant association between emotion expression condition and attribution choices, $\chi^2(1, N = 224) = 17.50$, $p < .001$, Cramer's V = .28. Chi-square goodness of fit tests showed that in both emotion conditions, participants more frequently inferred that the condemner were more likely to make dispositional attribution than non-dispositional attribution but the effect size was larger in the disgust-expression condition, $\chi^2(1, N = 109) = 101.15$, $p < .001$, Cohen's w = .93, than the anger-expression condition, $\chi^2(1, N = 115) = 43.84$, $p < .001$, Cohen's w = .38 (See Figure 2-a).

A two-way mixed ANOVA with emotion expression as a between-subjects factor and scaled measures of attribution inference as a within-subjects variable showed a significant interaction between emotion expression and inference of attribution, $F(1, 222) = 19.73$, $p < .001$, η^2_p = .08, and a main effect of attribution, $F(1, 222) = 134.89$, $p < .001$, η^2_p = .38, but no main effect of emotion expression, $F(1, 222) = 0.05$, p = .83, η^2_p = .00 (see Figure 2-b). Similar simple effect tests as mentioned above showed that participants inferred that the condemner who expressed disgust was more likely to make dispositional attribution to the wrongdoing (M = 4.77, SD =1.12) than non-dispositional attribution (M = 2.69, SD = 1.12), $F(1, 222) = 125.54$, $p < .001$, η^2_p = .36, and when the condemner expressed anger, there was also a similar, but weaker simple effect of attribution inference (dispositional attribution: M = 4.21, SD = 1.22; non-dispositional attribution: M = 3.29, SD = 1.22; $F(1, 222) = 26.43$, $p < .001$, η^2_p = .11).

Character Appeal (H1c). A Chi-square test of association between the forced-choice measure of appeal inference and emotion expression condition revealed a significant association between the two, $\chi^2(1, N = 224) = 43.50$, $p < .001$, Cramer's V = .44. As shown in Figure 3-a, when disgust was expressed, participants chose that the condemner wants to warn other people about the wrongdoer's bad moral character more frequently than the condemner wants other people to care about the harm caused, $\chi^2(1, N = 109) = 29.81$, $p < .001$, Cohen's w = .52, but when anger was expressed, they chose the appeal to care more frequently than to be warned, $\chi^2(1, N = 115) = 14.62$, $p < .001$, Cohen's w = .36.

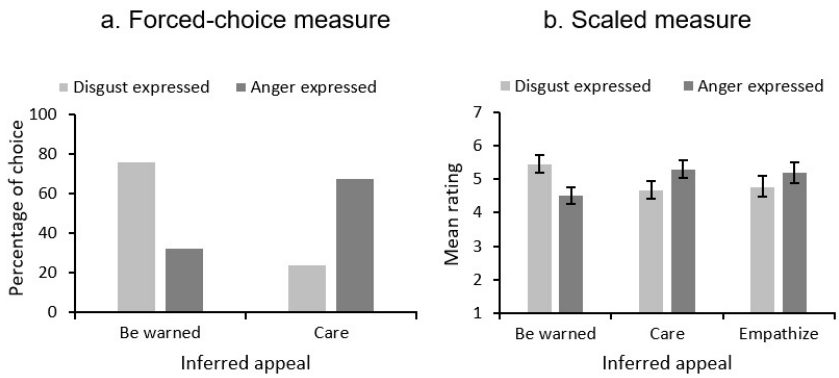

Figure 3. Inferences of Appeal by Emotion Expression Condition

Note. Error bars represent 95% confidence intervals.

A two-way mixed ANOVA with emotion expression condition as a between-subjects factor and scaled measure of appeal inference (warn, care, emphasize) as a within-subjects variable showed no main effect of appeal measure, $F(2, 444) = 0.00$, $p = .998$, $\eta^2_p = .00$; or main effect of emotion, $F(1, 222) = 0.04$, $p = .84$, $\eta^2_p = .00$. There was a significant interaction between emotion expression and appeal measures, $F(2, 444) = 20.49$, $p < .001$, $\eta^2_p = .08$ (See Figure 3-b). There were significant simple effects of appeal inference in both the disgusted expression condition $F(2, 221) = 8.78$, $p < .001$, $\eta^2_p = .07$, and the angry expression condition, $F(2, 221) = 9.62$, $p < .001$, $\eta^2_p = .08$. Pairwise comparisons with Sidak adjustment showed that from the expression of disgust, participants inferred more appeal to be warned from disgust ($M = 5.46$, $SD = 1.34$) than appeal to care ($M = 4.70$, $SD = 1.53$), $p < .001$, and appeal to empathize ($M = 4.79$, $SD = 1.83$), $p = .003$, whereas from the expression of anger, participants inferred more appeal to care ($M = 5.30$, $SD = 1.31$) and empathize ($M = 5.21$, $SD = 1.58$) than appeal to be warned ($M = 4.52$, $SD = 1.37$), $ps \leq .001$.

Inference of Social Relationship Closeness (H2)

A one-way ANOVA showed that participants inferred a closer relationship between the condemner and the wrongdoer under anger expression ($M = 4.01$, $SD = 1.18$) than disgust expression ($M = 3.27$, $SD = 1.21$), $F(1, 222) = 21.90$, $p < .001$, $\eta^2_p = .09$ (see Figure 4).

Inference of Reconciliation and Duration of Emotion (H3)

As closeness of a relationship can affect the two parties' chances of reconciliation in conflicts, we added closeness inferences as a covariate when analyzing the effect of emotion expression condition on inferences of chances to reconciliation (ANCOVA). Results showed that the condemner and the wrongdoer were expected to be more likely to reconcile when the condemner expressed anger ($M = 3.91$, $SD = 0.96$) versus disgust ($M = 3.01$, $SD = 1.04$), $F(1, 221) = 30.74$, $p < .001$, $\eta^2_p = .12$, controlling for the closeness of their relation $F(1, 221) = 14.31$, $p < .001$, $\eta^2_p = .06$ (see Figure 5-a).

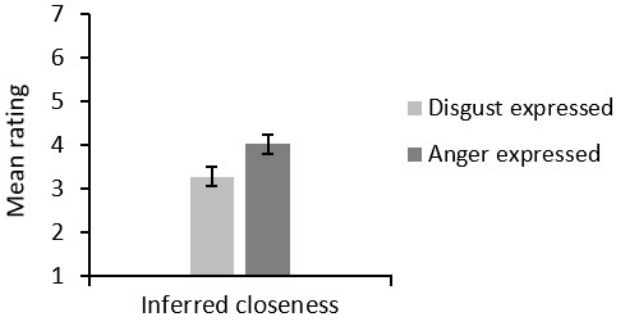

Figure 4. Inferences of Closeness of Social Relationship by Emotion Expression Condition

Note. Error bars represent 95% confidence intervals.

To compare the emotion time course of disgust and anger, a one-way ANOVA with emotion expression condition as a between-subjects factor and ratings of the corresponding emotion "after a few days" as a dependent variable was performed. It showed that participants inferred the same likelihood that the condemner would still feel the emotion after a few days from an expression of disgust ($M = 4.46$, $SD = 1.65$) and anger ($M = 4.23$, $SD = 1.37$), $F(1, 222) = 1.23$, $p = .27$, $\eta^2_p = .006$. Due to high correlation between the ratings of disgust and anger ($r = .80$), we ran a two-way mixed ANOVA with emotion expression condition as a between-subjects factor and emotion time course as a repeated measure (measure of corresponding emotion and covariate emotion; two emotion ratings were designated "corresponding emotion" if they matched the emotion communicated in the condition, and "covariate emotion" if they matched the other emotion). There was no main effect of expression of emotion, $F(1, 222) = 2.46$, $p = .12$, $\eta^2_p = .01$; or interaction between expression and emotion time course, $F(1, 222) = 0.86$, $p = .36$, $\eta^2_p = .004$; but there was a significant main effect of emotion time course, $F(1, 222) = 65.55$, $p < .001$, $\eta^2_p = .23$. As shown in Figure 5-b, in both conditions participants inferred that the condemner is more likely to feel the emotion they expressed than the other emotion.

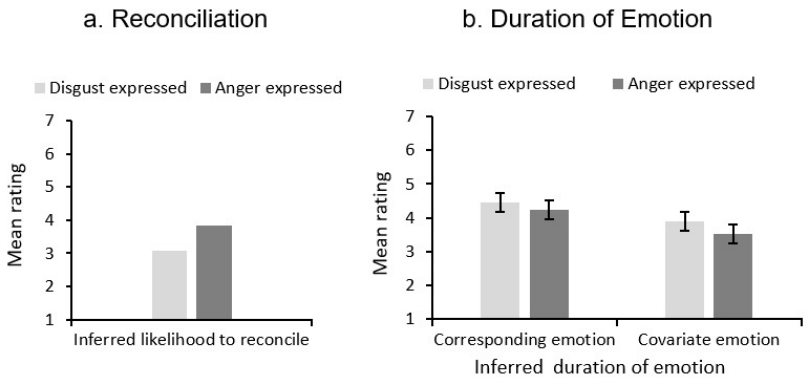

Figure 5. Inferences of Reconciliation and Duration of Emotion, by Emotion Expression Condition

Note. Error bars represent 95% confidence intervals. Figure 5-a shows estimated means after controlling for closeness of the relation.

