

Even Unpleasant Reminders That You Are an Animal Need Not Disgust You

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Three studies ($Ns = 200, 400, 400$) tested the hypothesis that we humans feel disgust when reminded of our animal nature. Participants verbally rated their disgust reaction to pictures of humans engaged in various unpleasant actions. For pictures of events that present danger or suffering, accompanied by an explicit and vivid reminder that animals face the same situation, participants reported fear and sadness rather than disgust. For pictures of events that present a norm violation, an explicit animal reminder (relative to a human picture alone) did not lead to a consequent increment in disgust. For pictures of events that present a physically disgusting contamination, an explicit animal reminder (relative to a human picture alone) led to a *decrement* in disgust. Thus, not all unpleasant animal reminders are disgusting. Some disgusting things may remind us of our animal nature, but they are not disgusting because they do so.

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According to Rozin, Haidt, and McCauley (2008, p. 761), “anything that reminds us that we are animals elicits disgust.” This “Animal Reminder Hypothesis” is widely cited in analyses of the causes of disgust (e.g., Beck, 2011; Herz, 2012; Nussbaum, 2004; Olatunji et al., 2007). Disgust is sometimes considered a basic emotion and thus one of the building blocks of a person’s emotional life, with a universal biologically hardwired mechanism. Disgust is also sometimes said to play a role in a surprisingly large range of psychological processes: to be part of the behavioral immune system, to form the basis of certain moral judgments, to influence interactions with out-group members and voting, and to be linked to diseases such as eating disorders, obsessive–compulsive disorder, and Huntington’s disease (see Rozin et al., 2008; Strohminger, 2014). Thus, understanding what causes disgust is a major task of affective science. This article asks whether being reminded that you are an animal is one of the causes.

Rozin and colleagues (2008) argued that we humans consider ourselves very different from and superior to other animals and are therefore disgusted at the thought of being like an animal (see also Haidt, McCauley, & Rozin, 1994; Haidt, Rozin, McCauley, & Imada, 1997; Rozin & Fallon, 1987; Rozin, Haidt, & McCauley, 1999, 2000). Indeed, prototypically disgusting events (odor, disease, defecation, injury) are ones that humans share with animals. Incest elicits disgust because it reminds us of our sexual animal

nature (Rozin & Haidt, 2013). Similarly, Kasperbauer (2015) proposed that because it is established that animal reminders elicit disgust, what needs explanation is how we cope with pet dogs and cats. Other theorists, however, have raised doubts about the Animal Reminder Hypothesis: Human beings readily and favorably compare themselves to some animals, yet are not disgusted (Royzman & Sabini, 2001; Tybur, Lieberman, Kurzban, & DeScioli, 2013). Being reminded of our animal nature would have no negative impact on survival or reproduction, and therefore there is no evolutionary rationale for developing an avoidance of such reminders (Al-Shawaf & Lewis, 2013).

Empirical evidence has been advanced as support for the Animal Reminder Hypothesis. According to ethnographic reports from many cultures, animal names are used as insults (Rozin et al., 2008). Individuals or groups that are often the target of others’ disgust reaction, such as interracial couples (Skinner & Hudac, 2017) or out-groups (Harris & Fiske, 2006), are also similarly given animal names. Bodily fluids produced by both human and nonhuman animals, such as mucus and sweat, are universally disgusting, and the only body product that is not disgusting is tears, which are considered uniquely human (Rozin & Fallon, 1987). Participants were more willing to try unfamiliar food when its animal origin was camouflaged in cooking (Hamerman, 2016).

Kollareth and Russell (2016) proposed and offered evidence for a modification of the Animal Reminder Hypothesis. In a series of six studies, participants indicated the intensity of their disgust reaction to pleasant and unpleasant animal-reminder stories and pictures. Pleasant animal reminders reminded respondents of their animal nature (even more powerfully than did unpleasant ones), but were not disgusting. Only unpleasant animal reminders were disgusting. The present study further examined this modified version of the hypothesis—the claim that unpleasant animal reminders elicit disgust. Prior research has clearly shown that unpleasant disgusting events remind us that humans are like other animals, but

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the question is whether they are disgusting *because* they remind us of our animal nature. In other words, is there empirical support for the Unpleasant Animal Reminder Hypothesis?

