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The Role of Emotions for Moral Judgments Depends on the Type of Emotion and Moral Scenario

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Abstract

Emotions seem to play a critical role in moral judgment. However, the way in which emotions exert their influence on moral judgments is still poorly understood. This study proposes a novel theoretical approach suggesting that emotions influence moral judgments based on their motivational dimension. We tested the effects of two types of induced emotions with equal valence but with different motivational implications (anger and disgust), and four types of moral scenarios (disgust-related, impersonal, personal, and beliefs) on moral judgments. We hypothesized and found that approach motivation associated with anger would make moral judgments more permissible, while disgust, associated with withdrawal motivation, would make them less permissible. Moreover, these effects varied as a function of the type of scenario: the induced emotions only affected moral judgments concerning impersonal and personal scenarios, while we observed no effects for the other scenarios. These findings suggest that emotions can play an important role in moral judgment, but that their specific effects depend upon the type of emotion induced. Furthermore, induced emotion effects were more prevalent for moral decisions in personal and impersonal scenarios, possibly because these require the performance of an action rather than making an abstract judgment. We conclude that the effects of induced emotions on moral judgments can be predicted by taking their motivational dimension into account. This finding has important implications for moral psychology, as it point towards a previously overlooked mechanism linking emotions to moral judgments.

Keywords: moral judgment, moral psychology, dilemma, approach, withdrawal, emotion.

Over the years, the role of emotions in morality has been the source of large controversies in moral philosophy and psychology. Philosophers have debated whether we should consider our emotional reactions when defining a certain action as morally permissible or not (Hume, 1777/1960; Kant, 1785/1959), while psychologists have traditionally focused on empirical research, in particular a) whether moral judgments stem from intuitions or from conscious reasoning, and b) which psychological processes are involved in moral intuitions (Cushman et al. 2010). Battling on these issues, scholars have neither been able to focus on providing a detailed account of the specific mechanisms through which emotions affect moral judgments nor on the contextual elements favoring the emotional involvement in the production of moral judgments. Providing a better understanding of the interaction between types of emotions with particular types of moral judgments is therefore the main objective of our paper. Furthermore, we will try to delineate some of the circumstances under which moral judgments are more likely to rely on emotional processes.

The two issues mentioned above have been at the core of the moral psychology debate in the last decade. It has been suggested that moral judgments result mainly from intuitions and that these intuitions are of emotional nature (Haidt, 2001; Prinz, 2006; Schnall et al., 2008; Wheatley & Haidt, 2005). Haidt & colleagues, for instance, proposed that moral judgments are largely influenced by our "gut feelings", an idea previously suggested by Hume (1777/1960). To test this, Haidt and colleagues (Schnall et al., 2008; Wheatley & Haidt, 2005) developed a series of moral vignettes describing violations of moral norms that are strongly connected to feelings of disgust. For instance, one of the most representative scenarios describes two siblings who decide to have sexual intercourse. Haidt hypothesized that such a scenario would induce a feeling of disgust in the participants and that this feeling would influence the outcome of their judgment concerning whether the protagonists'

intention is morally permissible. Different techniques were used to induce disgust in several studies, including hypnosis (Wheatley & Haidt, 2005) and disgusting smells (Schnall et al., 2008). These studies showed that the induction of disgust led to more severe moral judgments, supporting the hypothesis that moral judgments are linked to primary emotions, in this case, disgust. Furthermore, Schnall et al. (2008) showed that the effect on moral judgments was specific for disgust and not for other emotions, such as sadness, indicating that disgust is specifically linked to moral judgments related to scenarios that might trigger disgust. For this reason, these types of moral scenarios are labeled *disgust-related* in the present paper.

An alternative theory agrees that moral judgments result from intuitions, but denies any role for emotions in the formation of moral judgments, claiming that moral intuitions result from a moral specific psychological mechanism labeled "universal moral grammar" which focuses mostly on the protagonist's intentions in order to determine whether an action is permissible or not (Hauser, 2006; Huebner et al., 2008; Mikhail 2007). More importantly, the "moral grammar" (for a critique of this theory, see Dupoux & Jacob 2007) is independent of both emotional and cognitive mechanisms. According to this view, emotional and cognitive processes are typically activated *after* a moral judgment has been made. Emotions and reasoning thus have no causal role in determining moral judgments (Hauser, 2006; Huebner et al., 2008). Using personal and impersonal moral scenarios similar to those introduced by Greene et al. (2001) in the moral psychology literature, Cima et al. (2010) provided the strongest evidence against the claim that emotions are related to moral judgments by showing that psychopaths' moral judgments do not differ from those of healthy participants. This has been interpreted as contradictory to the claim that emotions play a role in determining moral judgments, as psychopaths are known to have impaired affective processing (Blair et al., 2005).

To further test the hypothesis that it is the protagonist's intention which determines moral judgments, another type of scenario was introduced (Young et al., 2006, 2010). These scenarios, labeled *beliefs* scenarios here, describe a person knowingly (versus unknowingly) causing a negative outcome (e.g., someone's death), that is, believing that his actions will (versus will not) lead to the negative outcome. The neural networks mostly involved in these types of moral judgments were found to be located in the temporal parietal junction (TPJ), a brain area the authors interpret to subserve false belief judgments (Saxe et al., 2003). In contrast to such a narrow view of a specific role of TPJ in Theory of Mind processing, a more frequent view is that TPJ is more broadly involved in general processes related to mentalizing, detecting multi-sensory integration incongruency (e.g. visual and proprioceptive signals from the body), and orienting attention away from self-related processing (Apperly et al. 2007; Decety & Lamm 2007; Mitchell 2005).

From a third point of view, some scholars try to reconcile the contradictory positions mentioned above. Greene and colleagues proposed a dual-process theory for moral judgments (Greene et al., 2004). They argue in this theory that moral judgments result from multiple psychological systems, claiming that both conscious reasoning and emotions are involved in moral judgments and suggesting that moral intuitions may rely on both affective and cognitive mechanisms. Furthermore, these authors also stressed the point that different moral judgments are underpinned by different psychological systems (Cushman et al. 2010).

Greene et al. (2001, 2004) used functional magnetic resonance imaging (fMRI) to test this theory and to investigate the neural correlates of moral judgments in two moral scenarios Thomson (1986) introduced to the moral philosophy literature. These scenarios represent types of situations in which one person has the possibility to save a greater number of human lives (usually five people) at the expense of harming a smaller number of human lives (usually one person). In order to achieve this, in one case a person has to act on an object or

tool to save lives (e.g., using a switch to deviate a runaway train from its path onto a side-track where only one workman will be killed, to prevent it from killing a group of track workers, thereby acting in a utilitarian way), while in the other case the person has to act directly on another person to save the lives of a greater number of people (e.g., pushing someone from a bridge onto a track to prevent a train from killing a group of track workers). Thus, the scenarios differ with respect to the means by which the goal of saving the group of people is achieved. Typically, this difference leads respondents preferring utilitarian judgments in the first scenario, later labeled *impersonal*, while being less utilitarian in their judgments in the second scenario, labeled *personal* (Greene et al., 2001). The neuroimaging data obtained by Greene and colleagues (2001, 2004) suggested that emotional processes were predominantly active when respondents were making judgments about *personal* moral scenarios, in particular when judging whether it is impermissible to kill a person in order to save others. In contrast, cognitive mechanisms played a more important role when respondents were making judgments about *impersonal* moral judgments and when judging whether it is permissible to sacrifice one life to save a group of people in the *personal* moral scenarios (Greene et al., 2001, 2004, 2008). These results thus show that cognitive mechanisms inform moral judgments based predominantly on an action's consequences (utilitarian judgments), while emotional mechanisms primarily inform moral judgments focusing on the means used to obtain a given outcome (deontological judgments).