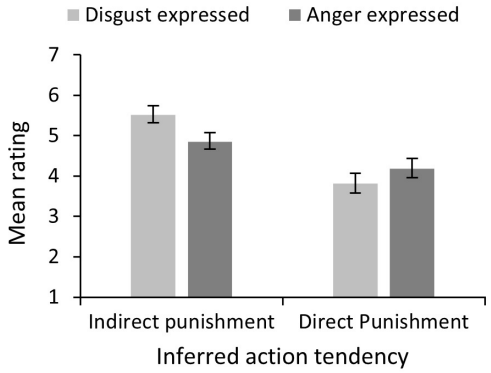

Figure 6. Inferences of Action Tendency by Emotion Expression Condition

Note. Error bars represent 95% confidence intervals.

Action-Tendency Inference (H4)

A two-way mixed ANOVA with emotion as a between-subjects factor and action tendency (direct, indirect) as a within-subjects measure revealed a significant interaction between emotion and action tendency, $F(1, 222) = 20.80$, $p < .001$, $\eta^2_p = .09$, and a main effect of action tendency, $F(1, 222) = 110.87$, $p < .001$, $\eta^2_p = .33$, but no main effect of emotion, $F(1, 222) = 1.52$, $p = .22$, $\eta^2_p = .01$ (See Figure 6). Simple effect tests revealed that in the disgust expression condition, participants inferred the expresser's tendencies to punish the wrongdoer indirectly ($M = 5.53$, $SD = 1.05$) more than directly ($M = 3.83$, $SD = 1.51$), $F(1, 222) = 110.89$, $p < .001$, $\eta^2_p = .33$. In the anger expression condition, indirect punishment ($M = 4.87$, $SD = 1.19$) was also rated more likely than direct punishment ($M = 4.19$, $SD = 1.09$), but the effect size was much smaller relative to disgust, $F(1, 222) = 18.30$, $p < .001$, $\eta^2_p = .08$.

Motive Inference (H5)

There was a significant association between emotion and choice of motive, $\chi^2(1, N = 224) = 7.83$, $p = .005$, Cramer's $V = .19$. Chi-square goodness of fit tests showed that in both emotion expression conditions, participants generally inferred that the condemner was mainly concerned about self-interest rather than morally concerned, but the effect size in the anger expression condition was larger, $\chi^2(1, N = 115) = 43.84$, $p < .001$, Cohen's w = .38, than the disgust expression condition $\chi^2(1, N = 109) = 8.82$, $p < .001$, Cohen's w = .08 (See Figure 7-a).

A two-way mixed ANOVA with emotion as a between-subjects factor and scaled measures of motive as a within-subjects variable showed there was a significant interaction between emotion and motive, $F(1, 222) = 36.15$, $p < .001$, $\eta^2_p = .14$, and a main effect of motive, $F(1, 222) = 30.15$, $p < .001$, $\eta^2_p = .12$, but no main effect of emotion expression, $F(1, 222) = 0.83$, $p = .36$, $\eta^2_p = .00$ (see Figure 7-b). Simple effect tests showed that the expression of anger led participants to infer more self-interested motivation ($M = 5.44$, $SD = 1.10$) than moral motivation ($M = 4.18$, $SD = 1.03$), $F(1, 222) = 67.97$, $p < .001$, $\eta^2_p = .23$, whereas the expression of disgust did not lead participants to rate the condemner's motives as more self-interested ($M = 4.68$, $SD = 1.49$) or more moral ($M = 4.74$, $SD = 0.96$), $F(1, 108) = 0.13$, $p = .72$, $\eta^2_p = .00$. Nonetheless, the expression of disgust was inferred as more morally motivated than anger, $F(1, 222) = 17.62$, $p < .001$, $\eta^2_p = .07$.[2]

Offense-Type Inference (H6)

A two-way mixed ANOVA with emotion expression condition as a between-subjects factor and inferred types of offense as a within-subjects measure revealed main effects of emotion, $F(1, 222) = 34.48$, $p < .001$, $\eta^2_p = .13$, and of-

2 We ran this simple effect test to address curiosity in the review process about the different motives the two emotions communicate, although it was not listed in the analysis plan. For a comparison, the expression of anger versus disgust was inferred as motivated more by self-interest, $F(1, 222) = 18.90$, $p < .001$, $\eta^2_p = .08$.

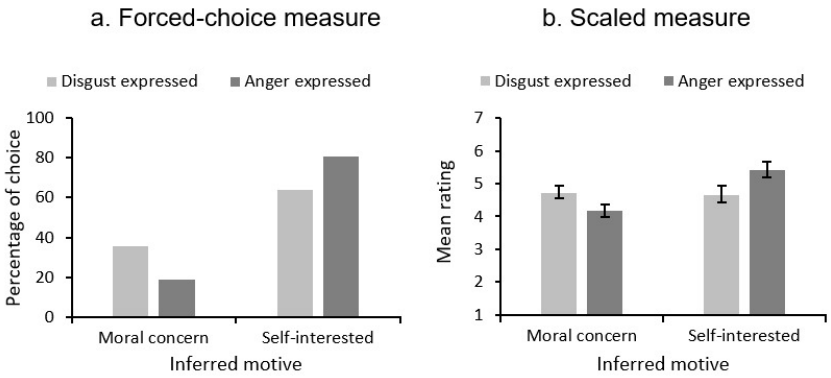

Figure 7. Inferences of Motive by of Emotion Expression Condition

Note. Error bars represent 95% confidence intervals.

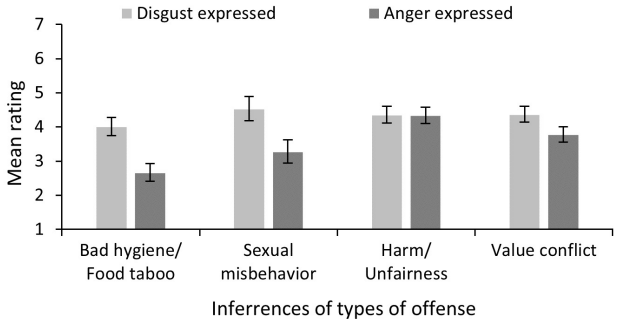

Figure 8. Inferences of Types of Offense by Emotion Expression Condition

Note. Error bars represent 95% confidence intervals.

fense-type inference, $F(2.63, 584.83) = 26.64$, $p < .001$, $\eta^2_p = .11$. There was also a significant interaction between emotion expression and offense type, $F(2.63, 584.83) = 14.06$, $p < .001$, $\eta^2_p = .06$ (See Figure 8).

There were significant simple effects of offense type in both the disgust expression condition, $F(3, 222) = 2.81$, $p = .04$, $\eta^2_p = .04$, and the anger expression condition, $F(3, 222) = 42.83$, $p < .001$, $\eta^2_p = .37$. Pairwise comparisons with Sidak adjustment showed that in the disgust expression condition, participants only inferred that the wrongdoing was more likely to be sexual misbehavior ($M = 4.53$, $SD = 1.96$) than bad hygiene or food-taboo violation ($M = 4.01$, $SD = 1.55$), and all other pairwise comparisons were not significant (value conflict: $M = 4.37$, $SD = 1.21$; harm or unfairness: $M = 4.36$, $SD = 1.42$). In the anger expression condition, all comparisons showed significant differences; harm or unfairness was rated the most likely offense ($M = 4.33$, $SD = 1.17$), followed by value conflict ($M = 3.78$, $SD = 1.24$), sexual misbehavior ($M = 3.28$, $SD = 1.80$), and then bad hygiene or food-taboo violation ($M = 2.67$, $SD = 1.29$), $ps < .05$.

Participants' open-ended responses about what incidents they imagined causing the condemner's emotions showed that the expression of anger was mostly associated with work-related misconduct such as bad-mouthing, taking credit for other's work, lying, stealing, or insulting, but offenses associated with the expression of disgust were more diverse. Besides work-related misconduct, they also reported poor hygiene, violating norms about food, physical abuse, sexual harassment, infidelity, sexism, racism, and homophobia, etc.

Discussion

Experiment 1 showed people made different inferences from observing a colleague expressing disgust versus anger towards an absent person's wrongdoing, largely in line with hypotheses. Specifically, our main hypotheses about disgust's (vs. anger) closer association with bad-moral-character inference were supported: An expression of disgust relative to an expression of anger led people to make inferences that the focus of condemnation was more about the wrongdoer's bad moral character (vs. the harm caused by the wrongdoer), the condemner attributed the wrongdoing more to the wrongdoer's disposition (vs. non-dispositional), and the condemner appealed other people to be warned about the wrongdoer's bad moral character more (vs. to care the harm caused). Collectively, it showed that the emotion of disgust, compared with anger, was more closely associated with evaluation of bad moral character.

