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## Disgust as Embodied Moral Judgment

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### Abstract

How, and for whom, does disgust influence moral judgment? In 4 experiments participants made moral judgments while experiencing extraneous feelings of disgust. Disgust was induced in Experiment 1 by exposure to a bad smell, in Experiment 2 by working in a disgusting room, in Experiment 3 by recalling a physically disgusting experience, and in Experiment 4 through a video induction. In each case, the results showed that disgust can increase the severity of moral judgments relative to controls. Experiment 4 found that disgust had a different effect on moral judgment than did sadness. In addition, Experiments 2-4 showed that the role of disgust in severity of moral judgments depends on participants' sensitivity to their own bodily sensations. Taken together, these data indicate the importance - and specificity - of gut feelings in moral judgments.

### Keywords

Disgust; Emotion; Morality; Embodiment; Embodied Cognition

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The grand tradition of moral philosophy has generally extolled the virtues of reason. For instance, Immanuel Kant (1785/1959) urged people to apply the categorical imperative; that is, to act only in such a way that one could consistently will that the principle guiding one's actions be widely adopted by other people. The utilitarian tradition (e.g., J. S. Mill) offered a method of calculating the correct course of action based on expected utility. Yet against this backdrop of rationalism, there have been occasional voices suggesting that people rely on affective intuitions. David Hume, for example, wrote that "morality is determined by sentiment. It defines virtue to be whatever mental action or quality gives to a spectator the pleasing sentiment of approbation; and vice the contrary (Hume, 1777/1960, p. 129)." More recently the bioethicist Leon Kass (1997) has written about "the wisdom of repugnance." He urges policymakers and the public to avoid judging technological innovations such as cloning on purely utilitarian grounds; rather, people should take into account their feelings of disgust, for such feelings tell us about boundaries that we should not cross.

In this paper we cannot say whether people *ought* to follow their feelings of disgust; we are concerned with whether they actually *do* use such feelings to guide their judgments, and the

limiting conditions upon such use. However, philosophers who argue for the importance of “psychological realism” in ethics say that philosophers must know the psychological facts before they can issue normative guidance (Flanagan, 1991). There are several good reasons for supposing that disgust does in fact shape moral judgments, even when it is extraneous to the action being judged.

The social intuitionist model of moral judgment (Haidt, 2001) builds on the insights of Hume to suggest that moral judgment is generally a result of quick gut feelings, much like aesthetic judgment. Moral reasoning plays several roles in the model: people search for reasons to justify their quick intuitive responses; people use reasoning to share their judgments with others and persuade them to agree; and people rely on reasoning when they have no initial intuition, or when they have conflicting intuitions. So moral reasoning is an important part of moral life, but for most people, most of the time, most of the action is in the quick, automatic, affective evaluations they make of people and events (see Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Bargh & Chartrand, 1999).

The notion that affective processes influence judgments and evaluations has also been systematically investigated within the affect-as-information framework (Schwarz & Clore, 1983, 1988). Affective feelings provide information about the momentary value of objects and situations. When making evaluative judgments, people attend to their own feelings, as if asking themselves: How do I feel about it? Thus, consistent with Hume’s statement above, people generally like what they feel good about and dislike what they feel bad about. As a consequence, affective feelings have been shown to influence ratings of life satisfaction (Schwarz & Clore, 1983), estimates of risk (Gasper & Clore, 1998; Loewenstein, Weber, Hsee, & Welch, 2001), and other evaluative judgments (e.g., Esses & Zanna, 1995; Forgas, Bower, & Krantz, 1984; Forgas & Moylan, 1991; Keltner, Locke, & Audrain, 1993; Ottati & Isbell, 1996).

## Disgust and Embodied Cognition

Experimental work on the role of affect on judgment has often focused on general inductions of positive and negative mood (Schwarz & Clore, 1983, 1988), with additional studies addressing specific emotions such as fear (Lerner & Keltner, 2001; Loewenstein et al., 2001) and anger (Bodenhausen, Shepard, & Kramer, 1994; DeSteno, Petty, Wegener, & Rucker, 2000; Keltner, Ellsworth, & Edwards, 1993; Lerner & Keltner, 2001), and disgust (Lerner, Small, and Loewenstein, 2004; Wheatley & Haidt, 2005).

Disgust evolved to help our omnivorous species decide what to eat in a world full of parasites and microbes that spread by physical contact (Rozin & Fallon, 1987; Rozin, Haidt, & McCauley, 2000). Disgust indicates that a substance either should be avoided, or, if ingestion has already occurred, should be expelled. Although disgust evolved as a food-related emotion, it was well suited for use as an emotion of social rejection. Across many cultures, the words and facial expressions used to reject physically disgusting things are also used to reject certain kinds of socially inappropriate people and behaviors, some that involve the inappropriate use of the body (e.g., cannibalism, pedophilia, torture), others that do not (e.g., hypocrisy, fawning, betrayal) (Haidt et al., 1997). However, as with other emotions, feelings of disgust can be transferred to objects for which they are irrelevant. Indeed, Lerner et al. (2004) showed that relative to being in a neutral mood, experimentally induced feelings of disgust reduced the amount of money participants were willing to pay for certain objects.

Feelings of disgust fit particularly well into approaches that see emotion and cognition as fundamentally embodied (e.g., Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005; Prinz, 2004). More than any other emotion, disgust feels like a “gut” feeling, and

because of its link to nausea, disgust may be the most effective emotion at triggering the gastro-enteric nervous system. It also fits well into theories such as Damasio's (1994) somatic marker hypothesis. On this view, bodily reactions to real events (e.g., nausea, arousal) come to be so well learned that whenever people merely think about a similar situation, they get an "as-if" reaction in the parts of their brains that control or sense those reactions. These flashes of affect then guide behavior and judgment.

One study used hypnosis to directly implant somatic markers of disgust. Wheatley and Haidt (2005) gave a post-hypnotic suggestion to highly hypnotizable participants to feel a flash of disgust to an arbitrary word ("take" or "often"). These hypnotic disgust words were sometimes embedded in short moral judgment vignettes. In two experiments, the presence of a hypnotic disgust word made moral judgments more severe. In an unexpected finding, the presence of a hypnotic disgust word in a story that contained no transgression caused one third of the participants to rate the action as somewhat morally wrong, even when they could find no reason whatsoever to back up their condemnation. In these cases it appears that affective intuitions are leading people astray.