In line with these conclusions, several other studies suggest that emotions are indeed strongly involved in personal and less involved in impersonal moral judgments. For example, a behavioral study by Valdesolo and DeSteno (2006), using one personal and one impersonal moral scenario, showed that being in a more positive affective state increased the odds of judging the protagonist's action morally permissible only in the personal moral scenarios. Moreover, lesion patients in a study involving patients with bilateral damage to the

ventromedial prefrontal cortex (vmPFC), a brain area associated with affective valuation processes, judged the actions of protagonists in the personal moral scenarios, but not in the impersonal scenarios, to be morally permissible significantly more often than normal controls (Greene, 2007; Koenigs et al., 2007; Young & Koenigs, 2007). Note however, that the interpretation of the Koenigs et al. findings is not univocal. In fact, while Moll and colleagues (2007) acknowledge that emotions are predominantly involved in personal scenarios, they propose an alternative explanation of these findings, suggesting that the moral judgments of patients with vmPFC lesion differ from those of healthy subjects because the former are unable (or less able) to experience prosocial moral sentiments. They are for this reason more prone to judge moral dilemmas in a more utilitarian fashion and not because they are unable to process emotionally salient information, as Greene (2007) suggests.

Moll and colleagues' interpretation is derived from a fourth theory on moral judgments which suggests that both emotions and conscious reasoning are involved in moral judgments, similarly to Greene's theory. Contrary to the latter, however, which holds that some moral judgments can only entail emotional or cognitive processes, Moll's position suggests that all moral scenarios will involve cognitive and emotional associations competing against each other at the moment of producing the corresponding moral judgment (Moll et al., 2005, 2008).

As the brief literature review makes clear, most of the research investigating the role of emotions for moral judgments focused primarily on the question of whether induced emotion has an effect on moral judgments. Empirical evidence has provided evidence for a role of emotions in moral judgments, speaking against those theories stating no causal role in moral judgments (Cima et al., 2010; Hauser et al., 2006; Huebner et al., 2008). Recently, some attempts have also tried to reconcile the contra posed views (Cushman et al., 2010). The main reasons for these contradictory findings and disagreement can be found in the fact that

no study has systematically compared the interaction between different types of emotions on different types of moral dilemma. The present study aims at taking a first step in filling this gap. To do so, we focused on the motivational dimension of emotions and their differential role on moral judgments typically used in the literature.

Recent research on social cognition has indicated that the effects of emotions on behavior can be better understood if emotions are classified according to their motivational dimension rather than their valence (Forgas, 2003; Harlé & Sanfey, 2010). More specifically, researchers investigating the relationship between motivation and emotion suggest classifying emotions according to approach and withdrawal motivational tendency rather than valence alone (Berkowitz, 2003; Harmon-Jones, 2004; Lang et al., 1997; Spielberg et al., 2008). Approach emotions are those which are more likely to result in behavior involving approaching a certain person, situation or event, while withdrawal emotions rather result in the opposite, namely, withdrawal of persons, situations, or events. Although other dimensions of emotions may be taken into consideration in order to predict their effects on moral decision making (Power and Dalgleish, 2008), we chose the motivational tendency as: a) in order to express their moral judgment on a given behavior, subjects are required to imagine the described action and have to decide whether they would endorse it or not, b) previous research on social decision making has mainly focused on the dimensions of motivational direction and valence. Harle and Sanfey (2010), for instance, predicted differential effects of emotions based on the motivational direction dimension, while others focused on the valence dimension (Schnall et al., 2008; Valdesolo and DeSteno, 2006; and Wheatley and Haidt, 2005). These studies provide a sufficient foundation for making differential predictions regarding how emotions would affect moral judgments if one or the other dimension prevails. In fact, testing two emotions with shared negative valence but opposite motivational

tendencies (anger and disgust) allows us to formulate mutually exclusive predictions on the effect emotions one should expect on moral judgments (as described in detail below).

To unveil whether emotions' motivational dimension is crucial in determining differential effects on moral judgments, the present study was designed to investigate how emotions differing in motivational tendency influence moral judgments and how these effects depend on the type of moral scenario being judged. More specifically, we tested the effects of two primary negative emotions with equal valence but opposite motivational directions: anger (approach motivation) and disgust (withdrawal motivation). Furthermore, to assess whether the effect of induced emotions also depends on the type of moral scenario, this study directly compared moral judgments expressed on four types of moral scenarios. This entailed the inclusion of scenarios where we did not expect emotions to exert an effect on moral judgments. To this end, we used the four types of scenarios most commonly used in the literature and introduced in detail above: disgust-related moral vignettes (Haidt, 2001), impersonal and personal moral scenarios (Greene et al., 2001), and beliefs moral scenarios (Young et al., 2006). As participants were asked to evaluate whether a protagonist's action was permissible in the scenarios, we predicted a differential effect of emotions on moral judgment depending on their motivational direction (approach vs. withdrawal). More specifically, given that approach emotions motivate one to engage in a physical interaction with someone else, approach emotions were expected to increase the number of permissibility judgments. In contrast, disgust should have the opposite effect, as it primes withdrawal action tendencies, resulting in a tendency to refrain from acting on a third party and leading to a decrease in judgments of moral permissibility. Thus, based on our main hypothesis that motivational direction rather than valence determines the effect of emotion on moral judgment, we predicted that anger and disgust – although both negative emotions – would have opposite effects on moral judgments. If, on the other hand, valence alone were

the main determinant of the effects of induced emotions on moral judgments, we would expect to see similar effects for anger and disgust.

Furthermore, we predicted that the observed effects on moral judgments should not only vary as a function of the type of emotion induced but also as a function of the type of moral scenario used. Based on the literature reviewed above, we predicted that emotions would have a stronger influence on moral judgments in the disgust-related and personal scenarios as compared to the impersonal or beliefs scenarios. Furthermore, disgust induction should have an especially strong effect on the disgust-related paradigms if the assumption that these judgments recruit general mechanisms evolved to process primary disgust in the human brain and body (Haidt, 2001) is correct. In contrast, emotions should not have an effect on moral judgments resulting from beliefs scenarios, as these mostly rely on inferences about abstract beliefs and about the protagonist's intentions in the scenario. Accordingly, brain areas such as the temporo-parietal junction (Young et at., 2006, 2010), which have been shown to subserve these types of inferences, are held to be part of domain-general processes (such as detecting incongruency or re-orienting attention; Decety & Lamm 2007). In contrast, brain structures directly associated with affective processing such as the insular cortex or the amygdala (Lamm & Singer, 2010; Singer, 2006), as well as the superior temporal sulcus which has been associated with emotional processing in moral judgments (Moll et al., 2005) do not seem to play a role in making belief inferences.