Among other significant differences, the two emotions conveyed different information about the expresser's relation with the target of the emotion; participants inferred that the condemner was less close to and less likely to reconcile with the target when they expressed disgust compared with anger. This finding shows that lay people can infer from expressions of disgust vs. anger that the target is more socially distant, which shows an understanding similar to theories and studies of contempt vs. anger (Fischer & Giner-Sorolla, 2016; Fischer & Roseman, 2007). It also echoed Hutcherson and Gross's (2011, Study 4) findings that anger was easier to be defused by reparative acts such as a verifiable apology from the party at fault, but disgust (and contempt) was more difficult to undo.

However, our hypothesis about inferences of duration of emotion was rejected. Fischer and Roseman's studies (2007) showed that intensity of contempt increased over time but anger remained similar, but comparing expressions of disgust and anger, we did not find that people infer the time course of the two emotions differently. We cannot conclude

that this indicates differences among the three emotions, because our experiment used a very different design from Fischer and Roseman (2007) in which participants reported their own emotional experience from a first-person perspective. We studied people's inferences from others' expressions of emotion, and our imaginary scenario provided very limited information. Moreover, our measure of duration of emotion asked about the likelihood that the emotions will remain and not the change in intensity of the emotions, which could also affect the results.

We also conceptually replicated three previous findings on the communication function of disgust and anger. In line with Fan et al., (2023), disgust relative to anger was found signaling stronger tendencies to punish the wrongdoer indirectly such as withdrawal and social exclusion. Replicating Kupfer and Giner-Sorolla's findings (2017), we found that anger communicated more self-interested motives than other-concerned and moral motives. However, our findings showed that disgust did not absolutely communicate more moral motives than self-interested motives, although participants inferred more moral motives from an expression of disgust than anger. Similar to Heerdink et al.'s (2019) findings, we also showed that when the condemner expressed disgust versus anger, participants inferred that the wrongdoing was more likely to be bodily-moral violation. However, their inference about how likely the wrongdoing is about harm or unfairness did not differ between two emotion expressions. It suggests that emotions of anger and disgust do not differ in their function in signaling harm or unfairness if the exact nature of the wrong is ambiguously presented, as in our case.

Interesting findings also came from one of our secondary measures, which found that the condemner's disgust relative to anger was inferred to be more likely to be caused by someone holding different values either from the condemner or the society. Indirectly, this finding is in line with a few other studies supporting the link between disgust and value conflicts. For example, people rated a drink more disgusting after copying a passage from an outgroup religion than an ingroup religion (Ritter & Preston, 2011). Landy et al. (2023) found that people felt more "disgusted" and more "gross" toward faces of male political outgroup members (who voted for Republican / Democrats) than faces of political ingroup members, although more anger was reported towards outgroup versus ingroup members, with even bigger effect size than disgust. Although we speculate that these group-based effects arose because people with different values are presumed to have bad moral character, more evidence is needed.

Experiment 2

Experiment 1 showed that people believe an expresser of disgust relative to an expresser of anger is less likely to reconcile with the target of the emotion. This was in line with Hutcherson and Gross's (2011) findings that disgust towards someone compared with anger is more difficult to be defused, even though disgust is more likely to render reparative acts such as apologizing and making amends. But the measure of reconciliation in Experiment 1 and Hutcherson and Gross's study design (2011) both indicated that the person who was angry or disgusted was the victim. We do not know if the two other-condemning emotions, if described as disinterested, could still signal the same consequences for the expresser.

Using an ambiguous scenario similar to Experiment 1, Experiment 2 additionally manipulated information about whether the target of disgust or anger took reparative actions. This change also made it clear that the expresser of disgust or anger is not the victim, but a third-party condemner. This manipulation would directly test whether a target of disgust or anger taking reparative actions could change participants' inferences about the situation, and their own action tendencies towards the target.

With these changes made, we expected to replicate Experiment 1's findings of moral-character inferences. The same as Experiment 1, this hypothesis would be tested repeatedly via three measures of character inferences (focus of condemnation, attribution of offense, and appeal).

> H1a. (focus measures, replicating Experiment 1) There would be a significant interaction between emotion expression and focus inference. For moral-disgust expressions, inferences would be more about bad moral character of the target condemned than harmful consequences the target caused. But this simple effect in the anger-expression condition would be weaker, or even reversed.
> H1b. (attribution measures, replicating Experiment 1) There would be a significant interaction between emotion expression and attribution inference. People would be more likely to infer that the condemner made more dispositional attribution of the wrongdoing than situational attribution in the disgust condition, and this effect in the anger condition would be weaker or even reversed.
> H1c. (appeal measures, replicating Experiment 1) There would be a significant interaction between emotion expression and appeal inference; in the disgust expression condition, participants would infer that the condemner appealed to other people to be warned about the target's bad moral character, more than to care about the harm caused, and the opposite pattern would be found in the anger expression condition.
> H2. (closeness, replicating Experiment 1) The relationship between the expresser and the target of the emotion would be inferred as less close in the disgust- versus anger-expression condition.

Due to the greater involvement of stable character inferences in disgust, people should presume that the emotion of disgust is resistant to change (see account #3, Introduction). Instead of operationalizing this change resistance as duration of the emotion as we did in Experiment 1, we asked about changes in emotion intensity and character judgment in Experiment 2. Therefore, we hypothesize:

> H3a. (change, mitigation measures; novel) There would be an interaction effect between emotion expression (disgust vs. anger) and the target's reparative acts (present vs absent) on observers' inferences about how likely the expresser's emotion is going to be mitigated, even controlling for the inferred closeness of their re-

lation. When the emotion's target takes reparative actions versus no actions, observers of an expression of anger would infer that the expresser's anger is more likely to be reduced, but observers of an expression of disgust would infer that disgust will be less likely to be mitigated.

H3b. (change, reparation interpretation measures; novel) As a corollary of the H1 and H3a, observers of an expression of disgust versus anger would infer that the expresser is more likely to believe the wrongdoer's reparation is performative and insincere; that is, compatible with bad moral character.

We also expected to replicate Experiment 1's findings about inferences of the expresser's action tendencies.

H4a. (action, replicating Experiment 1). When there is no reparation from the target, there would be a significant interaction between emotion expression and inferred action tendency; participants would infer that the expresser of disgust is more likely to act indirectly than directly towards the target, and their inference about the angry expresser's actions, as in Experiment 1's findings, would show the same direction but with smaller effect size, since the scenario is clear that the expresser is not a direct victim.

Additionally, a wrongdoer's reparative attempts should mollify an angry condemner who cares about the harm caused, but less so for a disgusted condemner who thinks the wrongdoer had bad moral character. Thus, we predict:

H4b (action, novel). There would be a two-way interaction between emotion expression and reparation on action-tendency inference across both direct and indirect types. When the wrongdoer takes reparative actions versus no actions, participants would infer that the expresser of anger is less likely to take direct and indirect actions towards the target, and this effect would be less strong for the expresser of disgust.

Furthermore, people act upon the information they gathered from others' emotions and behaviors. Expressions of condemning emotions could not only influence the target's behavior, but also a third-party observer's behavior. If an expression of disgust signals as a warning of a wrongdoer's bad character, people should be more likely to avoid the target of disgust relative to the target of anger. Moreover, the wrongdoer's reparation should not mitigate this effect of disgust on people's unwillingness to interact with them, at least not as much as when someone expressed anger towards the wrongdoer, because of the bad-character inferences. Thus, we test the following hypotheses.

H4c. (action, avoidance measures, novel) Observers of the expression of disgust versus anger would be more likely to avoid interacting with the target of the emotion.

H4d. (action, avoidance measures, novel) There would be an interaction effect between emotion expression and the target's reparation on observers' avoidance of interaction with the target. In the anger expression condition, the target's reparative actions would lower observers' avoidance tendency toward the target, compared with when no reparation is taken. But this effect would not be seen in the disgust expression condition, at least to a lesser extent.

Design

The experiment used 2 x 2 between-subjects design: emotion expression (disgust vs. anger) and reparation (present vs. absent). Participants were randomly assigned to one of the four conditions, read the corresponding vignette, and then completed the dependent measures. All experimental materials and the in-principle acceptance (IPA) Stage 1 protocol were pre-registered at https://osf.io/4z9qp.[3]

Methods

Participants

Using G*Power 3.1, a-priori power analysis showed that a sample size of 206 is needed to detect a medium-sized effect (η^2_p = .06) as in Cohen (1988) with 95% power in two-way mixed analysis of variance (ANOVA) (emotion expression as a between-subjects factor, and character inference as repeated measures) with alpha at .05. The medium effect size was conservatively decided based on Experiment 1's results (interaction between emotions and character inferences: η^2_p ranged from .08 to .12). As we do not have prior data to decide the effect size of the two-way interaction between emotion expression and reparation on some of the dependent variables, we used a small- to medium-sized effect (η^2_p = .04) for the power analysis. It showed that a sample size of 314 is needed to detect this effect size with 95% power in two-way factorial ANOVA (emotion expression and reparation as between-subjects factors) with alpha at .05.