In the current research, we examined the disgust-morality connection in a different way. Using four distinct ways of inducing disgust, we addressed the following questions: First, are all moral judgments influenced by disgust or only those that contain actions involving physical disgust? Second, are other, non-moral judgments affected as well? Third, is the effect driven by emotional feelings or activated concepts of disgust? And fourth, does any negative emotion (e.g., sadness) make moral judgments more severe, or is there something special about disgust?

## Experiment 1

As a first step, we conducted a conceptual replication of the Wheatley and Haidt (2005) study, using a different method. Inspired by demonstrations that smells can have subtle but powerful effects on cognitive processes (Holland, Hendriks & Aarts, 2005; Rotton, 1983), we exposed some participants to a disgusting smell—a commercially available "fart spray"—while they made moral judgments.

### Method

**Participants**—One-hundred twenty-seven Stanford students (55 male) participated individually in an outdoor setting in exchange for candy. Only students who were passing through the area (as opposed to stationary individuals who might have observed others participating) were recruited. Five participants were excluded from analysis due to non-compliance with instructions, and 2 were excluded due to guessing of the experimental hypothesis, leaving 40 participants in each condition.

### Materials

The fart spray (purchased at [www.forumnovelties.com](http://www.forumnovelties.com)) consisted of ammonium sulfide in a water solution. When the solution is sprayed, hydrogen sulfide, a component of flatulence, is released alongside ammonia. The resultant odor is unpleasant but harmless at low levels.

### Procedure

**Odor manipulation**—Participants were randomly assigned to one of three conditions differing in the level of disgusting odor present. The conditions were identical except for the quantity of fart spray applied to the bag lining a trash bucket hidden approximately 6 feet from the participant. In the control condition, no fart spray was present; in the mild-stink condition, four sprays were applied to the bag; in the strong-stink condition, eight sprays

were applied to the bag. The bag was replaced after testing each participant, and used bags were sealed and deposited into a larger receptacle situated over 100 feet from the study location. Before applying fart spray to a newly placed trash bag—or, in the control condition, testing a participant without any fart spray application—the experimenter waited for an additional interval of 3 minutes to allow for any lingering odor to dissipate. Pre-testing revealed that the fart spray odor retained its pungency in the testing area for as long as the treated bag was present.

**Moral judgments**—Using seven-point Likert scales, participants responded to four vignettes related to moral judgments (see Appendix for vignettes and scales). The four items gauged participants' support for the legalization of marriage between first cousins (*Marriage*), approval of sex between first cousins (*Sex*), moral judgments of driving rather than walking to work (*Driving*), and approval of a studio's decision to release a morally controversial film (*Film*). *Marriage* and *Sex* represented scenarios that, according to pre-testing, tended to elicit substantial disgust from control participants. *Driving* and *Film* represented scenarios that, according to pre-testing, tended to elicit little disgust from control participants<sup>1</sup>. Thus, variation in the results obtained for the two types of vignettes might suggest limitations or moderators of the relationship between induced disgust and moral judgments.

**Manipulation checks**—Following the moral-judgment items, participants indicated on seven-point Likert scales (1) how disgusted they currently felt (from “not at all disgusted” to “extremely disgusted”); (2) whether they were consciously aware of any unpleasant odor *while* they were answering the moral judgment questions, and if so, how much the odor bothered them (from “didn't notice any smell” to “stench completely nauseated me”); (3) how much they thought that any environmental odor affected their answers to the moral judgment questions (from “didn't affect my answers at all” to “strongly affected my answers”—this item was not a manipulation check); and (4) whether they could, *at present*, detect any unpleasant odor, and if so, how much the odor bothered them (from “no smell detectable” to “extremely nauseating stench”).

## Results

Unless otherwise noted, one-way analyses of variance (ANOVAs) were used with condition (control, mild-stink, strong-stink) as the independent variable. Whenever omnibus ANOVAs yielded significant results, they were followed by pairwise comparisons of means using Tukey's HSD tests.

**Manipulation Checks**—Self-reported disgust varied significantly as a function of condition,  $F(2, 117) = 13.69, p < .001, \eta_p^2 = 0.19$ . Post-hoc tests revealed that strong-stink participants reported feeling significantly more disgusted ( $M = 2.38, SD = 1.31$ ) than did mild-stink ( $M = 1.50, SD = 0.78$ ) or control ( $M = 1.33, SD = 0.66$ ) participants. Contrary to prediction, mild-stink participants' disgust levels did not differ significantly from those of control participants.

Self-reported conscious awareness of an unpleasant odor *during* the moral judgments phase varied significantly as a function of condition,  $F(2, 117) = 41.01, p < .001, \eta_p^2 = 0.31$ . Post-hoc tests revealed that strong-stink participants were significantly more bothered by an unpleasant odor during the moral judgments ( $M = 3.13, SD = 0.20$ ) than were mild-stink

<sup>1</sup>Hereafter, for brevity, we refer to scenarios that elicit substantial disgust from control individuals as “involving disgust” or “disgusting,” and those that do not elicit disgust from controls as “not involving disgust” or “not disgusting.” Analogous operationalizations for the labels “moral” and “non-moral” (scenarios that control individuals consider moral vs. non-moral) in Experiment 2 allow us to avoid any prescriptive assumptions about the scope of the moral domain.

participants ( $M = 2.13$ ,  $SD = 0.20$ ), who in turn were significantly more bothered by an odor than were control participants ( $M = 1.10$ ,  $SD = 0.20$ ). In each condition, only one or two participants (out of 40) believed that their moral judgments had been affected at all by any environmental odor present.

Self-reported awareness of an unpleasant odor *at present*—that is, after participants had been cued to try to detect an odor in their environment—also varied significantly as a function of condition,  $F(2, 117) = 56.30$ ,  $p < .001$ ,  $\eta_p^2 = 0.49$ . Post-hoc tests revealed that strong-stink participants were significantly more bothered by an unpleasant odor at present ( $M = 3.80$ ,  $SD = 1.51$ ) than were mild-stink participants ( $M = 2.38$ ,  $SD = 1.05$ ), who in turn were significantly more bothered by an odor than were control participants ( $M = 1.18$ ,  $SD = 0.55$ ).