Finally, previous findings suggest that emotions should affect personal more than impersonal scenarios (Greene et al., 2001, 2004; Koenigs et al., 2007; Valdesolo & DeSteno, 2006; Young & Koenigs, 2007).

Method

We performed two experiments to test our predictions. Experiments 1a and 1b examined the effects of induced disgust on participants' moral judgments assessed using the four types of moral scenarios mentioned above. In Experiment 1a, disgust was induced using a disgusting odor applied with a commercially available odor dispenser as in Schnall et al. (2008) ("fart spray" consisting of ammonium sulfide in water solution, which, when sprayed, results in a disgusting odor). As the results obtained in Experiment 1a did not replicate previous findings suggesting a priming effect of disgust induction on moral judgments (Schnall et al., 2008; Wheatley & Haidt, 2005), we performed another experiment using a different method for inducing disgust in Experiment 1b, where we used video clips with disgusting content, previously effectively used to induce disgust in an fMRI experiment performed by Harrison et al. (2007). In Experiment 2, we tested the effects of anger on moral judgments in the same types of moral scenarios used in Experiments 1a and 1b.

Experiments 1a and 1b

Participants

Fifty-five undergraduate students took part in Experiment 1a (disgust induced via odor). After providing informed consent, participants were randomly assigned to one of two conditions: an experimental condition in which the emotion of disgust was induced (group disgust/odor, $n = 30$, 22 females) and a control condition where no emotion was induced (group disgust/odor-control, $n = 29$, 23 females). One hundred and nine undergraduate students participated in Experiment 1b (disgust induced via video clip). As in Experiment 1a, participants were randomly assigned to one of two conditions: an experimental condition where disgust was induced (group disgust/video, $n = 56$, 42 females) and a control condition (group disgust/video-control, $n = 53$, 38 females). Participants received 20 Swiss francs for participating in these experiments.

Procedure

Emotion Induction

In Experiment 1a, as in Schnall et al. (2008), disgust was induced by means of "fart sprays". Before each experimental session, two consecutive sprays were applied to a trash bag placed below the desk at which participants sat during the experiment. Participants assigned to the control condition where no emotion was induced performed the experiment in an identical room but with a neutral ambient odor. In Experiment 1b, disgust was induced in the experimental group using a 2-minute video clip showing an actor interacting with human vomit (Harrison et al., 2007). The control group viewed a neutral 2-minute video clip of a person describing a painting.

Moral Judgments

Participants read 40 moral scenarios (translated into German), 10 per scenario type: disgust-related, impersonal, personal, and beliefs. For each scenario, they were to answer the question: "Is it morally permissible for the protagonist to do x," to which they answered *yes* or *no* by pressing one of two buttons on the computer keyboard. These scenarios were taken from previous studies: disgust-related moral scenarios from Schnall et al. 2008, personal and impersonal ones from Greene et al. 2008 and 2009, and belief moral scenarios from Young et al. 2006. Of the belief moral scenarios, four described neutral intentions resulting in three neutral outcomes and one negative one, and the other six describing bad intentions, three resulting in neutral outcomes and three in negative ones.

The order of presentation of the types of scenarios was randomized across subjects to exclude any presentation order effects on moral judgments.

Manipulation Checks

At the end of the study, participants reported on an 11-point scale (from *not at all* to *very strongly*) if and how strongly, after the induction, they felt any of the following emotions: anger, disgust, happiness, or sadness. Additionally, to assess possible differences in the decay of emotions over time, participants also reported how strongly they felt these emotions immediately before and after having responded to each moral scenario. Furthermore, participants were also asked to report whether and how strongly the emotion they felt might have influenced their moral judgments in order to assess possible effects of beliefs about the effect of emotions on behavior.

In order to increase the sensitivity of our analyses, we used the results of these rating scales to exclude participants for whom the emotion induction did not work satisfactorily, that is, who did not show the expected affective responses intended by the emotion induction procedures. To be sure that the respective emotion had been successfully induced, participants of a given experimental group had to report an emotion intensity of five or higher (i.e., above the midpoint on the 11-point scale ranging from *not at all* to *very strongly*) for the target emotion (i.e., disgust for the disgust groups, anger for the anger group, see Experiment 2). Participants of the control groups were included in the final analyses only if they reported emotion intensities of below five for all four emotions. In order to fully disclose the data obtained in our study, however, results will be reported for both the selected and the full sample.

Experiment 2

Participants

One hundred and twenty-two undergraduate students took part in Experiment 2 (anger induced via negative feedback). After providing informed consent, participants were randomly assigned to one of two conditions: an experimental condition in which the emotion

of anger was induced (group anger, n = 59, 23 females) and a control condition in which no emotion was induced (group anger-control, n = 63, 28 females). As in Experiments 1a and 1b, participants received 20 Swiss francs for participating in the experiment.

Procedure

Emotion Induction

Giving negative feedback on essays written by participants is a well-established technique for inducing anger (Harmon-Jones & Sigelman, 2001). The technique proposed originally in the mentioned study was slightly modified. First, the participants actually met the other participants who corrected their essays at the beginning of the experiment. Second, every participant had to both write and correct an essay to increase the credibility of the procedure. Furthermore, as pretests had shown that feedback interpreted as neutral was hard to obtain using the original scale, the nine-point feedback scale used in the original version was modified to a scale with only three evaluation categories (negative, neutral, positive).

Participants were given ten minutes to write a short essay discussing one of five controversial topics. One topic, for example, was "should alcoholic drinks be sold to people under 16 years of age." Participants were allowed to decide which topic they wanted to discuss in their essay. After writing their essay, each participant received an essay written by another participant and evaluated it by giving either a negative, neutral, or positive evaluation based on four criteria: rationality, logic, interest, and intelligence. The experimenter then replaced these evaluation forms with pre-prepared evaluation forms used to induce anger, or no emotion, and gave them to the participants. Depending on their group assignment, participants received evaluations that were either negative or neutral on all four criteria. Please note that this procedure may have induced some complex social emotions such as

shame or guilt, which were not controlled for given that our focus here were the effects of induced primary emotions on moral judgments.

Moral Judgments and Manipulation Checks

The procedures for moral judgments and manipulation checks were identical to those used in Experiments 1a and 1b.

Statistical Analysis

The moral judgment data were analyzed using a mixed-design analysis of variance (ANOVA), with the between-subjects factors Group (two factor levels: *experimental group,* in which emotions had been induced, and *control group*, in which no emotions had been induced) and Emotion (two levels: Experiments 1a and b with the emotion of disgust; Experiment 2 with the emotion of anger), and the within-subjects factor Type of scenario (4 factor levels: disgust-related, impersonal, personal, and beliefs). The dependent variable was the sum of permissible responses given for each type of scenario. Data from the experimental and control groups of Experiments 1a and 1b were analyzed together after ensuring that the two groups did not differ significantly (see results).

