


A Bad Taste in the Mouth: Gustatory Disgust Influences Moral Judgment

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Abstract

Can sweet-tasting substances trigger kind, favorable judgments about other people? What about substances that are disgusting and bitter? Various studies have linked physical disgust to moral disgust, but despite the rich and sometimes striking findings these studies have yielded, no research has explored morality in conjunction with taste, which can vary greatly and may differentially affect cognition. The research reported here tested the effects of taste perception on moral judgments. After consuming a sweet beverage, a bitter beverage, or water, participants rated a variety of moral transgressions. Results showed that taste perception significantly affected moral judgments, such that physical disgust (induced via a bitter taste) elicited feelings of moral disgust. Further, this effect was more pronounced in participants with politically conservative views than in participants with politically liberal views. Taken together, these differential findings suggest that embodied gustatory experiences may affect moral processing more than previously thought.

Keywords

morality, taste perception, embodied cognition, political orientation

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Morals . . . are not so properly objects of the understanding as of taste and sentiment. Beauty, whether moral or natural, is felt, more properly than perceived. (Hume, 1772/2004, p. 123)

In the 18th century, Hume made the startling suggestion that moral judgments are based on emotions rather than on pure reason. In his view, moral judgments were comparable to judgments of taste, and Hume understood the notion of taste quite literally: People assess something as morally wrong when it elicits physical disgust. The study reported in this article tested this idea by investigating whether the taste of a beverage can influence moral judgment.

Some morality researchers have argued that emotions serve as the foundation for moral development (Blair, 1995; Turiel & Killen, 2010) and for moral judgment (Haidt, 2001; Prinz, 2007). According to this approach, the wrongness of an action is determined by considering how that action makes one feel. Although not everyone agrees with this stance (Huebner, Dwyer, & Hauser, 2009), considerable empirical research supports a link between moral judgments and physical disgust (Borg, Lieberman, Kiehl, 2008; Haidt, 2003; Rozin, Haidt, & McCauley, 2009; Schnall, Benton, & Harvey, 2008; Schnall, Haidt, Clore, & Jordan, 2008). For example, Liljenquist, Zhong, and Galinsky (2010) showed that participants were

more likely to engage in charity and reciprocity of trust in a clean-scented room than in a baseline room with a neutral scent. They found that in a trust game, during which participants had to decide whether to return money to an unknown investor, subjects in a clean-scented room returned significantly more money than those in the baseline room. Further, participants in a clean-scented room expressed more interest in performing volunteer work and making monetary donations than did participants in the baseline room. Similarly, Zhong and Liljenquist (2006) demonstrated that participants who experienced threats to their moral purity (recalling their own unethical actions or writing about another person's misdeeds) had an increased need for physical cleansing; this need was revealed by faster lexical access to cleansing-related concepts and a stronger desire for cleansing products (e.g., soap, toothpaste). These studies suggest a link between morality and cleanliness, but what about disgust?

In a clever manipulation, Schnall, Haidt, et al. (2008) sprayed a nearby trash can with commercially available “fart sprays” to induce disgust in their participants. Participants

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exposed to strong and mild stink conditions made harsher judgments on a variety of moral vignettes (e.g., sex between first cousins) than did participants in a no-spray condition. Similar effects were found using dirty desks (vs. clean desks) and recall of disgusting experiences. Inbar, Pizarro, and Bloom (2010) recently used a similar manipulation to show that disgust can lead to increased disapprobation of gay men.

Although these results suggest that emotional disgust and cleanliness are highly associated with morality, such claims would be even stronger if these domains were found to recruit similar brain regions. Chapman, Kim, Susskind, and Anderson (2009) investigated the physiological overlap between oral and moral disgust. Similar facial motor activity occurred in response to disgust in the gustatory, visual (induced via disgusting pictures), and moral domains: All three types of disgust activated the levator labii muscle of the face, which has evolutionary origins in taste preference. Other studies have more directly provided evidence for activation of partially overlapping brain regions during physical disgust and moral disgust, particularly in temporal and frontal cortices (Moll et al., 2005; see also Borg et al., 2008, for additional neural correlates and Calder, Lawrence, & Young, 2001, for a possible dissociation between physical and moral disgust in Parkinson's disease).