**Moral Judgments**—The main results for the moral judgment items are presented in Table 1. For each participant, the average severity of moral judgment across the four vignettes was calculated, with lower scores indicating more severe condemnation. As expected, mean moral judgment varied significantly as a function of condition,  $F(2, 117) = 7.43$ ,  $p = .001$ ,  $\eta_p^2 = 0.11$ . Post-hoc tests revealed that mild-stink participants and strong-stink participants were both more severe in their average moral judgments than were control participants. The mild-stink and strong-stink participants did not differ.

To examine whether the vignettes' inherent disgustingness moderated the effect of our disgust manipulation on moral judgments, the average severity of moral judgment for each type of vignette (disgusting, including *Marriage and Sex*; and not disgusting, including *Driving and Film*) was calculated. In a two-way ANOVA with disgustingness of scenario (disgusting, not disgusting) as a within-subjects factor and condition (control, mild-stink, strong-stink) as a between-subjects factor, the interaction term was non-significant,  $F < 1.2$ ,  $p > .33$ . Thus, the moral scenarios' disgustingness did not moderate the effect of our disgust manipulation on moral judgments.

## Discussion

Experiment 1 replicated Wheatley and Haidt's (2005) basic finding that the presence of extraneous disgust can make moral judgments more severe. Interestingly, the effect of extraneous disgust on moral judgment was not moderated by the inherent disgustingness of the object of judgment. This lack of moderation should be interpreted cautiously, however, since our "disgusting" vignettes (e.g., first-cousin marriage) in this study were not extremely high in disgust. To investigate this issue further, we included some much more disgusting vignettes in our follow-up studies.

Wheatley and Haidt (2005) found that some of their participants showed a large effect of hypnotic disgust, while others showed no effect. Might some people look to their bodily reactions for guidance more than others do? As a next step we explored whether individual differences might contribute to how strongly participants' moral judgments are affected by a disgust manipulation.

## Experiment 2

Research suggests that people differ in terms in how sensitive they are to their own "gut feelings." Some people are very good at detecting the slightest changes in bodily sensations; for example, they notice feelings of hunger easily. Other people forget that they have not eaten in many hours until they see a clock and realize that it is lunchtime. Such individual differences affect whether people infer emotional feelings from their physical sensations. For example, some people report feeling happy when they are induced to put on a smile,

whereas others do not (Laird & Crosby, 1974). This difference in response to bodily cues is stable over time and consistent across a wide variety of behaviors and feelings (e.g., Duclos & Laird, 2001; Schnall, Abrahamson, & Laird, 2002; Schnall & Laird, 2003).

We investigated such individual differences as a potential moderator of the role of disgust in moral judgment. Miller, Murphy, and Buss (1981) devised a scale to measure people's general attention to internal physical states, which they refer to as Private Body Consciousness (PBC). Of special relevance to the current project is a study on the relationship between PBC and problem solving style. Baradell and Klein (1993) demonstrated that the quality of problem solving deteriorated under conditions of high stress for participants high on PBC, but not for those who were low on PBC. Experiment 2 was conducted with these findings in mind. Participants came to the laboratory and sat at either a disgusting or a non-disgusting desk while filling out a questionnaire that included moral judgment vignettes. We predicted that experimentally induced disgust would make moral judgments more severe, but that this effect would be limited to those participants who were more sensitive to their own physical sensations, as indicated by a high level of PBC.

We also sought to investigate the specificity of the disgust-morality connection, in two ways. First, we tested whether the effect of the disgust manipulation would be stronger for moral issues involving disgust, compared to those not involving disgust. Is the effect enhanced by a "match" between disgust feelings and physically disgusting elements in a story? Theories about "social disgust" (Rozin et al., 2000) suggest that disgust is easily applied or extended to purely social violations. Critics have argued, however, that there is no such thing as social disgust, and that people are speaking metaphorically when they call social actions disgusting (Bloom, 2004; Nabi, 2002). We predicted that physical disgust would enhance the severity of all types of moral judgments, although we were agnostic as to whether there would be a larger effect for disgusting versus non-disgusting moral violations.

We examined the specificity of the disgust-morality connection in a second way by examining whether experimentally induced disgust would "spill over" to alter other kinds of choices and evaluations. We included questions about public policy decisions, and about what kind of activities the participant would like to engage in after the experiment. For both kinds of questions, half of the items had some conceptual relationship to disgust, half did not. We had no prediction as to whether disgust would create a general bias that influenced many kinds of judgments, or whether the effects of disgust would be limited to the moral judgments that were our main dependent variables.

## Method

**Participants**—Forty-three undergraduate students (18 male) at the University of Virginia participated in exchange for credit towards a course requirement.

## Materials

**Vignettes**—To specifically compare whether disgust-related scenarios would be judged more harshly than scenarios not involving disgust, we constructed a new set of moral stimuli. In addition, labeling of the rating scales was reversed to facilitate the interpretation of results, with higher ratings indicating higher levels of moral condemnation. Twenty-four vignettes portraying various kinds of moral violations selected from previous work (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001; Haidt, Koller, & Dias, 1993, were given to 8 pilot participants who judged how appropriate the action of the story character was on a nine-point scale. Six vignettes that generated substantial variance among respondents (i.e., that avoided floor and ceiling effects) were selected for use (see Appendix). Three of these vignettes involved a moral violation with disgust: *Dog* (a man who ate his dead dog), *Plane*

*Crash* (starving survivors of a plane crash consider cannibalism), *Kitten* (a man deriving sexual pleasure from playing with a kitten) and three of the vignettes involved a moral violation with no disgust: *Wallet* (finding a wallet and not returning it to its owner), *Resume* (a person falsifying his resume) and *Trolley* (preventing the death of five men by killing one man). The instructions told participants to go with their initial intuitions when responding.

**Public Policy Items**—Six public policy items asked participants whether they would support these proposals if they were up for a vote in the U.S. Congress, on a scale from 0 (strongly oppose) to 9 (strongly support). Three items involved issues of contamination or guarding borders (i.e., spending more money for waste treatment, spending more money to “patrol the borders” against illegal immigrants, and making it easier for the government to “expel foreigners” with suspected links to terrorism). The other three issues did not involve such themes (i.e., allowing non-denominational school prayer, increasing federal funding for social science research, and decreasing the number of students per classroom).