The self-report data of the manipulation checks were analyzed as follows: In order to assess whether we had successfully induced emotions in the experimental groups, an ANOVA with the between-subjects factors Group and Emotion and the within-subjects factor Affect Rating (4 factor levels: anger, disgust, happiness, sadness) was performed. To establish whether anger and disgust intensity decayed over time and whether they differed with respect to decay, an ANOVA with the between-subjects factor Experimental Group (2 factor levels: disgust group and anger group) and the within-subjects factors Affect Rating (2 factor levels: induced disgust and induced anger) and Decay (2 factor levels: induced emotion

at beginning, induced emotion at end) was performed. Finally, to test whether participants' beliefs about the effects of an induced emotion on their moral judgments varied across emotions, we performed an ANOVA with the between-subjects factor Experimental Group and the within-subjects factor Influence (2 levels: influence of disgust on moral judgments and influence of anger on moral judgments). Violations of the sphericity assumption in ANOVA omnibus tests were corrected using the method proposed by Greenhouse and Geisser. A-priori and post-hoc hypotheses of specific differences between factor levels were assessed using linear contrasts computed with specific error variance terms (Boik, 1981).

More specifically, a first set of planned comparisons assessed whether the emotion inductions were successful, as indicated by the affect ratings of the manipulation checks. To this end, linear contrasts assessed whether the ratings of the target emotion (disgust in Experiments 1a and 1b, anger in Experiment 2) were higher than the mean ratings of the non-target emotions (happiness, sadness, and anger for Experiments 1a and 1b; happiness, sadness, and disgust for Experiment 2). These contrasts were calculated separately for the experimental and control group of Experiments 1a and 1b (pooled) and Experiment 2. To assess whether the intensity of the target emotions (disgust and anger) was equal in the corresponding experimental groups, another linear contrast compared the self-reported intensities (Anger vs. Disgust: Target Emotion Intensity). Similarly, a planned comparison contrasted the self-reported beliefs of the influence of the target emotions on moral judgments (Anger vs. Disgust: Influence) in order to assess the effect of participants' beliefs about the influence of the induced emotions on their moral judgments.

For moral judgments, a linear contrast was computed which tested whether the differences between the experimental groups and their respective control groups differed significantly, irrespective of the type of scenario (formally, corresponding to a contrast (Anger vs. Anger/Control) vs. (Disgust vs. Disgust/Control): mean of all scenarios) to assess

whether the Group*Emotion interaction was driven by anger increasing judgments of moral permissibility and disgust decreasing them. Another linear contrast tested whether the induced emotions affected the disgust-related and the personal scenarios more than the impersonal and beliefs scenarios. This contrast compared the difference in judgments of moral permissibility between the two experimental groups (compared to their respective controls) for the disgust-related and personal scenarios with that difference in the impersonal and beliefs scenarios (i.e., (Anger vs. Anger/Control) vs. (Disgust vs. Disgust/Control): (Disgust-Related and Personal vs. Impersonal and Beliefs). Furthermore, given that our data revealed a different pattern of results, we also tested whether emotions affected the impersonal and the personal scenarios more than the disgust-related and beliefs scenarios. This contrast compared the difference in judgments of moral permissibility between the two experimental groups (compared to their respective controls) for the impersonal and personal scenarios with the difference in the disgust-related and beliefs scenarios (i.e., (Anger vs. Anger/Control) vs. (Disgust vs. Disgust/Control): (Impersonal and Personal vs. Disgust-Related and Beliefs).

In addition, we specifically test whether emotions have an effect on the beliefs scenarios, using another planned comparison that contrasted responses given in the beliefs scenarios, separately for the two emotion inductions ((Anger vs. Anger/Control): Beliefs and (Disgust vs. Disgust/Control): Beliefs). Finally, the last *a priori* contrast tested if induced disgust had an effect on the disgust-related moral scenarios (Disgust vs. Disgust/Control: Disgust-Related).

ANOVAs were performed using SPSS (SPSS Statistics version 17.0) and linear contrasts using Statistica (Stata Soft Statistica version 7).

Results

Applying the exclusion criteria for emotion induction ratings explained above, a sample of 232 participants (143 females; 58 participants excluded) was selected for the analyses, composed of $n = 56$ participants (44 females; 30 participants excluded) in the two disgust groups, $n = 80$ participants in the disgust/control groups (58 females; 2 participants excluded), $n = 42$ participants in the anger group (18 females; 17 participants excluded), and $n = 54$ participants (23 females; 9 participants excluded) in the anger/control group. As an ANOVA with the between-subjects factor Experiment (2 levels: Experiment 1a and Experiment 1b) and the within-subjects factor Type yielded no between-subjects differences ($F < 1$ for the main effect Experiment, F (3, 402) = 39.918, $p < 0.001$ for the main effect Type, and $F < 1$ for the interaction Experiment*Type; full sample: main effect Experiment $F < 1$, F (3, 492) = 47.486, $p < 0.001$ for the main effect Type, and $F < 1$ for the interaction Experiment*Type), data from the experimental and control groups in Experiments 1a and 1b were treated together.

Emotion Induction

– Insert Table 1 here –

As expected, all main effects (Group, Emotion and Affect Rating) as well as the interactions (Group*Emotion and Group*Emotion*Affect Rating) were significant. Furthermore, the interaction Affect Rating*Emotion and Affect Rating*Group were also significant. Table one above provides the full statistical analyses details. An overview of the self-rated emotion intensities for the selected samples can be found in Figure 1 below.

Both methods used to induce disgust in Experiments 1a and 1b resulted in high average ratings of disgust in the full non-selected sample (Experiment 1a: M = 4.76, SEM = .443; Experiment 1b: M = 6.64, SEM = .354) as well as in the selected sample; the latter were obviously higher (Experiment 1a: M = 6.73, SEM = .228; Experiment 1b: M = 7.93, SEM = .235). Therefore, the analyses that follow on the data obtained in Experiments 1a and 1b are collapsed (Experiments 1a and 1b: M = 7.61, SEM = .195; full sample: M = 5.99, SEM = .293).

Linear contrasts (statistics reported in detail in Table 2) revealed the following findings: The linear contrast comparing self-reported values of disgust intensity showed that disgust was felt significantly more strongly in the disgust groups than in their respective control groups. Furthermore, the linear contrast comparing the average ratings of the non-target emotion intensities (anger, happiness, and sadness) did not reveal any significant differences. Additionally, disgust was felt significantly more strongly than the average of the other non-target emotions in the experimental group, as revealed by a linear contrast comparing disgust intensity against the non target emotions' intensities. The disgust/control group was successfully kept in a neutral emotional state as shown by a linear contrast comparing the intensity of each emotion with the mean intensities of the other emotions.

– Insert Table 2 here –

In a similar vein, Experiment 2 revealed that anger was felt more strongly in the experimental group than in the control group, and the target emotion in the experimental group was felt significantly more strongly than the average of the non-target emotions. Note,

however, that an examination of Figure 1 suggested that participants in the experimental group felt moderate levels of sadness. A post-hoc linear contrast computed to assess this observation revealed that sadness was significantly stronger in the anger group than in the control group. More importantly, a further linear contrast revealed that self-reported anger intensity in the experimental group was significantly higher than sadness. Comparing the self-rated intensities of emotions in the anger/control group revealed that no emotion was felt significantly more strongly than the average of the others.

Finally, comparing emotion intensities in the experimental groups across the two experiments revealed that there was no difference in the intensities of the target emotions (disgust and anger).