Physical disgust and moral disgust thus appear to be linked through cognitive, behavioral, and physiological processes. Although the extant research highlights this relationship in various ways, we are unaware of any studies that have specifically targeted taste perception. Hence, we used sweet and bitter tastes to explore how gustatory pleasure and disgust, respectively, map onto moral judgments. If moral disgust really does stem from physical disgust, we hypothesized, then taste perception should affect moral processing such that a disgusting beverage should elicit greater moral disgust than a sweet beverage or a control beverage (water).

In addition, we wanted to test the relation between political views and sensitivity to disgust. The former variable was of interest because politically conservative individuals seem to rely more on sensory information (Haidt & Hersh, 2001) and show greater sensitivity to disgust (Inbar, Pizarro, & Bloom, 2009) than do individuals with liberal views; we wanted to test this claim using our taste manipulation. We hypothesized that if conservatives are indeed more sensitive to disgust, then the taste manipulation should affect their moral processing more strongly than the moral processing of liberals.

Method

Fifty-seven Brooklyn College undergraduates (41 female, 16 male) participated in the experiment for course credit. Each participant was assigned randomly to one of three beverage conditions (sweet, bitter, or control), in which they completed a moral-judgment task. They were told that we were exploring the effects of motor interference (specifically arm-hand

movements) on cognitive processing, and we therefore directed them to drink a beverage during a moral-judgment task to instantiate this movement in a natural way. Participants in the sweet condition were given Minute Maid Berry Punch, those in the bitter condition received Swedish Bitters,¹ and control participants were given water. They were not told the identity of the beverages, although an ingredient list was provided so they could check for potential allergens. Beverages were administered in two 1-teaspoon doses in a small cup; the first dose was given at the onset of the moral-judgment task, and the second one was administered at the halfway point to ensure that the taste lingered throughout the task. Participants were instructed to drink each dose in its entirety in a single swift motion, "as if you were drinking a shot."

Moral judgments were assessed using Wheatley and Haidt's (2005) moral vignettes, which portray various moral transgressions (second cousins engaging in consensual incest, a man eating his already-dead dog, a congressman accepting bribes, a lawyer prowling hospitals for victims, a person shoplifting, and a student stealing library books). All participants received the same six moral vignettes, in counterbalanced order. After each vignette, participants rated "how morally wrong" the offense was on a scale consisting of a 14-cm line representing a continuum from *not at all morally wrong* to *extremely morally wrong*. Participants were asked to make a slash at the point on the continuum corresponding to their impressions. These marks were then converted to scores ranging from 0 to 100, with higher scores indicating harsher moral judgments.

Following the moral-judgment task, participants were given an unrelated language distractor task, in which they described their language background and rated sentences for their imageability. Participants were also asked to provide some basic demographic information and indicate their political orientation as either conservative or liberal. They also rated how sweet, bitter, neutral, and disgusting they found their beverage, using a 7-point Likert scale ranging from *not at all* (1) to *very much* (7); we had them make these ratings to check whether the taste manipulation was successful. Finally, they were asked to write down what they thought the study was about.

Results

Three of the 57 participants correctly guessed our hypothesis and were therefore excluded from all analyses. An overall moral-judgment score was obtained for each of the remaining 54 participants (bitter condition: $n = 15$; sweet condition: $n = 18$; control condition: $n = 21$) by averaging his or her ratings of the six vignettes. Self-report ratings of the beverages (shown in Table 1) confirmed that participants actually perceived the Swedish Bitters to be disgusting, the Minute Maid Berry Punch to be sweet, and the water to be neutral.