**Activity Items**—Participants also indicated whether they would like to engage in four activities after the experiment, on a scale from 0 (would not like to do that at all) to 9 (would very much like to do that). Two of the activities involved engaging in novel activities (eating a new food at a new restaurant; trying a new and risky sport such as skydiving); two involved familiar and safe activities (eating one’s favorite meal; watching one’s favorite movie).

**Private Body Consciousness**—After completing the Disgust Scale and the moral judgment vignettes, participants completed the Body Consciousness Questionnaire (Miller et al., 1981), which includes five items that comprise the private body consciousness subscale, on a scale from 1 (disagree strongly) to 6 (agree strongly). The items used were: “I am sensitive to internal bodily tensions,” “I know immediately when my mouth or throat gets dry,” “I can often feel my heart beating,” “I am quick to sense the hunger contractions of my stomach,” and “I am very aware of changes in my body temperature.”<sup>2</sup>

## Procedure

Before each participant entered the laboratory, the experimenter prepared the experimental room for either the extraneous disgust or the no disgust condition. For the disgust condition, a workspace was set up to look rather disgusting: An old chair with a torn and dirty cushion was placed in front of a desk that had various stains, and was sticky. On the desk there was a transparent plastic cup with the dried up remnants of a smoothie, and a pen that was chewed up. Next to the desk was a trash can overflowing with garbage including greasy pizza boxes and dirty-looking tissues. For the no-disgust condition, the same desk was used, but it was covered up with a clean white tablecloth. A new chair was provided, and none of the disgusting objects were present. A new and unchewed pen was provided for filling out the questionnaires.

After asking the participant to have a seat at the desk, the experimenter administered several questionnaires. Each of the two pages of the questionnaire contained three moral scenarios, followed by three questions concerning public policy, followed by two questions concerning whether the participant would like to engage in certain activities after the experiment. The order of the two questionnaire pages was counterbalanced, so that half of the participants received page one first, the other half received page two first. Next participants indicated on

<sup>2</sup>Because the PBC scale was given at the end of the experiment, it was important to demonstrate that the manipulation did not influence it. Indeed, there was no effect of condition on PBC score in Experiment 2,  $F(1, 41) = 1.89, p = .18$ , Experiment 3,  $F(2, 113) = .78, p = .46$ , or Experiment 4,  $F(1, 62) = 1.42, p = .24$ .

a series of rating scales to what extent they were feeling various emotions, namely feeling *relaxed, angry, happy, sad, afraid, depressed, disgusted, upset* and *confused*, on a 10.5 cm visual analogue scale labeled “Don’t feel at all” and “Feel very strongly” at the end points. Participants were asked to make a slash through the line to represent their feelings at the moment. All scales were scored by measuring in half centimeters from the “Don’t feel at all” end, yielding raw scores that could range from 0 to 21. Next, participants filled out the PBC questionnaire, using a scale from 0 (extremely uncharacteristic) to 4 (extremely characteristic) to indicate whether the statements were true for them.

## Results

**Manipulation Check**—Participants rated the emotions they were feeling at the end of the manipulation. Unexpectedly, the disgust condition did not differ from the control condition, in terms of self-reported disgust. However, we believed our disgust manipulation had high face validity, and that it was possible participants were reporting their feelings toward the experimental stimuli, rather than towards the physical setting we had created. We therefore proceeded to analyze the data as planned.

**Moral Judgments**—The primary prediction was that disgust would increase the severity of moral judgments for those participants high in PBC. We further tested whether these effects would be stronger for vignettes involving disgust.

Composite scores were formed for moral vignettes involving disgust (*Dog, Plane Crash, Kitten*), and moral items not involving disgust (*Wallet, Resume, Trolley*). A three-way repeated-measures ANOVA was conducted with content of moral vignette (involving disgust vs. not involving disgust) as a within-subjects factor, disgust condition (Disgust vs. No Disgust) and PBC (High vs. Low) as between-subjects factors. We tested whether the order in which the two sheets of the questionnaire were given interacted with the experimental manipulation. There were no interactions of Order and Condition,  $F(1, 39) = .46, p < .50, \eta^2 = .01$ , nor of Order, Condition, and Vignette content,  $F(1, 39) = .13, p < .72, \eta^2 = .00$ . Thus, order was not used as a factor in the analyses.

None of the three main effects were significant, but as predicted, the interaction between Disgust Condition and PBC was significant,  $F(1, 39) = 5.29, p < .03, \eta^2 = .12$  (see Figure 1). All six vignettes showed the effect in the predicted direction. Means for the vignette *Plane* showed a significant interaction of condition and PBC,  $F(1, 39) = 4.75, p < .03$ . Planned comparisons showed that when averaging across all 6 vignettes, participants high on PBC in the Disgust condition perceived the actions of the story character as more wrong than participants in the No Disgust Condition,  $F(1, 39) = 5.51, p < .02$ . In contrast, for participants in low on PBC, ratings of moral condemnation did not differ between the Disgust and No Disgust conditions,  $F(1, 39) = .86, p < .36$ . There was no three-way interaction and no interactions involving vignette content, indicating that disgust influenced moral judgment similarly for both disgust and non-disgust vignettes.

**Spillover effects**—We created 2 composite scores for each participant by averaging responses to the three public policy items related to contamination, and by averaging responses to the three that were not related to contamination. A  $2 \times 2 \times 2$  ANOVA with policy content (contamination-related vs. not-related), disgust condition (disgust vs. no disgust), and PBC (high vs. low) showed no significant effects. Similarly, we created composite scores for activity choices by averaging responses to the two familiar activities (*Favorite Meal, Favorite Movie*) and the two unfamiliar activities (*New Restaurant, Risky Sports*). As for the policy items, a  $2 \times 2 \times 2$  ANOVA with activity content (familiar vs. novel), disgust



condition (disgust vs. no disgust), and PBC (high vs. low) produced no significant effects. Thus, we found no evidence of spillover to non-moral judgments.

## Discussion

Once again we replicated the finding of Wheatley and Haidt (2005) that extraneously induced disgust makes moral judgment more severe, but we extended that finding in a theoretically predicted way: the effect was limited to those who are most likely to attend to their own visceral reactions. Participants who scored high on private body consciousness made more severe moral judgments when seated at a dirty desk than at a clean desk, whereas for participants low on PBC the desk manipulation had no effect.