– Insert Figure 1 here –

Analyses of the decay of the target emotions revealed that emotions were felt more strongly at the beginning than at the end of Experiments 1a, 1b, and 2 (Decay: F (1, 96) = 91.797, $p < 0.001$, $\eta_p^2 = 0.489$; full sample: F (1, 141) = 81.763, $p < 0.001$, $\eta_p^2 = 0.367$). However, the main effects Experimental Group (F (1, 96) = 3.212, $p = 0.076$, $\eta_p^2 = 0.32$; full sample: F (1, 141) = 2.153, $p = 0.144$, $\eta_p^2 = 0.15$), and Affect Rating (F (1, 96) = 2.036, $p < 0.156$, $\eta_p^2 = 0.014$; full sample: F (1, 141) = 2.036, $p = 0.156$, $\eta_p^2 = 0.014$) and the interaction Affect Rating*Decay ($F < 1$; Full sample: $F < 1$) did not reveal any significant differences. The interaction Experimental Group*Decay was not significant either ($F < 1$; full sample: $F < 1$), while the interaction Experimental Group*Affect Rating*Decay was significant (F (1, 96) = 93.384, $p < 0.001$, $\eta_p^2 = 0.493$; full sample F (1, 141) = 100.453, $p < 0.001$, $\eta_p^2 =$

0.416). The linear contrast (anger group vs. disgust group) vs. (induced emotion beginning vs. induced emotion end) showed that the two target emotions did not differ with respect to decay ($F < 1$; full sample $F < 1$). Finally, no general effect of the belief about the influence of induced emotions on moral judgments was revealed (main effect Influence: F (1, 96) = 1.632, $p = 0.205$, $\eta_p^2 = 0.017$; full sample: $F < 1$, and Experimental Group: $F < 1$; full sample: F (1, 141) = l.176, $p = 0.280$, $\eta_p^2 = 0.008$). However, the interaction Experimental Group*Influence (F (1, 96) = 37.566, $p < 0.001$, $\eta_p^2 = 0.281$ (Full Sample F (1, 141) = 40.068, $p < 0.001$, $\eta_p^2 = 0.221$)) was significant, reflecting that participants reported a slightly stronger influence of the induced target emotion on their moral judgments in the anger group than in the disgust group. The influence ratings, however, were comparably low for both groups (disgust influence M = 2.33 SEM = 0.401 and anger influence M = 1.77 SEM = 0.272**;** full sample: disgust influence M = 1.57 SEM = 0.217 and anger influence M = 1.90 SEM = 0.312), and their difference might also reflect presumed differences in influence explained *ex post*, rather than actual influence during judgments.

Moral Judgments

– Insert Table 3 here –

As in the Emotion Induction results section, the full details of the statistical analyses are presented in Tables 3 and 4. Table 3 describes the ANOVA results (Group, Type, and Emotion), while Table 4 shows results of the linear contrasts.

– Insert Figure 2 here –

The main effects of Group and Emotion, and the interactions Group*Type and Type*Emotion, were not significant. However, as expected, we observed a significant interaction Group*Emotion and a significant main effect of Type. Furthermore, the interaction Group*Emotion*Type revealed a tendency to significance at the 10% level (see Table 3). Figure 2 shows an overview of the moral permissibility judgments averaged by group.

– Insert Table 4 here –

The linear contrast assessing whether anger resulted in more judgments of moral permissibility than disgust was significant (see Table 4, first row). Further planned comparisons revealed that, contrary to our expectations, the disgust-related and personal scenarios did not differ significantly from the impersonal and beliefs scenarios (see Table 4, second row). However, the post-hoc comparison of personal and impersonal scenarios to disgust-related and beliefs scenarios revealed a significant difference (see Table 4, third row). They also revealed that neither of the two emotion inductions affected moral judgments in the beliefs scenarios. Contrary to our predictions, no effect of disgust on the disgust-related moral scenarios was found. Figure 3 shows the judgments of moral permissibility averaged by group for each type of moral scenario. Finally, an additional planned comparison revealed that emotions' effect was not stronger for the personal than for the impersonal moral scenarios (see Table 4, fourth row).

– Insert Figure 3 here –

Discussion

The main aim of this study was to investigate the effect of different emotions on different types of moral judgments. More specifically, we predicted that two types of negative emotions differing in the motivational tendency they elicit - approach vs. withdrawal - would have differential effects on different types of moral judgments. The induction of an approach emotion such as anger was expected to increase judgments of moral permissibility, while the induction of a withdrawal emotion such as disgust was expected to decrease them. Indeed, we expected the induction of an approach emotion to augment the participant's predisposition to endorse the action described in the scenarios (e.g., pushing a person off the bridge or pushing a lever) and that they would therefore be inclined to judge such an action as morally permissible. On the contrary, the induction of a withdrawal emotion was expected to reduce the participant's willingness to endorse the described action, resulting in judgment of such actions as not permissible.

Furthermore, we predicted that the judgments of moral permissibility would not only be influenced by the type of emotion induced, but also by the type of scenario for which moral judgments were required. We thus utilized four types of frequently used moral scenarios, namely, disgust-related, impersonal, personal, and beliefs scenarios. Based on the existing evidence, we expected emotions to predominantly influence the disgust-related (Schnall et al., 2008; Wheatley & Haidt, 2005) and personal moral scenarios (Greene et al., 2001, 2004; Koenigs et al., 2007; Valdesolo & DeSteno, 2006; Young & Koenigs, 2007), whereas a weaker effect was expected on the impersonal and beliefs moral scenarios.

The results of the manipulation checks confirmed that a) the emotion induction procedures successfully induced the intended emotions in the experimental groups (see Figure 1; note also that even though our selection criteria were tailored to ensure the general trend of these findings, the analysis of the data of the non-selected sample delivered similar results for the manipulation checks); b) a neutral emotional state predominated in the control groups; c) no relevant differences were found between the experimental groups, neither concerning the decay of emotions over time nor the participants' beliefs about the effect that emotions might have had on their moral judgments. Taken together, the results for the manipulation checks clearly show that our experimental manipulation successfully induced the desired emotional states in participants. The unexpected mild induction of sadness in the anger group is not problematic considering that a) anger was felt significantly more strongly than sadness, suggesting that the main group effects on moral judgments are attributable to the presence of anger and that b) the expected effects of sadness - a withdrawal emotion - on moral judgments might have counteracted the effects exerted by anger. Thus, the size of the effects of anger on moral judgments in the present study might have been underestimated and might be even stronger in the absence of concomitantly induced sadness (which is a withdrawal-related emotion). Finally, as we were primarily interested in the effects of induced basic emotions, we did not control for the induction of other more complex emotions such as guilt or shame, which might have resulted from the anger induction procedure.

The significant interaction of group and emotion confirmed our first hypothesis of an effect of emotion induction on judgments of the permissibility of actions in different types of moral scenarios. More specifically, the tailored comparison of overall judgments of permissibility in the anger versus the disgust conditions confirmed that the former indeed resulted in more judgments of permissibility than the latter. These findings therefore support the hypothesis that motivational tendency is a crucial feature in determining how emotions

affect moral judgments. Thereby, these results directly address the main objective motivating our study, which was to uncover the mechanisms by which emotions exert their influence on moral judgments.