To determine the effects of the beverage manipulation, we conducted a one-way analysis of variance (ANOVA) on the

Table 1. Participants' Mean Taste Ratings of the Three Drinks

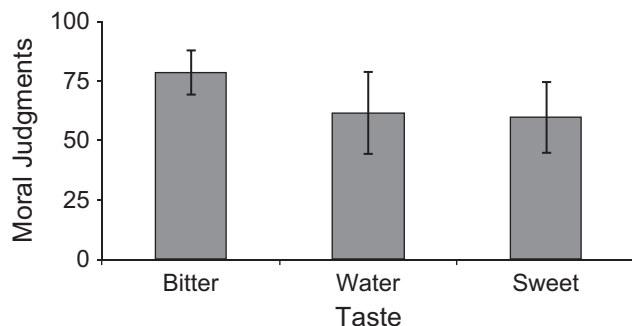
Rating	Bitter drink	Sweet drink	Water
Bitter taste	6.40 (0.99)	1.76 (1.26)	1.17 (0.71)
Sweet taste	1.07 (0.26)	5.52 (1.36)	1.33 (0.97)
Neutral taste	2.00 (1.36)	1.81 (1.44)	6.61 (0.98)
Disgusting taste	6.13 (1.36)	1.38 (0.74)	1.89 (1.81)

Note: Standard deviations are given in parentheses. Higher numbers indicate stronger endorsement that the descriptor was appropriate.

moral judgments. Results revealed a significant effect of beverage type, $F(2, 51) = 7.368, p = .002, \eta_p^2 = .224$. Planned contrasts showed that participants' moral judgments in the bitter condition ($M = 78.34, SD = 10.83$) were significantly harsher than judgments in the control condition ($M = 61.58, SD = 16.88$), $t(51) = 3.117, p = .003, d = 1.09$, and in the sweet condition ($M = 59.58, SD = 16.70$), $t(51) = 3.609, p = .001, d = 1.22$. Judgments in the control and sweet conditions did not differ significantly, $t(51) = 0.405, n.s.$ (Fig. 1). A regression analysis was also performed to test whether moral judgments could be predicted by feelings of physical disgust. Results indicated that 27.5% of the variance in moral judgments was accounted for by participants' self-reported disgust ratings, $t(52) = 4.445, p < .001, \beta = 0.525$. These results confirmed our primary hypothesis that disgust at least partially underlies moral processing.

Our secondary hypothesis was that conservatives would be more sensitive to disgust than liberals and would therefore make harsher moral judgments, particularly in the bitter condition. Ten participants who failed to identify themselves as liberal or conservative were removed from these analyses. Of the remaining 44 participants, 19 identified themselves as politically conservative and 25 identified themselves as politically liberal.

A 2 (political orientation: conservative, liberal) \times 3 (taste: bitter, sweet, control) between-subjects ANOVA was conducted on moral judgments to determine whether political orientation influenced judgments within each taste condition. There was a significant main effect of taste, $F(2, 38) = 9.741, p < .001, \eta_p^2 = .339$, which reflected the same difference

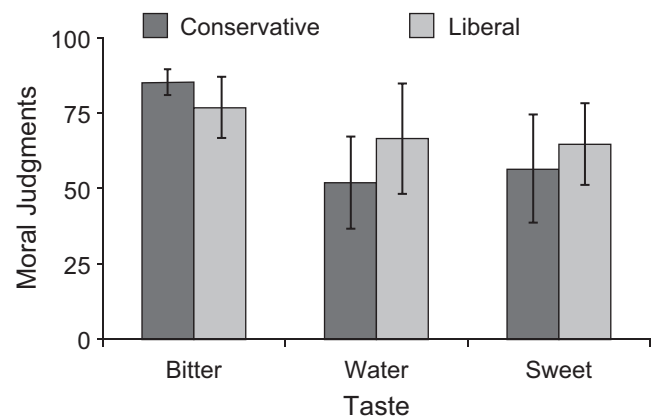
**Fig. 1.** Mean moral judgments as a function of beverage taste. Higher numbers indicate harsher judgments. Error bars represent standard deviations.

between the bitter condition and the control and sweet conditions that we found in our one-way ANOVA. Simple-effects analyses of political orientation in each taste condition showed that conservatives' moral judgments were marginally different from liberals' moral judgments in the control condition ($M = 51.81, SD = 15.83$, and $M = 66.74, SD = 17.49$, respectively), $F(1, 38) = 3.979, p = .053, \eta_p^2 = .095$. No other comparisons approached significance (see Fig. 2).