We also obtained some initial findings about the specificity of the relationship between disgust and moral judgment. On the one hand, disgust was not so specific that it affected only moral judgments about stories involving disgust. Extraneous disgust influenced judgments about both kinds of vignettes. On the other hand, disgust was not so general that it influenced all kinds of judgments, including non-moral evaluations. Our disgust manipulation had no effect on people's evaluations of public policy issues or on their ratings of the desirability of various activities. These latter findings are preliminary; It is possible that our questions about public policies and personal choices drew more heavily on pre-existing political or personal attitudes, without any need to use affect as information.

## Experiment 3

Because Experiment 2 used a somewhat unusual disgust manipulation, we considered it important to replicate the effect using a more established kind of manipulation, especially because we did not obtain any effect of condition on self-reported mood. One frequently used method to induce a specific emotion is to ask participants to write about a time in their lives when they experienced a specific emotion (e.g., Bodenhausen et al., 1994). In Experiment 3 we used this technique by asking half of the participants to write about an event that made them feel physically disgusted. In addition, we removed the sentence in the instructions that asked participants to go with their first intuition when making their ratings. We wanted to know if we would obtain the same results when no mention of intuitive feelings was made.

## Method

**Participants**—Sixty-nine undergraduate students (17 male) at the University of Plymouth participated in exchange for credit towards a course requirement.

## Materials

**Vignettes**—The same vignettes as in Experiment 2 were used.

**Mood Induction**—In the Disgust Condition, participants were asked to write about a specific event that happened to them that involved seeing or touching something physically disgusting. Instructions specified that the event should be one that made the participant feel physically ill or sick to the stomach. Participants were asked to relive the experience, and were given six minutes to write down as much detail as possible on an answer sheet. No such instructions were given to participants in the No Disgust condition.

**Private Body Consciousness Scale**—The same scale as in Experiment 2 was used.

**Pre-and Post Mood Ratings**—At the beginning of the experiment all participants completed mood ratings of *relaxed, angry, happy, sad, afraid, depressed, disgusted, upset*

and *confused*, on 10.5 cm visual analogue scales labeled “Don’t feel at all” and “Feel very strongly” at the end points, with the instruction to indicate current feelings. At the end of the experiment the same items were presented again.

## Procedure

Participants were tested individually and were provided with a packet of forms to complete. All participants first received the pre-test emotion rating scale. Those in the disgust condition then received instructions for the “Life Event Inventory” that asked them to recall a physically disgusting experience, whereas participants in the No Disgust condition did not. The rest of the packet was identical for both conditions, and consisted of the six moral vignettes, the Body Consciousness Questionnaire and the post-test emotion rating scales.

## Results

**Manipulation Check**—As an initial manipulation check the narratives produced by the Disgust Condition were inspected to ensure that participants had indeed recalled physically disgusting events. Two participants were identified who wrote primarily about moral disgust rather than physical disgust; their data were excluded. Two additional participants wrote primarily about feeling emotions other than disgust (one fear, one anger); their data were excluded as well.

We expected that participants in the Disgust Condition would report feeling more disgusted at the end of the experiment compared to their baseline. Feelings of disgust as reported at the end of the experiment were analyzed by a one-way ANCOVA with condition as variable, and baseline disgust as a covariate. The Disgust Condition gave significantly higher ratings ( $M = 2.04$ ,  $SD = 2.59$ ) than the No Disgust Condition ( $M = 1.16$ ,  $SD = 1.22$ ),  $F(1, 62) = 4.05$ ,  $p < .05$ ,  $\eta_p^2 = .06$ . On the other eight emotion ratings there were no effects of condition, with the exception of an unpredicted difference in which participants in the Disgust condition felt more relaxed afterwards,  $F(1, 62) = 4.62$ ,  $p < .04$ .

**Moral Judgments**—As in Experiment 2, our prediction was that disgust would increase the severity of moral judgments for those participants high in PBC. Composite scores of moral vignettes involving disgust and moral items not involving disgust were submitted to a three-way repeated-measures ANOVA with vignette content as a within-subjects factor, and condition and PBC as between-subjects factors. There were no main effects, but as predicted, the interaction between Disgust Condition and PBC was significant,  $F(1, 61) = 4.49$ ,  $p < .04$ ,  $\eta_p^2 = .07$  (see Figure 2). Five of the six vignettes showed the same pattern, with participants high in PBC in the Disgust Condition giving higher morality ratings than participants in the No Disgust Condition. Planned comparisons indicated that participants high on PBC in the Disgust condition exhibited a marginal tendency to perceive the actions of the story character as more wrong than participants in the No Disgust Condition,  $F(1, 61) = 3.10$ ,  $p < .08$ . In contrast, for participants low on PBC, ratings of moral condemnation showed no such effect,  $F(1, 61) = .156$ ,  $p < .22$ . There was no three-way interaction ( $p > .44$ ) and no other interactions involving vignette content ( $ps > .52$ ), indicating that the effect generalized across disgusting and non-disgusting moral violations.

## Discussion

Experiment 3 replicated the findings of Experiment 2: induced disgust makes moral judgment more severe, but only for those who are generally sensitive to their own visceral reactions. For participants low on PBC the disgust manipulation had no effect. The study also addressed two weaknesses of study 2. This time, the manipulation check confirmed that the two experimental groups differed in their self-reported disgust. Also, this time we obtained the same results without asking participants to follow their intuitive feelings.

## Experiment 4

Although Experiments 2 and 3 provided evidence about the specificity of the effects of disgust on judgment, they did not test whether these effects are specific to disgust, as opposed to any other negative emotion. We cannot yet rule out the possibility that any negative emotion, such as sadness, would have made moral judgments more severe.

Experiment 4 induced two negative emotions by having participants watch film clips previously shown (Lerner et al., 2004) to elicit disgust and sadness.<sup>3</sup> A comparison group watched a neutral film clip. We expected that participants in the disgust condition, but not in the sadness condition, would show the same pattern of results as in Experiments 2 and 3.

### Method

**Participants**—133 undergraduate students (60 male) at the University of Plymouth participated in exchange for course credit, or for payment. Three participants were excluded for not following instructions.