To allow for approximately 15 percent data exclusion, 363 participants who are fluent in English were recruited on Prolific. Following our registered analysis plan, 35 participants were excluded because (a) they did not agree to a commitment check, (b) their completion time was two median absolute deviation less than the final median completion time, showing nonserious responding (Leys et al., 2013), (c) they failed the manipulation check about whether the vignette mentioned the wrongdoer taking reparative action, indicating inattentiveness, or (d) they did not fully complete the experiment. This resulted in a sample size of 328 (160 males, 165 females, and 3 other, M_{age} = 30.0, *SD* = 9.81).

3 The pre-registration is identical to the Stage 1 IPA protocol, which was archived at https://osf.io/vg3mf/ before data collection. The pre-registration was entered on OSF after data collection due to administrative error.

Scenario

As Experiment 1's minimal-information scenario elicited inferences of harm violations regardless of the emotion expressed, removing a possible confounding factor, we used the same scenario in Experiment 2, with two changes. The first was that we manipulated the information about whether the target of the emotions made reparative actions. This wording we used indicated that the emotion expresser is not a direct victim. The vignette reads as below (word changes for the anger condition in brackets, and the last sentence in brackets will be absent in the no-reparation condition). Secondly, we further improved the design by counterbalancing gender of the expresser, crossed with the other manipulations. The same male face of disgust or anger from the RaFD (Langner et al., 2010) as Experiment 1 was shown, and a female face from the same source was shown when the expresser was described as female.

> You are at work in a job that you have only just started and you are sitting in the breakroom during your break. Two of your colleagues come into the room and sit at the table at the other end of the room. After a few minutes you overhear one of your colleagues talking and, although you do not know them well, you recognize the voices as belonging to your colleagues [Robert or Rose] and Adam.
> You can't hear all of the conversation from where you are but from what you hear, you can tell that they are talking about someone else who has done something wrong. You can tell from [Robert's or Rose's] voice that [he/she] sounds disgusted (angry). A minute later, you overhear the words "I am disgusted (angry)." You decide to glance up at [him/her] and you see [Robert's or Rose's] facial expression as follows.
> (You then overhear Adam says: "I heard he apologized and tried to make up for it.")

Measures

To control nonserious responding, we included a commitment check at the start of the experiment, asking participant to commit to providing thoughtful answers and excluding those who refuse, a method shown to effectively exclude nonserious respondents (Geisen, 2022; also see Aust et al., 2013). For manipulation checks, we asked participants how strongly they think the condemner feels disgusted and angry in the conversation (from 1 = *not at all* to 7 = *very much*), and whether the wrongdoer took reparative action (yes or no) after the vignette. Other measures appeared in the following sequence, which logically proceeds from inferences about the past, to inferences of the future, and ending with the participant's own action tendencies.

Participants were asked to make inferences about the expresser's focus of condemnation, appeal, attribution of the offense, action tendencies, closeness of the relation between the expresser and the target condemned, using the same measures as Experiment 1. Three new measures were included. First, a measure of inferences about the mitigation of the emotions had two items, how likely it is that the expresser's emotion will be reduced, and how strongly they think the expresser will feel disgusted/angry after three days, both on a seven-point scale. The two items were prefaced differently in the reparation and non-reparation conditions: We added "knowing that the target has apologized and tried to compensate" for the reparation conditions and "with the information given in the scenario" for the non-reparation conditions. This second item about emotional intensity after three days was subtracted from the original emotional intensity ratings of the appropriate manipulation check, so that positive values represent mitigation of emotion. Second, in the reparation conditions, four items measured inferences about the expresser's interpretation of the target's reparative acts, such as how likely it is that the expresser thinks the target's apology is sincere, fake, and the target's compensation is just to save their reputation. Third, we measured participants' own avoidant action tendencies towards the target of the emotions both in the reparation and non-reparation conditions. We felt that participants would not see direct action or some forms of indirect action as relevant to their limited knowledge of the situation, but the altercation might still create some doubt in their mind about interacting closely with the target. Three items were used, including how much you would like to avoid working with, to avoid social interaction with the person Robert/Rose condemned, and to collaborate with them on the same project, on a seven-point scale from *not at all* to *very much*.

Reliability analyses showed that the measures of inferred dispositional attribution (α = .83), non-dispositional attribution (Spearman's ρ = .55), closeness of the relation (Spearman's ρ = .54), interpretation of reparation (α = .80), direct punishment (α = .81), indirect punishment (α = .68), and participants' own avoidance tendencies (α = .67) had good reliability. For the scaled measures of appeal inference, the item of appeal to empathy was only moderately correlated with the item of appeal to care (Spearman's ρ = .32), similar to Experiment 1. Therefore, the two items were analyzed separately. The inferred mitigation item had low correlation with the calculated decrease of emotion intensity (Spearman's ρ = .09), and they were analyzed separately too. The correlations between all dependent variables were reported in Table 2.

Results

Manipulation Check

A two-way mixed analysis of variance (ANOVA) with emotion expression condition (anger vs disgust) as a between-subjects factor and ratings of emotional intensity (anger, disgust) as repeated measures was performed to check our manipulation of the condemner's emotional expression. There was no significant main effect of emotion expression on the combined ratings of emotional intensity for disgust and anger, $F(1, 326) = 0.30$, $p = .58$, $\eta^2_p = .00$; or main effect of intensity rating when aggregating across two emotion conditions, $F(1, 326) = 2.86$, $p = .09$, $\eta^2_p = .01$. The interaction between emotion expression and emotion rating was significant, $F(1, 326) = 286.96$, $p < .001$, $\eta^2_p = .47$. We then performed simple effect tests at each emotion level using the pooled error sum of squares (*SSE*) and degrees of

Table 2. Correlations between Dependent Variables, Experiment 2 (*N* = 328)

Dependent variables	1	2	3	4	5	6	7	8	9	10	11	12
1 Character focus												
2 Harm focus	-.17**											
3 Warning appeal	.64***	-.04										
4 Care appeal	.00	.47***	-.02									
5 Empathy appeal	.02	.12*	.05	.29***								
6 Dispositional attribution	.37***	.13*	.39***	.17**	.16**							
7 Non-dispositional attribution	-.23***	.11	-.17**	.01	-.09	-.43***						
8 Closeness of relation	.08	.14*	.11	.18***	.05	.09	.11*					
9 Emotion mitigation	-.23***	.05	-.18***	.00	.04	-.20***	.35***	.06				
10 Emotion intensity decrease	.02	.13*	-.04	.18**	.04	-.18**	.13*	.00	.08			
11 Direct punishment	-.06	.23***	.07	.12*	.07	.23***	.01	.33***	-.09	-.12*		
12 Indirect punishment	.29***	-.01	.26***	.14*	.09	.49***	-.35***	.04	-.27***	-.16**	.28***	
13 Avoidance	.19***	-.03	.21***	.10	-.10	.20***	-.06	.06	-.01	-.05	.09	.18**

Note. *$p < .05$, **$p < .01$, ***$p < .001$.

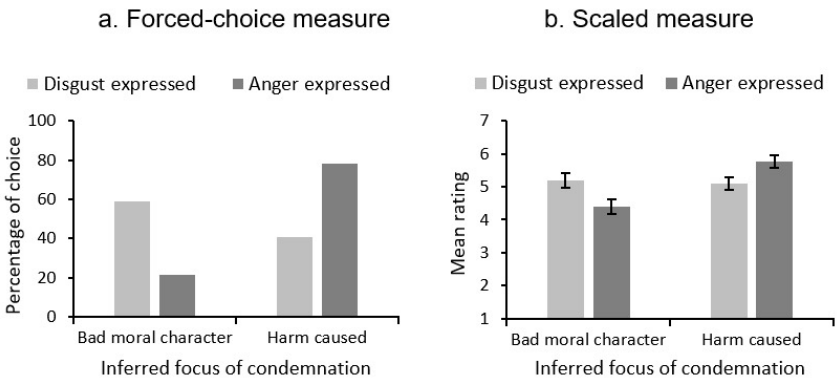

Figure 9. Inferences of Focus of Condemnation by Emotion Expression Condition

Note. Error bars represent 95% confidence intervals.

freedom (*df*) from the overall two-way mixed ANOVA.[4] It showed that in the disgust expression condition, intensity of disgust (M = 6.05, SD = 0.96) was higher than anger (M = 4.88, SD = 1.26), $F(1, 326) = 115.55$, $p < .001$, $\eta^2_p = .26$. and in the anger expression condition, intensity of anger (M = 6.12, SD = 0.92) was rated higher than disgust (M = 4.70, SD = 1.45), $F(1, 326) = 174.62$, $p < .001$, $\eta^2_p = .35$. Therefore, the manipulation of emotional expressions was considered successful.