Furthermore, our results also support the prediction that the influence of emotions also depends on the types of moral scenarios in which moral judgments were requested. However, not all of our predictions were confirmed. In one sense, the results confirm that emotion effects are particularly strong for moral judgments in personal moral scenarios, and basically absent for those expressed in belief moral scenarios. Contrary to our predictions, however, emotions influenced moral judgments in the impersonal moral scenarios, and not in the disgust-related ones. The latter observation was particularly surprising, as it stands against previously reported findings (Schnall et al., 2008; Wheatley & Haidt, 2005) suggesting that the emotion of disgust plays a crucial role in moral judgment.

As mentioned, we also did not observe stronger effects of emotions on personal compared to impersonal scenarios (see also Table 4), indicating that the experimental induction of emotions also affects impersonal moral judgments and that emotion induction effects for them are similar in size to those observed for the personal scenarios. This might seem at odds with theoretical arguments in the field of moral psychology suggesting that moral judgments triggered by impersonal scenarios are less likely to entail a spontaneous emotional response than personal scenarios (Greene et al., 2001, 2004; Koenigs et al., 2007; Valdesolo & DeSteno, 2006; Young & Koenigs, 2007). The present results, therefore, point to two possible roles of emotions when judging these two similar types of moral scenarios. While previous research (Greene et al., 2001, 2004) suggests that personal scenarios *spontaneously* recruit affective processes more extensively, experimentally inducing emotions seems to affect judgments in both types of scenarios in a similar way. As a possible

mechanism, we suggest that induced emotions possibly override the tendency of personal scenarios to spontaneously elicit affective states.

The specific effects of emotion induction on impersonal and personal but not disgust and belief moral scenarios observed in our data might be accounted for in several ways. A first explanation could be the fact that when evaluating the personal and impersonal moral scenarios, the subject is asked to evaluate whether it is permissible for him/her to perform the described action from a first-person perspective (e.g., is it permissible for *you* to push a man off the bridge?), while in the disgust-related and belief scenarios the action judged is performed by a third party (e.g. is it permissible for A to bribe B?). Although plausible, this explanation is not totally convincing, as previous findings document that emotions influence moral judgments in both cases, i.e., when the judged action is performed by a third party (Schnall et al., 2008; Wheatley & Haidt, 2006), or when it is performed in first person (Valdesolo & DeSteno, 2006).

In line with Greene et al. (2009) and with our assumption that the impact of emotions on moral judgments may depend on the motivational action tendency of emotions, an alternative explanation for the unexpected effects may be that induced emotions particularly influence moral scenarios entailing a strong *action demand*. In fact, while the personal and impersonal scenarios require one to imagine performing an effortful action, such as pushing a man or a lever, the disgust related and belief scenarios do not require such action imagery. Future studies will have to provide empirical evidence to clarify which features are most likely to drive the observed effects of emotions induction on moral judgments. Additional features such as differences in syntactic or text complexity, response times, familiarity, emotional salience, degree of conflict of each moral scenario will have to be controlled by such investigations as well.

The absence of emotion induction effects on beliefs paradigms is in line with our predictions and with previous findings reporting that the brain areas recruited to make this type of moral judgment are usually associated with detecting multi-sensory integration incongruence (e.g. visual and proprioceptive signals from the body), mentalizing, and re-orienting attention from self- to other-related processing (Decety & Lamm 2007). Furthermore, previous studies investigating moral judgments given during belief scenarios did not find an increase in activation of brain areas directly linked with affective processing during moral judgments (Greene et al., 2001; Moll et al., 2002) or with affective brain networks known to support emotions and empathy (Lamm and Singer, 2010; Singer, 2006; Singer & Lamm, 2009), reported by other studies. However, the lack of an influence of disgust induction on moral judgments for the disgust-related scenarios is surprising given the results of previous studies (Schnall et al., 2008; Wheatley & Haidt, 2005). As possible reasons accounting for this discrepancy between current and previous findings, we can exclude an inefficiency of the chosen disgust induction procedures in Experiments 1a and 1b. Our analyses clearly confirmed that: a) the disgust induction led to reliably stronger subjective reports of feelings of disgust as compared to other emotions in both experiments, as well as to a comparable self-rated emotion intensity as compared to the anger induction, b) the disgust induction did not show any reliable effect on disgust-related moral judgments even for the participants selected on the basis of high emotion induction ratings (see Figure 1), and c) the disgust induction had considerable effects on judgments in two other types of moral scenarios for the same participants (the personal and impersonal scenarios) in both Experiments 1a and 1b.

However, the different response format used in our and in previous studies might explain the discrepancy in results. While participants in the two previous studies showing disgust-related effects (Schnall et al., 2008; Wheatley & Haidt, 2006) were asked to quantify

the wrongness of a moral violation on a scale from zero to one hundred, participants in our experiments were asked to evaluate whether the situation described in the scenario is morally acceptable or not. This may have resulted in a floor effect in the control group, leaving no space to observe a possible effect of disgust on moral judgments. In other words, the reference baseline of judgments of permissibility given by the participants kept in a neutral emotional state in our study might already have been too low to allow for observing an effect of disgust in the disgust-related scenarios. Another possible reason for the different findings may be related to cross-cultural differences. The disgust-related scenarios used in our and previous studies were designed to represent stereotypical violations of US American moral norms and they may have had different effects on the Swiss-German sample investigated in our study.

In summary, our study allows us to draw some important conclusions on the relationship between emotions and moral judgments. First, our results show that experimentally induced emotions play a direct causal role in determining moral judgments, contradicting arguments in moral psychology that emotions are not involved in moral judgments. Second and most importantly, our findings contribute to a better understanding of the mechanisms by which emotions influence moral judgments, showing that action motivational tendencies predict how moral judgments will be influenced by emotions: while anger as an approach emotion increased judgments of moral permissibility, the withdrawal emotion of disgust decreased them. We propose that this effect was modulated by the differences in the action demands implied by moral scenarios. As both impersonal and personal moral scenarios involve stronger action demands compared to disgust-related and beliefs scenarios, the induction of emotions had a stronger influence on the former two.

In conclusion, the present work demonstrates that experimentally induced emotions causally influence moral judgments and that this influence critically depends on the type of

emotion induced and the type of moral scenario evaluated. We believe that the role played by more complex moral emotions such as contempt or indignation also strongly depends on the elements involved in the moral scenarios judged and on the motivational tendencies these complex emotions induce. Our data are compatible with the view that moral judgments result from a combination of both emotional intuitions and reasoning, and that the relevance of each of these mechanisms depends on the moral scenario being evaluated. To get a better understanding of the mechanisms by which emotions influence moral judgments, future studies will have to determine how factors such as valence, motivational tendency of emotions, and action demands of the decisions collaborate in influencing moral judgments. For this, a better taxonomy as well as better standards of normative empirical data on the psycholinguistic, emotional and other variables characterizing the moral scenarios used in research is needed, allowing for a priori classification of the cognitive, affective, and action-related components needed to make judgments about different types of moral scenarios (see also Knutson et al., 2010). Finally, the present study focused only on the role of different types of emotions on moral judgments but ignored moral actions. The observed effects of emotions on moral decision making and behavior may be even stronger when participants are actually required to perform moral actions, and not only to judge their permissibility.

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Tables

Table 1: Summary of the ANOVA results for the self-reported emotion ratings.