One initial question was whether all unpleasant animal reminders are disgusting. Perhaps, people can be unpleasantly reminded of their animal nature and yet have emotional reactions other than disgust. Thus, Study 1 examined unpleasant pictures of events presenting danger or suffering in situations that both humans and nonhuman animals face. To enhance the animal reminder aspect of the event, participants were shown parallel human and animal pictures and were explicitly reminded that animals face the same situation.

The next question was whether those unpleasant animal reminders that elicit disgust do so because they remind us of our animal nature. Many unpleasant disgust elicitors do indeed remind us of our animal nature. For example, many unpleasant disgusting events occur equally in humans and in other animals: death, poor hygiene (Cox, Goldenberg, Pyszczynski, & Weise, 2007; Goldenberg, Pyszczynski, Greenberg, & Solomon, 2000; Goldenberg et al., 2001), and violation of the exterior form of the body such as gore, deformity, and mutilation (Olatunji et al., 2007; van Overveld, de Jong, Peters, & Schouten, 2011). In such cases, however, the disgust-eliciting event has two features: its specific content (such as the body odor or sight of a mutilated body) and its ability to remind a witness that similar events occur with other animals. Such research, therefore, confounds the animal reminder with the specific content. Even when some disgusting events remind us of our animal nature, they may not be disgusting because they remind us of our animal nature. Therefore, a more rigorous test was sought. Studies 2 and 3 asked whether, for the same event, giving an explicit and vivid reminder that animals do such things adds to the disgust reaction. Studies 1–3 were approved by the Boston College Internal Review Board. Inclusion criteria for participants required current residency in the United States and speaking English as a native language. For each study, all data collected are reported here.

Study 1: Animal Reminders Elicit Fear and Sadness

Do all unpleasant animal reminders elicit disgust? Participants were presented pictures of events that present danger or suffering that human beings share with animals. Parallel pictures showed an animal performing the same action to make the animal reminder as vivid as possible. For example, one pair of pictures showed a man running away from fire in a building and a deer running away from a forest fire. Participants were also explicitly reminded that human beings share these events with animals. Although both the Animal Reminder Hypothesis and the Unpleasant Animal Reminder Hypothesis predict that these reminders elicit disgust, sadness and fear seemed more likely responses. Previous studies showed that appraisal of danger is related to fear (Poulton & Andrews, 1994) and suffering is related to sadness (Fultz, Schaller, & Cialdini, 1988).

Participants rated their emotional reaction to a picture of a human either doing something dangerous or suffering. Before the rating, they saw a picture of an animal doing more or less the same thing. There were 10 pairs of pictures, 5 for danger and 5 for suffering. The 10 pairs were presented in a between-subjects design. Thus, each participant saw one pair of pictures. The par-

ticipant initially saw only the human picture, then the human picture alongside the animal picture with an explicit statement that animals sometimes do what humans do, and then again only the human picture, to which the participants rated their emotional reaction.

Method

Participants. Participants were 200 Americans (98 women, 102 men, $M_{\text{age}} = 36.18$ years, range: 18–65 years) recruited through Amazon Mechanical Turk. For each event type (danger v. suffering), sample size was 100. The main comparison of interest was disgust v. fear reaction to danger stimuli and disgust v. sadness reaction to suffering stimuli. A statistical power analysis showed that with a sample size of 100 for each event type, for a dependent-sample *t* test, there is 85% power for detecting a small sized effect ($d = 0.3$) with a .05 criterion of statistical significance (two-tailed).

Pictures. Five pairs of pictures (taken from Google images) presented events of danger: a man running away from fire in a building/a deer running away from forest fire; a man facing a huge wave towering over him/a dog facing a huge wave towering over it; a man dangling from a mountain cliff/a goat on a mountain cliff; a man facing a huge tiger/a deer facing a huge tiger; a man running away from an elephant/a deer running away from a lion.