Moral-Character Inference (H1)

Focus of Condemnation (H1a). A Chi-square test of association between the forced-choice measure of focus inference and emotion expression condition revealed a significant association between the two, $\chi^2(1, N = 328) = 46.88$, $p < .001$, Cramer's V = .38. Chi-square goodness of fit tests showed that participants more frequently inferred that the focus of condemnation was mainly about the wrongdoer's bad moral character in the disgust expression condition, $\chi^2(1, N = 163) = 5.16$, $p = .02$, Cohen's w = .18, but more frequently inferred that the focus of condemnation was mainly about the harm the wrongdoer caused in the anger expression condition, $\chi^2(1, N = 165) = 52.42$, $p < .001$, Cohen's w = .56 (See Figure 9-a).

A two-way mixed ANOVA with emotion expression condition as a between-subjects factor and inferred focus of condemnation (character, harm) as repeated measures showed no main effect of emotion expression on focus inference, $F(1, 326) = 0.44$, $p = .51$, $\eta^2_p = .00$, but a significant main effect of focus inference when aggregating across two emotion conditions, $F(1, 326) = 33.94$, $p < .001$, $\eta^2_p = .09$. There was also a significant interaction between emotion expression and focus inference, $F(1, 326) = 42.86$, $p < .001$, $\eta^2_p = .12$ (see Figure 9-b). To test simple effects of focus inference, we performed a one-way repeated measures ANOVA at each emotion level, using the pooled *SSE* and *df* from the overall analysis. From the expression of disgust, participants did not infer that the focus of condemnation was more likely the wrongdoer's bad moral character (M = 5.18, SD =1.42) than harm caused by the wrongdoer (M = 5.10, SD = 1.28), $F(1, 326) = 0.26$, $p = .61$, $\eta^2_p = .00$. But from the expression of anger, they inferred that the focus of condemnation was more likely harm caused (M = 5.76, SD = 1.18) than bad moral character (M = 4.39, SD = 1.47), $F(1, 326) = 77.01$, $p < .001$, $\eta^2_p = .19$.

Dispositional Attribution (H1b). A Chi-square test of association between the forced-choice measure of attribution inference and emotion expression condition did not show a significant association between the two, $\chi^2(1, N = 328) = 0.28$, $p = .60$, Cramer's V = .03. Chi-square goodness of fit tests showed that participants more frequently inferred that the condemner were more likely to make dispositional attribution than non-dispositional attribution in both the disgust-expression condition, $\chi^2(1, N = 163) = 81.14$, $p < .001$, Cohen's w = .71; and the anger-expression condition, $\chi^2(1, N = 165) = 91.69$, $p < .001$, Cohen's w = .75 (See Figure 10-a).

A two-way mixed ANOVA with emotion expression as a between-subjects factor and scaled measures of attribution inference as a within-subjects variable showed a significant main effect of attribution inference when collapsing across two emotion conditions, $F(1, 326) = 175.29$, $p < .001$, $\eta^2_p = .35$, but no main effect of emotion expression on attribution inference, $F(1, 326) = 0.33$, $p = .57$, $\eta^2_p = .00$, or interaction between emotion expression and attribution inference, $F(1, 326) = 1.62$, $p = .20$, $\eta^2_p = .01$ (see Figure 10-b). Regardless of the emotion expressed, participants inferred that the condemner was more likely to make dispositional attribution to the wrongdoing (disgust condition: M = 4.65, SD = 1.07; anger condition: M = 4.47, SD = 1.23) than non-dispositional attribution (disgust condition: M = 3.07, SD = 1.21; anger condition: M = 3.17, SD = 1.15).

Character Appeal (H1c). A Chi-square test of association between the forced-choice measure of appeal inference and emotion expression condition revealed a significant as-

4 The same method was used for other simple effect tests when not specified.

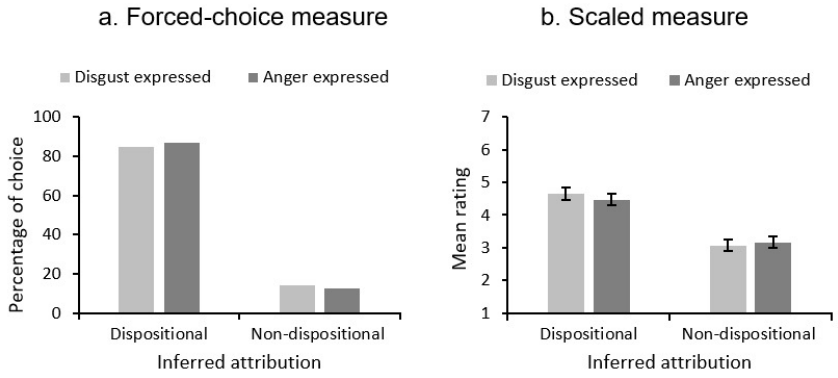

Figure 10. Inferences of Attribution by Emotion Expression Condition

Note. Error bars represent 95% confidence intervals.

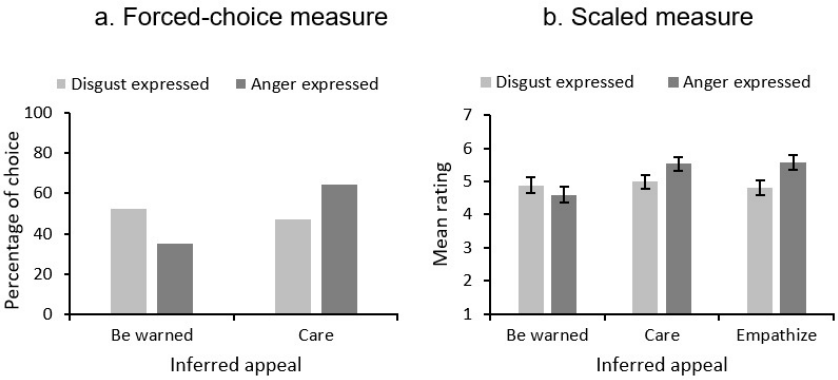

Figure 11. Inferences of Appeal by Emotion Expression Condition

Note. Error bars represent 95% confidence intervals.

sociation between the two, $\chi^2(1, N = 328) = 10.32$, $p = .001$, Cramer's $V = .18$. As shown in Figure 11-a, when disgust was expressed, participants chose the item that the condemner wants to warn other people about the wrongdoer's bad moral character as frequently as the item that the condemner wants other people to care about the harm caused, $\chi^2(1, N = 163) = 0.50$, $p = .48$, Cohen's w = .06, but when anger was expressed, they chose the appeal to care more frequently than to be warned, $\chi^2(1, N = 165) = 14.55$, $p < .001$, Cohen's w = .30.

A two-way mixed ANOVA with emotion expression as a between-subjects factor and scaled measure of appeal inference (warn, care, empathize) as a within-subjects variable showed a main effect of appeal inference when aggregating across emotion conditions, $F(1.91, 621.74) = 14.20$, $p < .001$, $\eta^2_p = .04$; and a main effect of emotion expression on appeal inference, $F(1, 326) = 11.36$, $p < .001$, $\eta^2_p = .03$. There was also a significant interaction between emotion expression and appeal inference, $F(1.91, 621.74) = 13.85$, $p < .001$, $\eta^2_p = .04$ (See Figure 11-b). Simple effect tests using the aforementioned method showed significant differences among the appeal inferences in the angry expression condition, $F(1.91, 621.74) = 27.45$, $p < .001$, $\eta^2_p = .08$, but not in the disgusted expression condition, $F(1.91, 621.74) = 0.76$, $p = .46$, $\eta^2_p = .00$. Pairwise comparisons with Holm adjustment showed that from the angry expressions, participants inferred more appeal to care ($M = 5.53$, $SD = 1.31$) and empathize ($M = 5.57$, $SD = 1.41$) than appeal to be warned ($M = 4.59$, $SD = 1.59$), $ps < .001$; whereas from the disgusted expressions, they did not make different inferences about the three appeal types (to be warned: $M = 4.88$, $SD = 1.46$; care: $M = 4.99$, $SD = 1.32$; and empathize: $M = 4.80$, $SD = 1.48$), ps ranging from .35 to .87.

Inference of Social Relationship Closeness (H2)

A one-way ANOVA test showed that participants inferred a closer relationship between the condemner and the wrongdoer under anger expression ($M = 4.27$, $SD = 1.23$) than disgust expression ($M = 3.61$, $SD = 1.21$), $F(1, 326) = 23.64$, $p < .001$, $\eta^2_p = .07$ (see Figure 12).

Inference of Change (H3)

Inference of Change of Emotion (H3a). As the inferences of change of emotions were measured by both the mitigation item and a calculated decrease of emotional intensity, we performed a two-way ANCOVA for each measure, with emotion expression and reparation as between-subjects factors. Inferred closeness of relation was added in the ANCOVA as a covariate, because it could affect how the expresser's feeling towards the wrongdoer changes.