### Materials

The moral judgment vignettes were the same as in Experiment 2. Film clips previously shown to result in disgust (a scene from *Trainspotting* involving a disgusting toilet) and sadness (a scene from *The Champ* where a boy watches his father die) were used. An emotionally neutral film clip consisted of a scene about whales from the documentary *Planet Earth*.

### Procedure

Participants were randomly assigned to watch one of the three films immediately before completing the moral judgment vignettes. They then filled out the PBC scale and the emotion rating scale used in experiment 2.

### Results

**Manipulation Check**—Self-reported disgust varied significantly as a function of condition,  $F(2, 114) = 107.05, p < .0001, \eta_p^2 = .65$ , with planned contrasts indicating that participants in the disgust condition ( $M = 11.35, SD = 5.63$ ) gave significantly higher ratings of disgust than participants in the sadness ( $M = 1.51, SD = 1.55, p < .0001$ ) and neutral ( $M = 1.20, SD = 1.69, p < .0001$ ) conditions. Similarly, conditions differed on reported sadness,  $F(2, 114) = 30.37, p < .0001, \eta_p^2 = .35$ , with participants in the sadness condition ( $M = 4.72, SD = 3.05$ ) reporting more sadness than those in the disgust ( $M = 1.58, SD = 1.97, p < .0001$ ) or neutral ( $M = 1.04, SD = 1.48, p < .0001$ ) conditions. Thus, as in the original Lerner et al. (2004) research using the same film clips, we were successful at inducing specific emotional feelings.

In order to examine the effects of specific emotions on moral judgment we inspected boxplots for outliers (outside of three box lengths) on self-reported emotions inconsistent with the intended experimental emotion. Similar technique have previously been used (e.g., Bower, Gilligan, & Montiero, 1978; Storbeck & Clore, 2005) to demonstrate mood effects in participants for whom the mood induction was unambiguously successful at inducing the target emotion. For example, we did not retain participants in the disgust condition who had unusually high ratings for sadness. Eleven outliers were excluded from analyses.

<sup>3</sup>The authors are grateful to Jennifer Lerner for generously providing the original film clips as used in Lerner, Small, and Loewenstein (2004).

**Moral Judgments**—As in Experiment 2 we created composite scores for vignettes involving disgust (*Dog, Plane Crash, Kitten*), and for vignettes not involving disgust (*Wallet, Resume, Trolley*). We conducted a repeated-measures ANOVA with content of vignette (involving disgust vs. not involving disgust) as a within-subjects factor, film condition (Disgust vs. Sadness vs. Neutral), PBC (high vs. low) and Sex (male vs. female) as between-subjects factors. There was a marginally significant interaction of disgust condition and PBC,  $F(2, 104) = 2.70, p < .07, \eta_p^2 = .05$ . Further, there was an effect of sex, with females ( $M = 5.41, SD = 1.45$ ) giving generally more severe judgments than males ( $M = 4.63, SD = 1.54$ ),  $F(1, 104) = 12.15, p < .001, \eta_p^2 = .11$ .

More importantly, we tested our specific predictions and compared high PBC participants in the disgust condition with their counterparts in the sadness and neutral conditions. For this initial comparison we merged the sadness and neutral conditions together and found that participants in the disgust condition gave more severe moral judgments than did participants in the two comparison conditions,  $F(1, 104) = 4.11, p < .05$  (see Figure 3). This was not the case for participants low on PBC,  $F(1, 104) = .27, p < .61$ . Further comparisons showed that participants high on PBC in the disgust condition gave significantly higher ratings than those in the sadness condition,  $F(1, 104) = 4.68, p < .03$ , and there was a trend for the comparison with the neutral condition,  $F(1, 104) = 1.82, p < .18$ . Interestingly, the means for the sadness condition were lower than the means in the neutral condition, further supporting the notion that the effects of disgust are not just due to it being a negative emotion. As in Experiments 2 and 3, no three-way interaction of vignette content, condition and PBC was found,  $p < .55$ , indicating that disgust influenced moral judgment similarly for both disgust and non-disgust vignettes.

## Discussion

Experiment 4 addressed the critical issue of the specificity of the effects documented in Experiments 1-3. We induced highly specific feelings of disgust or sadness and found that induced disgust made moral judgments more severe than did induced sadness. In fact, somewhat surprisingly, sadness showed a trend in the opposite direction of influence on moral judgment. We do not know if this trend is reliable, but it suggests that the effects we found of disgust on moral judgment are not merely a manifestation of a general tendency for negative affect to amplify moral judgments. It thus appears that the more clearly participants are experiencing disgust, the more directly this feeling is taken as input to moral judgments. Although an objection might be made that such a direct link could be indicative of semantic priming, by activating the concept of disgust in the film, and again activating the concept of disgust in the vignettes, the moderating effect of PBC suggests that this is not the case: As in Experiments 2 and 3, effects on moral judgments were only present for participants who were susceptible to feeling disgust because they were generally sensitive to their own bodily cues.

**Meta-Analysis Combining Data From Experiments 2-4**—In three experiments we found evidence that participants high in PBC were prone to making more severe moral judgments when exposed to a disgust manipulation, relative to not being exposed to such a manipulation. Although all data show the same general pattern, some of the effects were only marginally significant. Thus, to assess whether the predicted effect was reliable, we conducted a meta-analysis combining all data sets and testing for the interaction of Condition and PBC. We expressed the composite moral judgments for the three experiments as Z-scores, and conducted a three-way ANOVA with Condition, PBC, and Experiment as factors. We found a significant interaction of Condition and PBC,  $F(2, 210) = 4.99, p < .008, \eta_p^2 = .05$ . More importantly, the critical planned comparison for participants scoring high in PBC between the Disgust and No Disgust conditions was also significant,  $F(1, 210)$

$= 5.58, p < .02$ . Thus, it is clear that across the four different manipulations of disgust, there one common effect. For people high (but not people low) in PBC, our disgust manipulations increased the severity of moral condemnation, relative to the neutral conditions. In addition, there was a significant main effect of condition,  $F(2, 210) = 3.06, p < .05, \eta_p^2 = .03$ , with highest means for the Disgust Condition, followed by the No Disgust Conditions, and the Sadness Condition.