Five pairs of pictures (taken from Google Images) presented events of suffering: a man searching for water in a desert/a bird looking for water in a pipe; a man seeing his wife in pain/a bird seeing its mate in pain; a man looking weak and tired/a dog looking weak and tired; a woman suffering from illness/a bird suffering from illness; a human drowning in water/a dog drowning in water.

Emotion response scale. The response format listed six emotions: grossed-out, disgusted, angry, sad, scared, happy, and pleased. Participants could choose as many or as few emotions as they wanted by clicking “yes” or “no” for each. For any emotion that was clicked “yes,” the participant was asked to rate its intensity with a 7-point scale (ranging from 1 = *barely* to 7 = *extremely*). The score for each emotion label was 0 for “no” and the intensity rating for “yes.” Thus, the range was 0 to 7.

Overall feeling scale. Participants rated, on a single item with a 7-point scale (ranging from 1 = *extremely good* to 7 = *extremely bad*), how the picture, overall, made him or her feel.

Animal reminder scale. A single question (manipulation check) asked about the extent to which the picture reminded the participant that human beings in many ways are like animals. The question was accompanied by a 7-point scale (ranging from 1 = *not at all* to 7 = *very much*).

Procedure. Participants were randomly assigned to one of 10 cells: 2 event types (danger v. suffering) \times 5 picture pairs. Thus, each participant saw only one pair of pictures. The pair of pictures was presented in three steps: First, the participants saw the human picture, along with a request to pay attention to the picture. Second, on the next screen, the participants saw the same human picture again, but alongside the matching animal picture, accompanied with a verbal statement. For example, for the pictures of a human and a dog drowning, the statement was “Let us remind you that animals also drown.” In the third screen, the participant saw the human picture again alone and used the emotion response scale

to report his or her emotional response to the human picture. Finally, the participant indicated overall how good or bad the picture made him or her feel and the extent to which the human picture reminded him or her that human beings in many ways are like animals.

Results and Discussion

Preliminary analyses. The pictures were intended to be unpleasant to the participants and the manipulation, pairing human pictures with similar animal pictures, aimed to remind participants of their animal nature. In preliminary analyses, the questions were whether the pictures were unpleasant and whether the manipulation was effective.

Unpleasantness of pictures. The events shown in the human pictures were unpleasant. On average, participants rated their overall feeling to the pictures as bad. In single-sample *t* tests, mean overall feeling rating for each type of event was significantly greater than the midpoint of the scale (4), which would be neither good nor bad: danger ($M = 5.18$, $SD = 1.09$) and suffering ($M = 5.51$, $SD = 0.95$), $t_s(99) > 11.25$, $ps < .001$, $ds > 1.12$.

Being reminded of animal nature. The manipulation was effective: In single-sample *t* tests, participant mean animal reminder rating for each type of event was significantly above a floor effect (2): danger ($M = 4.02$, $SD = 1.61$) and suffering ($M = 4.17$, $SD = 1.96$), $t_s(99) > 11.04$, $ps < .001$, $ds > 1.11$.

Emotional reactions to the two types of event. The hypothesis being tested was that pictures presenting danger or suffering, even when they remind participants of their animal nature, elicit fear or sadness, respectively, more than disgust. There was support for the hypothesis: Participant emotional rating differed depending on the type of event. In an analysis of variance with emotion (5 levels: *scared*; *sad*; *angry*; composite disgust score [*disgusted* and *grossed-out* averaged, Cronbach's $\alpha = .75$]; composite happiness score *happy* and *pleased* averaged, Cronbach's $\alpha = .83$) as a repeated measures dependent variable and event type (2 levels: danger v. suffering) as between-subjects variable, there was a significant effect for emotion, $F(4, 792) = 158.78$, $p < .001$, $\eta^2 = .44$, no significant effect for event type, $F(1, 198) = 0.03$, $p = .870$, and, critically, a Significant Emotion \times Event Type interaction, $F(4, 792) = 38.95$, $p < .001$, $\eta^2 = .16$.