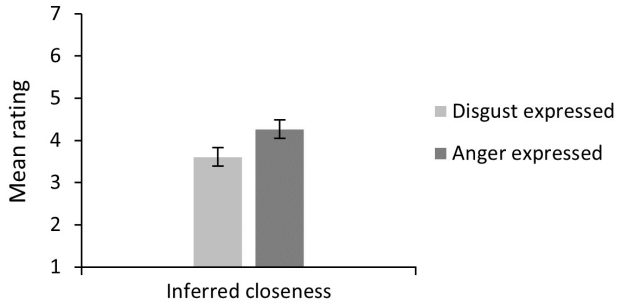

Figure 12. Inferences of Closeness of Social Relationship by Emotion Expression

Note. Error bars represent 95% confidence intervals.

For the measure of inferred mitigation of emotions, the two-way ANCOVA showed that controlling for closeness of the relation, $F(1, 323) = 1.43$, $p = .23$, $\eta^2_p = .00$, there was only a marginally significant main effect of reparation on mitigation of emotion, $F(1, 323) = 3.44$, $p = .06$, $\eta^2_p = .01$. The effect of emotion expression on mitigation of emotion was not significant, $F(1, 323) = 0.03$, $p = .86$, $\eta^2_p = .00$. Neither was the hypothesized interaction between emotion expression and reparation, $F(1, 323) = 2.63$, $p = .11$, $\eta^2_p = .01$ (see Figure 13-a). The rated likelihood of mitigation of emotions was generally higher in the reparation conditions (disgust: $M = 3.77$, $SD = 1.33$; anger: $M = 3.56$, $SD = 1.38$) versus the no reparation conditions (disgust: $M = 3.27$, $SD = 1.38$; anger: $M = 3.52$, $SD = 1.20$).[5]

For the calculated decrease of emotion intensity, the two-way ANCOVA showed that controlling for closeness of the relation, $F(1, 323) = 0.19$, $p = .66$, $\eta^2_p = .00$, there was a main effect of emotion expression on emotion intensity decrease, $F(1, 323) = 3.95$, $p = .05$, $\eta^2_p = .01$, but no main effect of reparation on emotion intensity decrease, $F(1, 323) = 2.39$, $p = .12$, $\eta^2_p = .01$. The interaction between emotion expression and reparation was not significant, $F(1, 323) = 2.56$, $p = .11$, $\eta^2_p = .01$ (see Figure 13-b). However, participants inferred more intensity decrease for disgust when the wrongdoer takes reparative actions ($M = 2.71$, $SD = 1.54$) versus no actions ($M = 2.15$, $SD = 1.60$), but not for anger (reparation condition: $M = 2.76$, $SD = 1.64$; no-reparation conditions: $M = 2.77$, $SD = 1.59$).[6]

Inference of Interpretation of Reparation (H3b). A one-way ANOVA was performed to test the effect of emotion expression on inferred interpretation of reparation in the reparation conditions. Results showed that participants did not infer that the expresser of disgust ($M = 4.94$, $SD = 1.19$) compared to the expresser of anger ($M = 4.93$, $SD = 1.12$) is more likely to believe the wrongdoer's reparation is more performative and insincere, $F(1, 161) = 0.00$, $p = .98$, $\eta^2_p = .00$.

Action-Tendency Inference (H4)

Same as Experiment 1, we performed a two-way mixed ANOVA with emotion expression as a between-subjects factor and action-tendency inference (direct vs. indirect punishment) as repeated measures for the no-reparation conditions (H4a). Results showed a significant main effect of action-tendency inference when aggregating across emotion conditions, $F(1, 163) = 162.17$, $p < .001$, $\eta^2_p = .50$, but no main effect of emotion expression on action-tendency

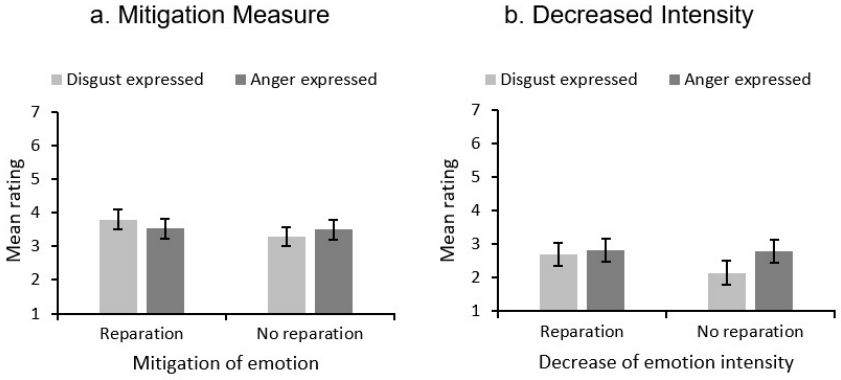

Figure 13. Inferences of Emotion Change by Emotion Expression and Reparation

Note. Error bars represent 95% confidence intervals. Figures show estimated means after controlling for closeness of the relation.

5 Howell (2012, p. 423) suggested that it is common to only look at simple effects if a significant interaction is present, but simple effect tests may be warranted even if the interaction is nonsignificant. Given the noticeable bigger differences for mitigation of disgust (vs. anger) between the two reparation conditions, we ran simple effect tests at each emotion level using the error terms from the overall model. For the disgust expressions, participants inferred the emotion is more likely to be mitigated in the reparation (vs. no reparation) condition, $F(1, 323) = 5.61$, $p = .02$, $\eta^2_p = .02$; whereas for the angry expressions, participants' ratings of mitigation did not differ between the reparation and no reparation conditions, $F(1, 323) = 0.03$, $p = .86$, $\eta^2_p = .00$.

6 For the same reason noted in footnote 5, we ran simple effect tests to examine the effect of reparation on emotion intensity decrease at each emotion level. Results showed that participants expected more decrease of disgust in the reparation (vs. no reparation) condition, $F(1, 323) = 4.71$, $p = .03$, $\eta^2_p = .01$; but not for anger, $F(1, 323) = 0.00$, $p = .98$, $\eta^2_p = .00$.

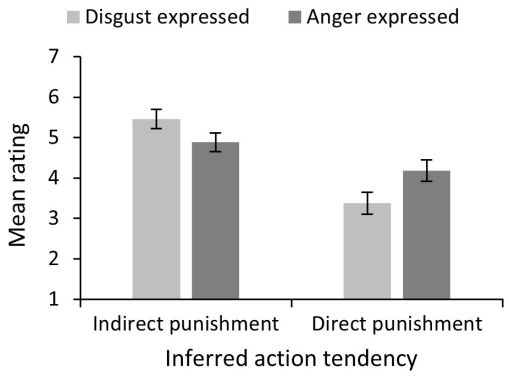

Figure 14. Inferences of Action Tendency by Emotion Expression in No-reparation Conditions

Note. Error bars represent 95% confidence intervals.

inference, $F(1, 163) = 0.66$, $p = .42$, $\eta^2_p = .00$. There was a significant interaction between emotion and action tendency, $F(1, 163) = 40.05$, $p < .001$, $\eta^2_p = .20$ (See Figure 14). Simple effect tests at each emotion level revealed that in the disgust expression condition, participants inferred the expresser is more likely to punish the wrongdoer indirectly ($M = 5.45$, $SD = 1.06$) than directly ($M = 3.37$, $SD = 1.21$), $F(1, 163) = 178.45$, $p < .001$, $\eta^2_p = .52$. In the anger expression condition, indirect punishment ($M = 4.88$, $SD = 1.12$) was also rated as more likely than direct punishment ($M = 4.18$, $SD = 1.27$), but the effect size was much smaller relative to the disgust condition, $F(1, 163) = 20.90$, $p < .001$, $\eta^2_p = .11$.

We then performed a three-way mixed ANOVA, with emotion expression and reparation as two between-subjects factors and action-tendency inference as repeated measures to test H4b. There were only a significant main effect of action-tendency inference when aggregating across all conditions, $F(1, 324) = 269.85$, $p < .001$, $\eta^2_p = .45$, and a significant interaction between emotion expression and action-tendency inference, $F(1, 324) = 54.35$, $p < .001$, $\eta^2_p = .14$. There was no significant main effect of emotion expression, $F(1, 324) = 2.10$, $p = .15$, $\eta^2_p = .01$; or reparation on action-tendency inference, $F(1, 324) = 2.73$, $p = .10$, $\eta^2_p = .01$; or any other two-way or three-way interactions. The hypothesized interaction between emotion expression and reparation was not significant either, $F(1, 324) = 0.16$, $p = .69$, $\eta^2_p = .00$. Across two emotion conditions, participants' ratings of the expresser's action tendency in general were slightly lower in the reparation conditions (anger condition: $M = 4.18$, $SD = 1.52$; disgust condition: $M = 4.39$, $SD = 1.41$) than in the non-reparation conditions (anger condition: reparation: $M = 4.41$, $SD = 1.54$; disgust condition: $M = 4.53$, $SD = 1.24$).