To further test our hypothesis about whether disgust affects conservatives' and liberals' judgments differently, we divided subjects into two groups: the disgust group (bitter condition) and the nondisgust group (sweet and control conditions combined). We then conducted two contrast analyses, one for conservatives and one for liberals, to directly compare judgments between the disgust and nondisgust groups. Conservatives' judgments were significantly harsher in the disgust group ($M = 84.94, SD = 4.69$) than in the nondisgust group (sweet condition: $M = 56.60, SD = 17.00$; control condition: $M = 51.81, SD = 15.83$), $t(16) = 4.473, p < .001, d = 2.21$. Conversely, liberals' judgments did not differ significantly between the disgust group ($M = 76.67, SD = 9.47$) and the nondisgust group (sweet condition: $M = 64.72, SD = 14.07$; control condition: $M = 66.74, SD = 17.49$), $t(22) = 1.703, n.s.$ This suggests that liberals are less likely to recruit extraneous sensoriperceptual information during moral processing than conservatives are. Taken together, these results suggest that physical disgust helps instantiate moral disgust, and that these effects are more salient in individuals with politically conservative views than in individuals with politically liberal views.

Discussion

This research had three aims: First, we wanted to add to the literature demonstrating that moral reasoning can be affected by embodied, sensory information. Second, to identify a stronger connection between disgust and morality, we sought to

**Fig. 2.** Mean moral judgments as a function of taste and political orientation. Higher numbers indicate harsher judgments. Error bars represent standard deviations.

explicitly test the differential effects of taste. Using stimuli with either positive or negative valence (a manipulation novel to morality research), we found that moral judgments are affected by taste, particularly if that taste is disgusting. Finally, drawing from some of the research in political psychology (Inbar, Pizarro, & Bloom, 2009), we aimed to provide further evidence that the moral processing of politically conservative individuals is more strongly affected by disgust than is the moral processing of liberals, a finding also obtained by Haidt and Hersh (2001).

One explanation for the latter result is that moral judgments are normally made using a nonemotional system, but that this system can be influenced by extraneous emotions, and conservatives may be more vulnerable than liberals to that influence. Alternatively, both liberals and conservatives could use “affect-as-information” (Schwarz & Clore, 1983, p. 519; 1998) in moral decision making but differ in their reliance on disgust. Disgust has been associated with violations of purity norms (Rozin, Lowery, Imada, & Haidt, 1999), and such norms are more prevalent in conservative than in liberal morality (Haidt, 2007). The hypothesis that emotions guide both liberals and conservatives is more parsimonious than the hypothesis that emotions influence conservatives more than liberals, and it is also consistent with the finding that people generally have difficulty articulating reasons for their moral judgments (Haidt, 2001). Further work should explore whether other emotions, such as anger, can influence liberals as much as conservatives.

This research has many implications. For example, much as other researchers have suggested (Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005), it indicates that sensory and perceptual information may play a more significant role in human conceptual architecture than previously thought (e.g., Newell & Simon, 1972). It also supports the central tenets of the conceptual-metaphor theory and the perceptual-symbol-systems theory by demonstrating how abstract concepts like morality could originate from sensory experiences (Barsalou, 1999; Lakoff & Johnson, 1980; Prinz, 2002) and how intuitions and feelings play fundamental roles in moral processing (Haidt, 2001).

To extend and improve this research, future studies could incorporate additional behavioral and physiological measures to further explore the sensorimotor relationships between gustatory and moral disgust (previous research has explored other sensory modalities, such as smell and sight; e.g., Schnall, Haidt, et al., 2008). It would also be important to explore whether different tastes can influence subsequent emotions in predictable ways. For example, do sweet, bitter, sour, and savory tastes of varying intensities instantiate corresponding emotions, and, if so, to what extent can these tastes reliably predict people’s moral judgments? The time course and duration of these effects is also unknown and should be investigated.

These findings open up a host of practical questions. For example, should jurors avoid overly bitter or sweet foods as

they deliberate a verdict? Could political attitudes and orientations be moderated by particular diets? And do food preferences partly shape moral development? As John Ruskin noted, “Taste is not only a part and index of morality, it is the only morality. The first, and last, and closest trial question to any living creature is ‘What do you like?’ Tell me what you like, I’ll tell you what you are” (as cited in Meynell, 1900, p. 174).

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Note

1. Swedish Bitters is a natural herbal supplement that promotes healthy digestion. To control for positive moods, we did not inform participants of its bodily effects.

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