The significant Emotion \times Event type interaction was pursued by comparing the emotion ratings for danger and suffering events separately. For events presenting danger, participants felt scared and only minimally disgusted (see Table 1). In paired-sample *t* tests with Bonferroni correction, fear was significantly greater than disgust and each other emotion. The composite disgust score was 0.29 on a 0–7scale. Disgust did not differ significantly from happiness. Fear was also the emotion with the highest mean intensity for each of the pictures presenting danger (see Table S1 in the supplemental materials for the analysis).

For events presenting suffering, participants felt sad and, again, only minimally disgusted (see Table 1). In paired-sample *t* tests with Bonferroni correction, sadness was significantly greater than every other emotion, including disgust. The composite disgust score was 0.49 on a 0–7scale. Disgust did not differ significantly from happiness. Sadness was also the emotion with the highest mean intensity for each of the pictures presenting suffering (see Table S1 in the supplement for the analysis).

Table 1
Mean (and Standard Deviation) Emotion Rating for Each Type of Event, Study 1

Event type	Scared	Sad	Angry	Disgust	Happiness
Danger	3.86_a (2.36)	2.11 _b (2.34)	.35 _c (1.14)	.29 _c (.98)	.35 _c (1.00)
Suffering	1.81 _b (2.47)	3.94_a (2.35)	.56 _c (1.54)	.49 _c (1.20)	.28 _c (1.17)

Note. Means on an 8-point scale (0 = no to 7 = extremely). Mean disgust score is *disgusted* and *grossed-out* averaged, and mean happiness score is *happy* and *pleased* averaged. Mean values in bold indicate the emotion that had the highest mean intensity for a picture type. Different subscripts on mean values within a row indicate a significant difference between the intensity of the emotions. The comparisons were based on paired-sample *t*-test with Bonferroni correction.

Summary. Not all unpleasant animal reminders are disgusting. Looking at a picture that depicts danger (while being explicitly reminded that animals face the same danger) made participants feel scared, not disgusted. Looking at a picture that depicts suffering (while being explicitly reminded that animals too suffer) made participants feel sad, not disgusted.

Study 2: Animal Reminders That Elicit Disgust

Not all unpleasant animal reminders are disgusting, but some are. Thus, the question remains whether disgusting animal reminders are disgusting *because* they are animal reminders. Therefore, Study 2 asked if augmenting the animal reminder aspect of a disgusting event (through an explicit statement and a picture) would augment the disgust response. There were 10 picture pairs, all anticipated to elicit disgust at least to some degree. Each pair consisted of a picture of a human and a matching picture of an animal. The pictures were presented in two different conditions—human-only and human-plus-animal. In the human-only condition, the participant saw only the human picture, whereas in the human-plus-animal condition, the participant saw both the human and the matching animal picture along with an explicit statement that animals too undergo this type of event. In both conditions, the participant rated their emotional reaction to the picture of the human. There were thus 20 cells (2 conditions \times 10 pictures) in a between-subjects design.

Method

The method was the same as in Study 1, except as noted.

Participants. Participants were 400 Americans (206 women, 194 men, $M_{age} = 35.56$ years, range: 18–62 years). The main comparison of interest was disgust response between human-plus-animal and human-only conditions. A statistical power analysis showed that with a sample size of 400, for an independent-sample *t* test, there is 99% power for detecting a small-sized effect ($d = 0.3$) with a .05 criterion of statistical significance (two-tailed).

Pictures. There were 10 pairs of pictures. Each pair consisted of a human picture and a parallel animal picture. The pictures showed 10 different acts or conditions portrayed very similarly for humans and animals: a man vomiting/a tiger vomiting; a man urinating/a dog urinating; a human body decaying/an animal body decaying; a man sneezing/a giraffe sneezing; a sick boy/a sick dog; a boy dying/a dog dying; a boy licking on a glass/a dog licking on

a glass; a man covered in dirt/pigs covered in dirt; humans preparing human flesh as if to cook and eat it/a big crocodile eating a small crocodile; a woman unhappily looking at a happy couple/a swan looking at a swan couple.