Lastly, we investigated participants' own avoidance tendency. A one-way ANOVA with emotion expression as the between-subjects factor showed that participants' own avoidance tendency did not differ between the disgust condition ($M = 4.01$, $SD = 1.12$) and the anger condition ($M = 3.94$, $SD = 1.06$), $F(1, 326) = 0.37$, $p = .55$, $\eta^2_p = .00$ (H4c). A two-way ANOVA was performed to test the effects of emotion expression and reparation on avoidance tendency (H4d). It showed no main effect of emotion expression, $F(1, 324) = 0.39$, $p = .53$, $\eta^2_p = .00$; or reparation on participants' action tendency, $F(1, 324) = 1.76$, $p = .19$, $\eta^2_p = .01$. The interaction between emotion expression and reparation was also not significant, $F(1, 324) = 0.19$, $p = .66$, $\eta^2_p = .00$. Participants reported similar avoidance tendency across four experimental conditions (anger, reparation: $M = 3.83$, $SD = 1.17$; anger, no reparation: $M = 4.04$, $SD = 0.93$; disgust, reparation: $M = 3.96$, $SD = 1.12$; disgust, no reparation: $M = 4.06$, $SD = 1.14$).

Secondary Analyses of Gender Effects

As gender effects were not primary hypotheses of the experiment, we carried out secondary tests of interactions with the gender counterbalancing factor for each of the ANOVA tests above, following the registered analysis plan. Here we report the results when a significant interaction between gender and any other factor was found.

For the manipulation check, we performed a three-way mixed ANOVA with emotion expression and the expresser's gender as between-subjects factors and emotion intensity rating as repeated measures. Results showed a significant effect of gender on emotion intensity ratings, $F(1, 324) = 4.48$, $p = .04$, $\eta^2_p = .01$; and a significant interaction between emotion expression and gender, $F(1, 324) = 4.65$, $p = .03$, $\eta^2_p = .01$. Simple effect tests at each emotion level using the error terms from the overall three-way mixed ANOVA showed that the female expresser's anger ($M = 5.64$, $SD = 1.40$) was rated as more intense than the male expresser's anger ($M = 5.20$, $SD = 1.39$), $F(1, 324) = 9.17$, $p = .003$, $\eta^2_p = .03$; whereas for the disgust expression, the intensity ratings did not differ between the female ($M = 5.46$, $SD = 1.21$) and male expressers ($M = 5.47$, $SD = 1.31$), $F(1, 324) = 0.00$, $p = .98$, $\eta^2_p = .00$.

For the analysis of inferred focus of condemnation, adding the expresser's gender as another between-subjects factor to the original two-way mixed ANOVA showed a significant interaction between gender and focus inference, $F(1, 324) = 4.24$, $p = .04$, $\eta^2_p = .01$. Simple effect tests for each gender using the error terms from the three-way mixed ANOVA showed that the harm focus item was generally rated higher (male: $M = 5.52$, $SD = 1.26$; female: $M = 5.35$, $SD = 1.28$) than the character focus item (male: $M = 4.61$, $SD = 1.51$; female: $M = 4.96$, $SD = 1.47$), although the effect was stronger for the male expresser, $F(1, 324) = 31.57$, $p < .001$, $\eta^2_p = .09$; compared to the female expresser, $F(1, 324) = 7.07$, $p = .01$, $\eta^2_p = .02$.

We also found gender effects on the calculated decrease of emotion intensity. Adding the expresser's gender as another factor to the original two-way ANCOVA showed a significant interaction between gender and emotion expression, $F(1, 319) = 6.83$, $p = .01$, $\eta^2_p = .02$. Simple effect tests for each gender using the error terms from the three-way ANCOVA showed that for the male expresser, the inferred emotion intensity decrease did not differ between disgust ($M = 2.51$, $SD = 1.57$) and anger ($M = 2.41$, $SD = 1.73$), $F(1, 319) = 0.02$, $p = .89$, $\eta^2_p = .00$; whereas for the female expresser, the inferred intensity of anger decreased more ($M =$

3.17, *SD* = 1.37) than disgust (*M* = 2.36, *SD* = 1.62), $F(1, 319) = 9.79$, $p = .002$, $\eta^2_p = .03$.

Discussion

The character hypothesis of moral disgust was largely supported in Experiment 2, although some results from the three character-relevant measures did not precisely align with the specific hypotheses (H1a-c). For the inferences about the focus of condemnation, the forced-choice measure showed that disgusted expressions led participants to infer that the focus was more about the target's bad character (vs. harm caused), whereas the opposite was found for angry expressions. The scaled measure of focus inference showed the same results for angry expressions, but for disgusted expressions, participants did not infer whether the focus was more about character or harm. Likewise, both the forced-choice and scaled measures of appeal inferences indicated that participants inferred that the expressers of anger want others to care about the harm caused and empathize with them, more than being warned about the target's bad character. But these appeal inferences did not differ for the expressers of disgust. Similar to Experiment 1, both angry and disgusted expressions elicited attributions that were overwhelmingly dispositional (vs. non-dispositional). However, in contrast to Experiment 1, no significant differences were found in the attribution inferences between the two emotion expressions. Taken together, Experiment 2's measures of harm vs. character inference generally showed that while angry expressions more strongly signal harm than bad character, disgusted expressions signal the target's bad character and harm equally.

Besides the central character hypotheses, Experiment 2 replicated Experiment 1's finding that participants inferred a more socially distant relation between the expresser of disgust (vs. anger) and the target of the emotion (H2). It also replicated the finding that although both angry and disgusted expressions signal stronger tendencies to punish the wrongdoer indirectly (vs. directly), the effect size was larger for disgust than anger (H4a).

Nonetheless, we did not find that moral disgust was more resistant to change than anger in people's inferences, in any of the new measures: inferred mitigation of emotion, emotion intensity reduction, and interpretation of the target's reparation (H3a-b). Also, there was no interaction effect between emotion expression and the target's reparation on participants' inferences of the expressers' emotion change. Participants likewise did not infer that the expressers of disgust (vs. anger) are more likely to interpret the target's reparation as performative. The hypotheses about action tendencies involving the new manipulation of reparation, were also not confirmed (H4b-d). Participants did not make different inferences about how reparative action would affect the disgusted (vs. angry) expressers' action tendencies. Participants' own avoidance tendency towards the target of disgust (vs. anger) expressions did not differ, and there was no interaction effect between emotion expression and reparation on participants' avoidance tendency either.

Compared to Experiment 1 which clearly showed that the expression of disgust is more closely associated with bad-character judgment than harm, Experiment 2 also provided support for the character hypothesis of moral disgust, but the evidence was somewhat weaker. Some factors and limitations of the experiment need to be considered when interpreting the results. The two modifications in Experiment 2's design, namely the inclusion of the reparation factor and the counterbalancing of the expresser's gender, might account for the weaker results.

The scenario in Experiment 2 made it clear that the expresser is not a victim, whereas in Experiment 1 this information was open to interpretation, and the reconciliation measure even implied that the expresser is a victim. We speculate that people may draw slightly different inferences from a disgusted or angry expression when it is from a victim versus a third-party condemner. As previously mentioned, anger is more commonly reported in wrongdoings against the self, whereas disgust is more likely when the wrongdoings were disinterested (Hutcherson & Gross, 2011; Molho et al., 2017; Tybur et al., 2020). Thus, people might expect a victim to express anger rather than disgust and a third party to express disgust rather than anger. When a disgusted expression is from a victim (vs. a third party), it may convey stronger condemnation of the wrongdoer's bad moral character.

Furthermore, a third party's emotional responses to a wrongdoing tend to be less strong than when they were a direct victim (for anger particularly, Hutcherson & Gross, 2011). As a result, people might think a third party's expression of anger or disgust as more of a deliberate gesture of condemnation but less of a genuine "read-out" of inner emotional state, making it hard to infer their real thoughts and feelings. This may explain the unexpected results regarding emotion change resistance. When the observers are not sure how the condemner actually feels towards a wrongdoer, it would be hard for them to infer how the emotions would change over time.

The condemner's role as a third party instead of a victim may also be one of the reasons why we did not find any effects from the reparation manipulation on people's inferences about the condemner's interpretation and action tendencies. Reparation from the wrongdoer may have less direct impact on a third party's emotional, attitudinal, and behavioral responses, compared to the victim. Additionally, because we lacked prior data for the power analysis, it is likely that our sample size is not sufficiently large to detect any interaction between emotion expression and reparation, if such effect exists at all.

Another factor to consider was the step of counterbalancing the expresser's gender in Experiment 2. Although it increased the generalizability of the findings it could have potentially increased variance of the measures, reduced effect sizes, and thus resulted in weaker evidence for the character hypothesis of moral disgust. Our secondary analyses of gender effects showed that the expresser's gender influenced participants' emotion perception and inferences. For example, the intensity of anger was rated higher for the female (vs. male) expresser. Regardless of the emo-

tion expressed, participants inferred that the condemnation focused more on harm than on bad character, but the effect was stronger for the male expresser than female. We do not know whether these gender effects were due to the particular four pictures of facial expressions selected from RaFD, as only one picture was presented for each gender and each emotion. An improvement of the experiment, therefore, would be using multiple faces of emotion expressions as stimuli to eliminate confounding effects from one or two particular faces.