	Selected Sample			Full Sample		
ANOVA results	F-value (df)	P Value	η_p^2	F-value (df)	P Value	η_p^2
Group	F (1, 228) = 466.002	< 0.001	0.671	F (1, 282) = 177.562	< 0.001	0.386
Emotion	F (1, 228) = 38.915	< 0.001	0.146	F (1, 282) = 34.921	< 0.001	0.110
Affect Rating	F (3, 684) = 92.928	< 0.001	0.290	F (3, 846) = 92.928	< 0.001	0.290
Group*Emotion	F (1, 228) = 10.03	0.002	0.042	F (1, 282) = 2.199	0.139	0.008
Group*Affect Rating	F (3, 684) = 103.521	< 0.001	0.312	F (3, 846) = 43.402	< 0.001	0.133
Emotion*Affect Rating	F (3, 684) = 150.857	< 0.001	0.398	F (3, 846) = 93.818	< 0.001	0.250
Group*Emotion*Affect Rating	F (3, 684) = 166.228	< 0.001	0.422	F (3, 846) = 79.525	< 0.001	0.220

Table 2: Summary of the statistics for analyses of the self-reported emotion ratings assessed by means of linear contrasts. Capital letters abbreviations A, AC, D, and DC refer to the Anger, Anger/Control, Disgust, and Disgust/Control groups respectively. Non-capital letters abbreviations a.i., d.i., h.i., and s.i. refer to induced emotion intensity, respectively: anger intensity, disgust intensity, happiness intensity, and sadness intensity.

	Selected Sample		Full Sample	
Linear contrasts	F-value (df)	P Value	F-value (df)	P Value
D vs. DC: d.i.	F (1,228) = 531.837	< 0.001	F (1,282) = 263.497	< 0.001
D vs. DC: a.i., h.i, s.i.	F (1,228) = 1.753	0.187	F < 1	-
D: d.i. vs. a.i., h.i., s.i.	F (1,228) = 631.186	< 0.001	F (1,282) = 430.289	< 0.001
DC: d.i. vs. a.i., h.i., s.i.	F < 1	-	F < 1	-
DC: a.i. vs. d.i., h.i., s.i.	F (1,228) = 2.04	0.155	F (1,282) = 1.018	0.314
DC: h.i. vs. d.i., a.i., s.i.	F (1,228) = 1.731	0.19	F < 1	-
DC: s.i. vs. d.i., a.i., h.i.	F < 1	-	F < 1	-
A vs. AC: a.i.	F (1,228) = 638.529	< 0.001	F (1,282) = 153.656	< 0.001
A vs. AC: d.i., h.i, s.i.	F (1,228) = 1.753	0.187	F (1,282) = 1.006	0.317
A vs. AC: s.i.	F (1,228) = 44.485	< 0.001	F (1,282) = 42.826	< 0.001
A: a.i. vs. d.i., h.i., s.i.	F (1,228) = 644.232	< 0.001	F (1,282) = 256.7	< 0.001
A: a.i. vs. s.i.	F (1,228) = 141.415	< 0.001	F (1,282) = 80.142	< 0.001
AC: a.i. vs. d.i., h.i., s.i.	F (1,228) = 2.04	0.155	F (1,282) = 3.19	0.075
AC: a.i. vs. a.i., h.i., s.i.	F < 1	-	F < 1	-
AC: h.i. vs. a.i., a.i., s.i.	F (1,228) = 1.731	0.19	F (1,282) = 1.29	0.256
AC: s.i. vs. a.i., a.i., h.i.	F < 1	-	F < 1	-
A: a.i. vs. D: d.i.	F < 1	-	F < 1	-

Table 3: Summary of the ANOVA results for the analyses of moral judgments.

	Selected Sample			Full Sample		
ANOVA results	F-value (df)	P Value	η_p^2	F-value (df)	P Value	η_p^2
Group	F < 1	-	-	F (1,282) = 2.38	0.124	0.080
Emotion	F (1,228) = 2.95	0.085	0.130	F (1,282) = 3.983	0.047	0.140
Type	F (3,684) = 70.428	< 0.001	0.236	F (3,846) = 98.269	< 0.001	0.258
Group*Emotion	F (1,228) = 6.989	0.009	0.030	F (1,282) = 2.199	0.139	0.008
Group*Type	F < 1	-	-	F < 1	-	-
Emotion*Type	F (3,684) = 1.756	0.164	0.080	F (3, 846) = 1.108	0.340	0.040
Group*Emotion*Type	F (3, 684) = 2.45	0.073	0.011	F (3,846) = 2.218	0.095	0.008

Table 4: Summary of the statistics for analyses of the moral judgments assessed by means of linear contrasts. As in Table 1 capital letter abbreviations refer to each group respectively. Non-capital abbreviations, b, dr, i, and p, refer to the type of moral dilemma, respectively: beliefs, disgust-related, impersonal and personal.

	Selected Sample		Full Sample	
Linear contrasts	F-value (df)	P Value	F-value (df)	P Value
(A vs. AC) vs. (D vs. DC): mean (dr, i, p, b)	F (1,228) = 6.989	0.009	F (1,282) = 7.909	0.005
(A vs. AC) vs. (D vs. DC): mean (dr, p) vs. (i, b)	F (1,228) = 3.532	0.199	F (1, 282) = 2.136	0.145
(A vs. AC) vs. (D vs. DC): mean (i, p) vs. (dr, b)	F (1,228) = 4.140	0.043	F (1,282) = 3.138	0.070
(A vs. AC) vs. (D vs. DC): mean (i) vs. (p)	F < 1		F < 1	-
A vs. AC: b	F < 1	-	F < 1	-
D vs. DC: b	F < 1	-	F < 1	-
D vs. DC: dr	F < 2	-	F < 1	-

Figure Captions

Figure 1 Self-reported emotion intensity (M +/- SEM) for the selected participants in the experimental and control groups. Ratings were provided on a scale from 0 (*not at all*) to 10 (*extremely*) in response to the question "How strongly did you feel this emotion?"

Figure 2 Mean (+/- SEM) of affirmative judgments of moral permissibility summed over all forty moral judgments, in response to the question "Is it morally permissible for the protagonist to do x,".

Figure 3 Mean (+/- SEM) of affirmative judgments of moral permissibility separated by the four types of moral scenarios, with 10 judgments each.