Procedure. Participants were randomly assigned to one of 20 cells: 2 conditions (human-only v. human-plus-animal) \times 10 pictures. Thus, each participant saw only one of the 10 human pictures.

In the human-plus-animal condition, the participant saw the picture pair—human picture and the parallel animal picture—exactly following the procedure in Study 1.

In the human-only condition, the participant saw only the human picture, which was presented in two steps, instead of the three steps in the human-plus-animal condition. The second step in the human-plus-animal condition was omitted here. Thus, first, the participants saw the human picture, and then saw the human picture again and reported their emotional response to the human picture. Similar to the human-plus-animal condition, the participant also indicated overall how good or bad the picture was and the extent to which the human picture reminded them that human beings in many ways are like animals.

Results and Discussion

Preliminary analyses. The pictures were intended to be unpleasant to the participants, and the manipulation aimed to remind participants of their animal nature in the human-plus-animal condition more than in the human-only condition. The question was whether the pictures were unpleasant and whether the manipulation was effective.

Unpleasantness of pictures. The events shown in the human pictures were unpleasant. On average, participants rated their overall feeling to the pictures as bad. In single-sample *t* tests, participant mean overall feeling rating for events in each condition were significantly greater than the midpoint of the scale (4), which would be neither good nor bad: human-only condition ($M = 5.49$, $SD = 1.09$) and human-plus-animal condition ($M = 5.42$, $SD = 1.17$), $ts(199) > 17.10$, $ps < .001$, $ds > 1.20$. In an independent-sample *t* test, there was no significant difference for the overall

feeling rating between the conditions, $t(398) = 0.66$, $p = .507$, $d = 0.06$.

Being reminded of animal nature. Participants were reminded of their animal nature in both the conditions. In single-sample *t* tests, participant mean animal reminder rating within each condition was significantly above a floor effect (2): human-plus-animal condition ($M = 4.23$, $SD = 2.04$) and human-only condition ($M = 3.79$, $SD = 1.96$) $ts(199) > 12.82$, $ps < .001$, $ds > 0.90$. More importantly, the manipulation was effective: In an independent-sample *t* test, participants in the human-plus-animal condition were reminded of their animal nature more than were participants in the human-only condition, $t(398) = 2.20$, $p = .029$, $d = 0.22$.

Disgust reactions in the two conditions. Because participants in the human-plus-animal condition were reminded of their animal nature more than were participants in the human-only condition, both Rozin et al.'s (2008) Animal Reminder Hypothesis and Kollareth and Russell's (2016) Unpleasant Animal Reminder Hypothesis predict greater disgust in the human-plus-animal condition than in the human-only condition. That prediction was not supported. Indeed, overall the reverse was found: The composite disgust score (*disgusted* and *grossed-out* averaged, Cronbach's $\alpha = .87$) in the human-only condition ($M = 3.57$, $SD = 2.53$) was greater than that in the human-plus-animal condition ($M = 2.81$, $SD = 2.49$). In a general linear mixed model analysis of variance on the composite disgust score with picture (10 levels) as a random factor, and condition (2 levels) as a fixed factor, there was a significant effect for condition, $F(1, 9) = 11.47$, $p = .008$, $\eta^2 = .03$, and for picture, $F(9, 9) = 11.48$, $p = .001$, $\eta^2 = .21$ (see Table 2 for the main effect of picture), but no significant Picture \times Condition interaction, $F(9, 380) = 0.99$, $p = .450$. Analyses for *disgusted* and *grossed-out* ratings separately showed the same pattern. (See Table S2 in the supplemental materials for the analyses for *disgusted*, *grossed-out*, and each of the other emotions.)