The within-subjects nature of some of our variables made the ANOVA approach advisable from an analytic as well as from a presentational perspective. Of course, the use of median splits on a continuous variable is sometimes inadvisable, in part because an adventitious location of the median might create two groups that differ only by chance. However, inspection of the scatter plots does not show that to be the case, and three replications of the effect in different samples as well as in the meta-analysis argues convincingly against that possibility.

## General Discussion

Four studies involving four different ways of inducing disgust found a causal relationship between feelings of physical disgust and moral condemnation. In addition, the results addressed four aspects of this relationship. First, we found that the effect of disgust applies regardless of whether the action to be judged is itself disgusting. Second, the results showed evidence of discriminative validity in that disgust influenced moral, but not additional non-moral judgments. Third, since the effect occurred most strongly for people who were sensitive to their own bodily cues, the results appear to concern feelings of disgust, rather than merely the primed concept of disgust. And fourth, that there is something special about the connection between disgust and morality was indicated by the fact that induced sadness did not have similar effects.

Our interpretation of these results flows jointly from the social intuitionist model of moral judgment (Haidt, 2001) and the affect-as-information approach to evaluative judgments more generally (Clore et al., 2001; Schwarz & Clore, 1983). Both propose an affective basis for judgments. The affect-as-information hypothesis proposes that evaluative judgments reflect affective reactions to the object being judged, and focuses on the dynamics of affect use. In short, it says that when making evaluative judgments, flashes of feeling often inform us about how we feel about a situation - whether we like it or dislike it.

The social intuitionist model (Haidt, 2001; Haidt & Graham, 2007) describes specific mappings between moral emotions and kinds of moral judgments. It says that all negative emotions are not the same; disgust, anger, and contempt play the primary roles as motivators of moral condemnation of others (Rozin, Lowery, Imada & Haidt, 1999). In experiment 4 we demonstrated a difference between the effects of disgust and those of sadness. In future studies researchers could attempt the more difficult task of examining whether other morality-relevant emotions, such as anger have effects different than disgust. However, our findings on the specificity or “match” between disgust and story content suggest that such differentiation may be hard to demonstrate. We found that disgust influenced judgments of non-disgusting moral violations as much as it influenced judgments of disgusting moral violations. It is possible that extraneous anger would show a similar breadth of influence.

## Informativeness and Attribution

Although emotional reactions are themselves automatic and preemptory, the role of affect in judgment turns out to be contingent on its apparent informativeness. Thus, rather than being obligatory, affective influences on judgment can often be eliminated by making salient an irrelevant but plausible cause for the feelings. This effect was observed in Schwarz and

Clore's (1983) original studies concerning mood effects on judgments of life satisfaction. In one condition, they drew respondents' attention to the fair or foul weather outside, which was the actual cause of their feelings. In this condition, no mood effects were observed because feelings interpreted as being about the weather seemed irrelevant to judgments of general life satisfaction.

We unwittingly evoked this process in an earlier and failed attempt to carry out these experiments. As a disgust manipulation, we asked participants to immerse one hand in a gooey substance mixed from creamed corn, collard greens and chocolate pudding. Immediately afterward, participants made morality ratings. This very concrete disgust experience, which was not otherwise involving in the way that films are, did not influence moral judgments (compared to those who put their hands in a bucket of water), presumably because the unusual nature of the experience and its obvious relation to disgust remained highly salient as participants made their moral judgments. In retrospect, it seems likely that any disgust elicited by the moral dilemmas was likely to be attributed to the feeling of the gooey substance, rather than the other way around. Accordingly, for the current studies we chose more subtle, multi-dimensional disgust inductions, including being exposed to an unpleasant but incidental smell (Experiment 1), working in a room that happened to be dirty and disorderly (Experiment 2), and watching a disgusting scene from a film (Experiments 3 and 4). Our goal was to induce low-level, background feelings of disgust. Because feelings tend to take as their object whatever is in mind at the time they are experienced (Clore et al., 2001), we predicted that the pre-existing feelings of disgust would be experienced, along with any vignette-induced disgust, as a flash of an emotional reaction of the kind that the social intuitionist model hypothesizes to be the basis of moral judgment.

### Embodied Aspects of Emotional Experience

In three of our four studies we specifically investigated the effects of disgust on moral judgment for people highly sensitive to their own bodily cues. Our findings are in line with recent approaches emphasizing that emotional processes are fundamentally embodied (e.g., Niedenthal et al., 2005; Prinz, 2004). As mentioned in the introduction, disgust is often experienced as a particularly visceral feeling, possibly because it can trigger nausea, throat clenching, and the very physical process of food expulsion in order to protect the body from harmful contaminants (Rozin et al., 2000). Although emotions generally involve a physical, embodied component, we suspect that the strong physical basis might be even more pronounced for disgust; indeed, in Experiment 4 participants high and low on PBC in the sadness condition showed practically identical means on their moral judgments, whereas PBC strongly mediated the effect for those in the disgust condition. Further research is needed to clarify the extent to which some emotions might be more embodied than others. In addition, further research is needed to investigate to what extent the individual difference we focused on in this work, private body consciousness, is associated with other indices of bodily sensitivity, such as whether a person derives emotional feelings from their expressive behavior (e.g., Schnall et al., 2002), or habitually pays attention to their emotions (e.g., Gasper & Clore, 2000). Finally, if only a subset of participants use their embodied affective cues to arrive at moral judgments, questions arise concerning what kind of information other individuals use to do so. Based on the social intuitionist model (Haidt, 2001), one possibility might be that individuals who are less in tune with their own bodily feedback might be more easily influenced by other people's persuasive attempts to shape their moral views.

### Using One's Intuition?

The present data show that some people are more easily influenced by extraneous disgust than are others. But for those who do pay attention, *should* they? Should people use their intuitions when confronted with moral issues? In the present case the answer appears to be

no, because people who followed their feelings were “tricked” by extraneous disgust. Prior experiments in which explicit attributions of affect to extraneous sources were encouraged (Schwarz & Clore, 1983) suggest that it might help to be reminded that in some situations, the feeling of disgust simply has nothing to do with the judgment at hand. For example, jurors judging a defendant with a facial deformity, or who engages in harmless sexual practices they do not approve of, might need help in overcoming their spontaneous flashes of irrelevant disgust. Thus, once we realize that we indeed rely on repugnance in cases where it is clearly not a kind of wisdom (Kass, 1997), we can perhaps do something about it.