Figures

Figure 1

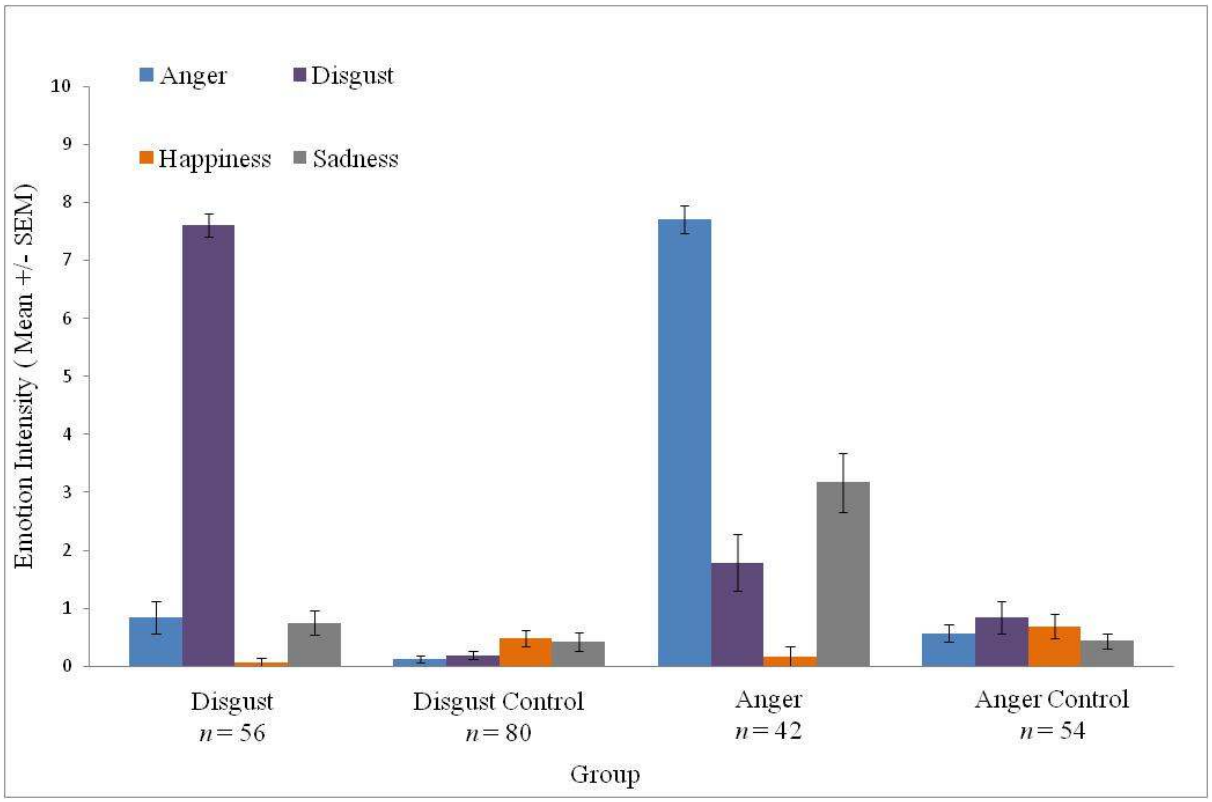


Figure 2

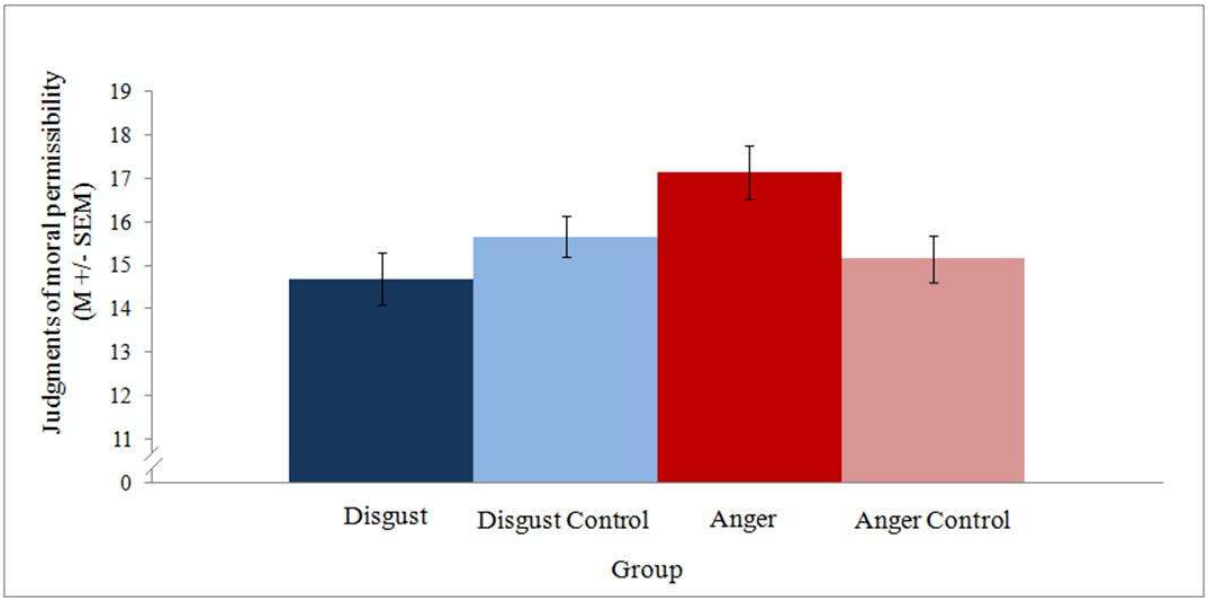
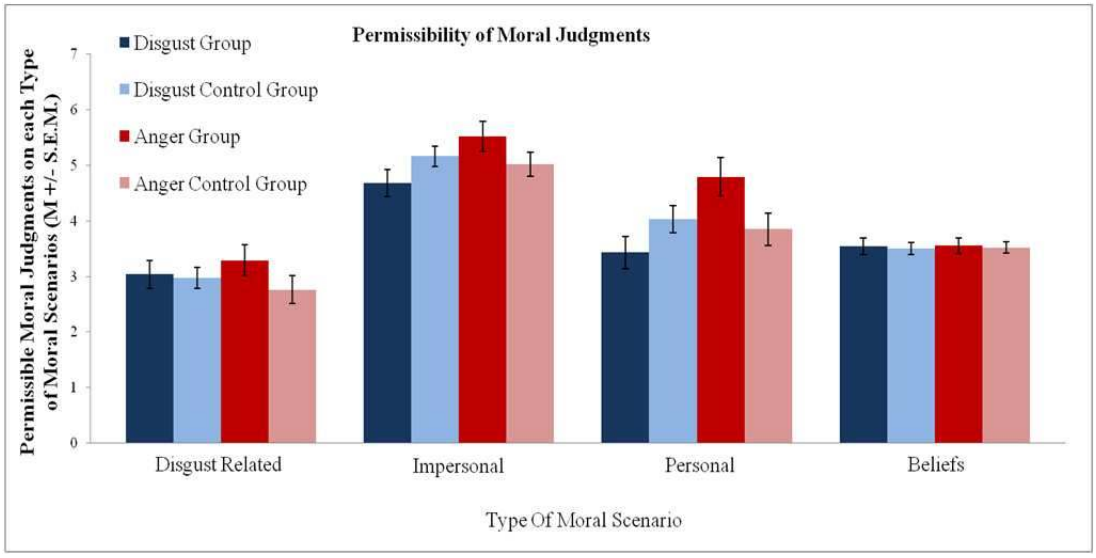

Judgments of moral permissibility (M +/- SEM)
19
18
17
16
15
14
13
12
11
0
Disgust
Disgust Control
Anger
Anger Control
Group

Figure 3


Permissibility of Moral Judgments
Disgust Group
Disgust Control Group
Anger Group
Anger Control Group
Permissible Moral Judgments on each Type of Moral Scenarios (M +/- S.E.M.)
0
1
2
3
4
5
6
7
Disgust Related
Impersonal
Personal
Beliefs
Type Of Moral Scenario