Disgust reaction for each picture separately. The two animal reminder hypotheses fared poorly, but because of the importance of the Animal Reminder Hypothesis, the data were explored further to search for events in which an augmented animal re-

Table 2
Mean (and Standard Deviation) Composite Disgust Score for Each of 10 Pictures of a Human Action, Overall and for the Two Conditions, Study 2

Picture	Overall	The difference between conditions				
		Human-plus-animal	Human-only	Difference	95% Confidence Interval	Effect Size (Cohen's <i>d</i>)
Cannibalism	5.59 _a (1.97)	5.82 (1.73)	5.35 (2.21)	.47	-.79, 1.74	.24
Vomiting	4.15 _{ab} (2.26)	3.57 (2.46)	4.72 (1.93)	-1.15	-2.56, .26	-.52
Decay	3.90 _{bc} (2.29)	3.35 (1.91)	4.45 (2.54)	-1.10	-2.54, .34	-.49
Sneezing	3.75 _{bc} (2.26)	3.35 (2.22)	4.15 (2.29)	-.80	-2.24, .65	-.35
Urinating	3.60 _{bc} (2.57)	3.35 (2.80)	3.85 (2.36)	-.50	-2.15, 1.15	-.19
Dying	2.59 _{bcd} (2.15)	2.22 (2.11)	2.95 (2.18)	-.73	-2.10, .65	-.34
Sick	2.29 _{cd} (2.66)	1.52 (2.18)	3.05 (2.93)	-1.53	-3.17, .13	-.59
Hygiene	2.24 _{cd} (2.27)	2.30 (2.33)	2.17 (2.27)	.13	-1.35, 1.60	.06
Jealousy	1.94 _d (2.21)	1.67 (1.87)	2.20 (2.53)	-.53	-1.95, .90	-.24
Licking	1.89 _d (2.15)	.95 (1.64)	2.82 (2.22)	-1.87	-3.12, -.63	-.96

Note. Means on an 8-point scale (0 = no to 7 = extremely). The composite disgust score is the average of *disgusted* and *grossed-out* ratings. The pictures are ranked on the basis of overall mean values. For overall mean values, different subscripts in the column indicate a significant difference between the emotion intensity. The comparisons were based on one-way analysis of variance with Bonferroni correction on the composite disgust score with picture (10 levels) as between-subject variable.

minder augmented the disgust reaction. Table 2 shows the mean and standard deviation of the composite disgust scores in the human-plus-animal and in the human-only conditions separately for each picture—ranked on the basis of the difference scores (human-plus-animal minus human-only). Both animal reminder hypotheses would predict a positive difference score for each picture as there would be an increment in disgust in the human-plus-animal condition. Overall, the set of pictures was not subject to a ceiling effect: Some of the pictures were rated above the scale midpoint as disgusting even in the human-alone condition, but some were below the midpoint of the scale; of the latter, licking, sick, dying, and jealousy provided ample room for the explicit animal reminder to increase the disgust reaction. However, in all these cases, the reverse was found: In eight of the 10 pictures, the difference score was negative—mean composite disgust score was greater in the human-only condition than in the human-plus-animal condition, even though, for only one of the pictures (licking) was this difference statistically significant, $t(38) = 3.04$, $p = .004$. (Lack of significance is likely related to the modest n (20) for each picture separately and the relatively large variances obtained.) For the other two pictures—cannibalism and hygiene—the pattern was reversed, thus consistent with both Animal Reminder Hypotheses: Mean composite disgust score was greater in the human-plus-animal condition than in the human-only condition. For these two pictures, the difference between the conditions was not significant and the difference scores were the smallest of all 10 pictures.

Summary. Some events elicit disgust, and current theory in psychology predicts that the more the event reminds someone of their animal nature, the more disgusting the event becomes. Contrary to this prediction, adding an explicit and vivid reminder that animals too undergo the same event tended to make that event seem *less* disgusting.