But on the other hand, if people ignore all feelings when making judgments, they may have little else to go on. Relying on affect may be a heuristic, but as Gigerenzer (2002) argues, in many domains, heuristics are not error-prone shortcuts, because there is no known reasoning process that will give a better answer. If each person tried to figure out the optimal moral judgment without taking any counsel from affectively-laden intuitions, it is not clear that the products of such deliberation would be wise. Indeed, Damasio’s (1994) patients, who lack the ability to integrate somatic markers into their decision making, seem quite foolish, and they are unable to make up their minds about simple matters. Our findings lead us to conclude that affectively-laden moral intuitions are often useful, but we need to be aware of our heavy reliance on such intuitions and of the factors that sometimes distort them.

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## Appendix

### Vignettes used in Experiment 1

#### Marriage

Some U.S. states allow first cousins to marry each other. The state you live in does not currently permit first-cousin marriages but is considering legalizing them. What do you think about such legislation? (1 = strongly oppose legalization; 7 = strongly support legalization)

#### Sex

How moral or immoral do you, personally, find consensual sex between first cousins to be? (1 = extremely immoral; 7 = perfectly okay)

#### Driving

James is going to work and considers whether to walk the 1½ miles or to drive in. He is feeling lazy and decides to drive in. How moral or immoral do you, personally, find James’s decision to be? (1 = extremely immoral; 7 = perfectly okay)

#### Film

Controversy has erupted over a documentary film about Mexican immigrants. The film has received excellent reviews, but several of the people interviewed in it have objected that their rights were violated. The filmmaker deliberately had his camera crew stand back 15 feet in a crowd so that some interviewees did not realize they were being filmed. Because the camera was not hidden, the procedure was legal. What do you think about the studio’s

decision to release this film, despite the aforementioned allegations? (1 = strongly disapprove of film release; 7 = strongly approve of film release)

### **Vignettes used in Experiments 2, 3 and 4**

All responses were given on a scale from 0 (perfectly OK) to 9 (extremely wrong).

#### **Dog**

Frank's dog was killed by a car in front of his house. Frank had heard that in China people occasionally eat dog meat, and he was curious what it tasted like. So he cut up the body and cooked it and ate it for dinner. How wrong is it for Frank to eat his dead dog for dinner?

#### **Plane Crash**

Your plane has crashed in the Himalayas. The only survivors are yourself, another man, and a young boy. The three of you travel for days, battling extreme cold and wind. Your only chance at survival is to find your way to small a village on the other side of the mountain, several days away. The boy has a broken leg and cannot move very quickly. His chances of surviving the journey are essentially zero. Without food, you and the other man will probably die as well. The other man suggests that you sacrifice the boy and eat his remains over the next few days. How wrong is it to kill this boy so that you and the other man may survive your journey to safety?

#### **Wallet**

You are walking down the street when you come across a wallet lying on the ground. You open the wallet and find that it contains several hundred dollars in cash as well the owner's driver's license. From the credit cards and other items in the wallet it's very clear that the wallet's owner is wealthy. You, on the other hand, have been hit by hard times recently and could really use some extra money. You consider sending the wallet back to the owner without the cash, keeping the cash for yourself. How wrong is it for you to keep the money you found in the wallet in order to have more money for yourself?

#### **Resume**

You have a friend who has been trying to find a job lately without much success. He figured that he would be more likely to get hired if he had a more impressive resume. He decided to put some false information on his resume in order to make it more impressive. By doing this he ultimately managed to get hired, beating out several candidates who were actually more qualified than he. How wrong was it for your friend to put false information on his resume in order to help him find employment?

#### **Kitten**

Matthew is playing with his new kitten late one night. He is wearing only his boxer shorts, and the kitten sometimes walks over his genitals. Eventually, this arouses him, and he begins to rub his bare genitals along the kitten's body. The kitten purrs, and seems to enjoy the contact. How wrong is it for Matthew to be rubbing himself against the kitten?

#### **Trolley**

You are at the wheel of a runaway trolley quickly approaching a fork in the tracks. On the tracks extending to the left is a group of five railway workmen. On the tracks extending to the right is a single railway workman. If you do nothing the trolley will proceed to the left, causing the deaths of the five workmen. The only way to avoid the deaths of these workmen is to hit a switch on your dashboard that will cause the trolley to proceed to the right,



causing the death of the single workman. How wrong is it for you to hit the switch in order to avoid the deaths of the five workmen?

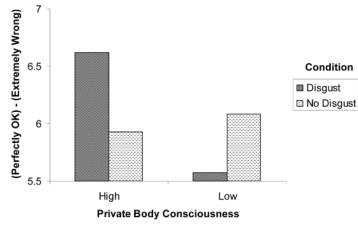
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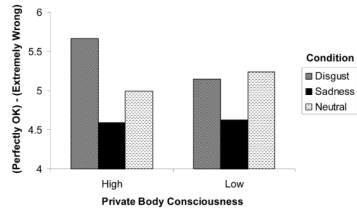
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**Figure 1.** Experiment 2, judgments of wrongness of moral actions, as a function of Private Body Consciousness and condition.



**Figure 2.** Experiment 3, judgments of wrongness of moral actions, as a function of Private Body Consciousness and condition.



**Figure 3.** Experiment 4, judgments of wrongness of moral actions, as a function of Private Body Consciousness and condition

**Table 1**

## Moral Permissibility by Condition, Experiment 1

Vignette	Moral judgment severity		
	Control	Mild-stink	Strong-stink
Marriage	2.93 (1.49)	2.20* (1.07)	2.25 (1.30)
Sex	2.67 (1.53)	1.90* (0.93)	2.40 (1.69)
Driving	5.48 (1.36)	4.98 (1.48)	4.95 (1.38)
Film	3.45 (1.62)	3.03 (1.58)	2.63* (1.13)
Mean	3.75 (0.88)	3.15** (0.69)	3.18** (0.79)

Note.  $n = 40$  for each condition. Minimum and maximum scores for each item were 1 and 7. High scores indicate permissibility; low scores indicate moral condemnation.

\*  $p < .05$ , pairwise comparison to control by Tukey's HSD test.

\*\*  $p < .01$ , pairwise comparison to control by Tukey's HSD test.