We also found that participants' own avoidance tendency toward the target of condemnation did not differ between the disgust and anger conditions. Rather, participants remained neutral about their avoidance tendency in all conditions (mean ratings close to the midpoint of the scale, 4 = *neutral*). In retrospect, we presented the participant's role in the vignette as a newcomer to the company, and we did not mention about in what capacity or how frequently participants may interact with the people involved in the scenario. In such a situation, a person might not feel invested or entitled enough to take any of the actions listed.

General Discussion

The present research systematically examined what information expressions of anger and moral disgust communicate to third-party observers. Based on accounts suggesting differences between elicitors and characteristics of the two emotions, the two experiments tested whether people can reverse-engineer the appraisals and action tendencies underlying moral disgust and anger in a minimal-information workplace scenario.

We found that people indeed drew different inferences from observing disgusted and angry expressions. Our primary hypothesis that a disgusted (vs. angry) expression signals more about the target's bad moral character was evidenced in both experiments. Other accounts about the differences between disgust and anger in social relations, action tendencies, motive, and violation types were also supported as communication features (see Table 1 for a summary). While lending additional support for the aforementioned accounts by showing an impact in people's inferences from emotion expressions, the present research also provides direction for future research on communicative functions of the two other-condemning emotions.

As our experiments employed an ambiguous scenario with minimal descriptions of disgusted and angry expressions, participants had to rely solely on these emotions to make inferences. This design helped eliminate potential confounding factors in the situation that could influence participants' inferences. Nonetheless, we believe it is important to discuss our choices of emotion terms and facial expressions, given the recurring controversies surrounding them in the literature on moral disgust.

Language usage has always been a point of debate for research on moral disgust. As disgust is often conflated with anger in common language, previous research has used various ways to differentiate them in either measurement or stimuli. For example, some used synonyms such as "sickened," "revolted," and "grossed out" to measure disgust (e.g., Nabi, 2002; Sabo & Giner-Sorolla, 2017). When using disgusted expressions as stimuli to test their association with moral disapproval, research has also substituted disgust with more visceral terms such as "gross", "nauseated", "queasy", or "yuck" (Piazza & Landy, 2020).

Although we could have used more viscerally disgusting terminology, we think this kind of substitution needs better justification, and may not be appropriate for studying disgust in sociomoral contexts. As opposed to pathogen, sexual, or bodily-moral disgust, purely sociomoral disgust is not usually associated with visceral reactions such as "grossed out" (Herz & Hinds, 2013; Kollareth & Russell, 2019). Substituting disgust with these terms would have likely changed people's inferences about the nature of the offences in our experiments, making them even more likely to be construed as hygienic or sexual violations than our disgust stimuli already apparently suggested, compared to anger (H6, Experiment 1). Note, however, that even the disgust expressions used in Experiment 1 only raised inferences of sexual and hygiene violations to about the level of harm inferences, not beyond.

Besides words, we used facial expressions of anger and disgust in the stimuli, as previous research has shown that asking participants' endorsement of these facial expressions in measures helps differentiation between the two emotions (e.g., Giner-Sorolla & Chapman, 2017; Molho et al., 2017). The disgust face we used from RaFD consists three action units: AU 9, nose wrinkle; AU 10, upper lip raise; and AU 25, lips apart (Langner et al., 2010).[7] Although widely used in research, this standard disgust face has been criticized for its low recognition and confusion with anger (for a reivew, see J. A. Russell, 1994; also see Jack et al., 2016; Pochedly et al., 2012). Instead, the sick face which shows someone is about to vomit[8] has been suggested as an alternative facial expression of disgust. In recognition tasks, the sick face versus the standard face was endorsed more frequently as disgust and conveyed higher intensity (Widen et al., 2013; also see Cordaro et al., 2020).

We used the standard disgust face, because it may be more applicable in sociomoral contexts compared with the sick face. In Yoder et al.'s (2016) expression-production studies, the sick face was chosen more than the standard disgust face for physical disgust stimuli, whereas the standard disgust face is chosen more for moral disgust stimuli (e.g., bullying, racism, and cheating). A recent study of four

7 This is slightly different from the standard disgust face which only consists of either or both of AU 9 and AU 10 in Ekman and Friesen's (1978) influential facial coding system.

8 The sick face consists of four action units (AU 6, cheeks raised; AU 7, tight eyelids; AU 10, raised upper lip, and AU 26, dropped jaw).

cultural groups (i.e., American, Indian, Japanese and Egyptian) also found that all groups selected the standard disgust face more than the sick face for moral violations (e.g., stealing, betraying, and hypocrisy), whereas all groups except the Egyptian selected the sick face more for pathogen- or sex-relevant elicitors (Kollareth et al., 2022).[9] Indeed, our Experiment 1 found that although participants associated the disgust face with pathogen- or sex-relevant elicitors more than the angry face, the two emotion expressions were equally associated with and harm and unfairness. Moreover, our two experiments established that even between basic minimal expressions of disgust and anger, including both verbal and facial expressions, people could differentiate between the two emotions across multiple inference measures.

Limitations and Future Directions

The present research has some limitations. Firstly, despite the benefits of using an ambiguous scenario in our experiments, whether the results could be generalized to more specific scenarios remains to be seen. In scenarios where the offence is known, people's own judgment of the offence may influence how they interpret disgusted or angry expressions, and in turn, the disgusted or angry expressions may also influence people's judgment of the offence. Hess et al. (2018) presented participants with descriptions of specific violations such as unusual or immoral behavior together with a picture of a witness's facial expressions (e.g., anger, disgust, and neutral), and asked them to judge the immorality and impoliteness of the behavior and rate the anticipated emotion expression intensity. They found a bidirectional relation: The contextual information influenced people's expected intensity of the emotional reactions, and the emotional reactions also influenced people's judgment of the event. For example, unusual behaviors were rated as more immoral and impolite when accompanied by either anger or disgust versus when presented without an emotion expression, suggesting a function of angry and disgusted expressions in providing third parties with a reference of social and moral norms. While keeping in mind the bidirectional influence between context and emotion perceptions, future research could use more concrete violations and more nuanced moral appraisal measures than those we included in the two experiments, to test whether the character hypothesis of moral disgust still stands.

Secondly, although the present research showed different signaling functions of moral disgust and anger, we do not know how these emotional expressions may exert influences on third-party observers. Experiment 2 showed that participants did not report inclination to avoid the target of disgust or anger expressions. But because of the scenario's ambiguity, weak social tie described, and possibly limited behavior measures in the experiment, we cannot conclude that disgusted or angry expressions do not influence a third party's behavior in meaningful ways. From an evolutionary perspective, Tybur et al. (2013, 2018) theorized that the primary function of moral disgust is to coordinate condemnation and punishment from others through expressions of the emotion. Indeed, there is suggestive evidence that indirect punishment motivated by disgust includes gossip about the behavior, which presumably functions to align a social network in condemnation (Molho et al., 2017, 2020; Tybur et al., 2020).To our knowledge though, no empirical work has directly examined how this function is achieved by studying the role of disgust in the coordination of punishment among multiple individuals at once. It is also unclear whether this function is unique to moral disgust (i.e., anger might also be coordinated). Future research is warranted to investigate not only the signal values of moral disgust (vs. anger) but also their impacts on third parties' behavior.

Thirdly, gender differences should be considered in future research on communication function of other-condemning emotions. Our Experiment 2 showed slight differences in how people perceived disgusted and angry expressions from male versus female characters. Similarly, Kupfer and Giner-Sorolla (2017, Study 2) noted stronger effects of emotional expression (anger vs. disgust) on motive inferences for male versus female characters. We do not know whether these differences are due to varied disgust sensitivity between the two genders. Previous research has shown that women generally have higher disgust sensitivity than men, especially in the sexual domain (e.g., Olatunji et al., 2012; Tybur et al., 2011). However, gender norms for emotional expression also make anger a more usual and acceptable emotion for men versus women to express (e.g., Coats & Feldman, 1996; Fischer & Evers, 2010), so it may be that a woman's anger, being less normal, may be perceived differently than a man's. Consequently, it is likely that disgust and anger expressions from men or women may convey distinct information to third-party observers.

Conclusion

While moral disgust and anger often co-occur in response to moral violations, our research showed that expressions of the two emotions convey different information to third-party observers. The primary and novel finding is that disgusted expressions aimed at a person signal the person's bad moral character more strongly than angry expressions, shedding light on the social-functional differences between the two emotions.

Contributions

Contributed to conception and design: Daqing Liu, Roger Giner-Sorolla

9 Both Yoder et al. (2016) and Kollareth et al. (2022) found that the anger face was selected more than the disgust face for moral violations.

Contributed to acquisition of data: Daqing Liu

Contributed to analysis and interpretation of data: Daqing Liu, Roger Giner-Sorolla

Drafted and/or revised the article: Daqing Liu, Roger Giner-Sorolla

Approved the submitted version for publication: Daqing Liu, Roger Giner-Sorolla

Competing Interests

The authors declare no conflicts of interests.

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Data Accessibility Statement

All materials, anonymized data, and code are accessible at https://osf.io/wjvy6/. The approved Stage 1 protocol was archived at https://osf.io/vg3mf/.

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