Study 3: Animal Reminders for Physical Disgust Versus Norm Violation Events

In Study 2, being reminded of our animal nature tended to lessen the disgust reaction; this effect was unexpected and therefore is best replicated with new stimuli before firm conclusions are drawn. In addition, two stimuli tended in the opposite direction: an increase (albeit small and nonsignificant) in disgust with an explicit animal reminder. This effect requires further exploration. The two pictures that showed an increase in disgust when paired with an animal reminder were cannibalism and extremely poor hygiene. These pictures may have been interpreted as showing violations of social or moral norms. Humans in our society are normatively obligated to avoid eating each other or allowing themselves to be filthy. These two results from Study 2 are no more than hints, but worth following up all the same, for they suggest that Rozin's Animal Reminder Hypothesis may be valid in certain cases. In contrast, the activities that showed the strongest decrement in disgust were related to physical disgust elicitors without a moral connotation, such as body fluids, sickness, decay, and death.

Chapman and Anderson (2012) categorized the set of disgust elicitors into physical disgust elicitors and norm violations. This distinction suggests that perhaps animal reminders may have a different effect on disgust depending on the type of elicitor. Perhaps the Animal Reminder Hypothesis may be valid for norm

violations, whereas for events consisting of physical disgust elicitors, being reminded of animal nature may lead to a decrement in disgust. Study 3 therefore examined pictures that presented either physical disgust events or norm violations. The method was the same as in Study 2, but with new specific events and new pictures.

Method

The method was the same as in Studies 1 and 2, except as noted.

Participants. Participants were 400 Americans (203 women, 197 men, $M_{\text{age}} = 35.06$ years, range: 19–64 years). The main comparison of interest was disgust response to the human pictures between human-plus-animal and human-only condition for physical disgust and norm violation events separately. A statistical power analysis showed that with a sample size of 200 for each event-type, for an independent-sample t test, there is 85% power for detecting a small sized effect ($d = 0.3$), with a .05 criterion of statistical significance (two-tailed).

Pictures. Five pictures presented physical disgust events: a wound on a human being/a wound on a horse; a human being sweating/an elephant sweating; a man's body abnormally covered with body hair/a monkey's body covered with hair; mucus coming out of the nose of a woman/mucus coming out of the nose and mouth of a horse; a human picking lice on another's hair/a monkey picking lice on another monkey's hair.

Five pictures presented norm violation events: a woman when being with her partner secretly holds another man's hand/a bird flying into a nest to find another bird with its partner; a man passing by a woman lying on the wayside/a bison running away from another bison that is caught by a lion; two football players in a tussle/two deer locked their horns in a tussle; a man aggressively looking at another man who cowers/a wolf aggressively over another wolf who cowers; a woman displaying the upper portion of her breasts in front of a man/a peacock displaying its feathers in front of a peahen.

Results and Discussion

Preliminary analyses. The pictures were intended to be unpleasant to the participants, and the manipulation aimed to remind participants of their animal nature in the human-plus-animal condition more than in the human-only condition. The preliminary question was whether the pictures were unpleasant and whether the manipulation was effective.

Unpleasantness of pictures. The events shown in the human pictures were unpleasant. On average, participants rated their overall feeling to the pictures as bad. In single-sample t tests, participant mean overall feeling rating for each type of event and in each condition was significantly greater than the midpoint of the scale (4), which would be neither good nor bad: physical disgust events (human-only condition [$M = 5.25$, $SD = 0.83$] and human-plus-animal condition [$M = 5.13$, $SD = 1.08$]); and norm violations (human-only condition [$M = 4.99$, $SD = 1.10$] and human-plus-animal condition [$M = 4.95$, $SD = 1.06$], $t_s(99) > 8.98$, $p_s < .001$, $d_s > 0.89$).

In an analysis of variance on the overall feeling rating with event type (physical disgust v. norm violation) and condition (human-only v. human-plus-animal) as fixed factors, there was a significant effect for event type, $F(1, 396) = 4.84$, $p = .032$, $\eta^2 =$

.01, but not for condition, $F(1, 396) = 0.61, p = .434$, and not for event Type \times Condition interaction, $F(1, 396) = 0.16, p = .696$. For the effect of event type, the overall feeling rating in the physical disgust event ($M = 5.19, SD = 0.96$) was greater than that in the norm violation event ($M = 4.97, SD = 1.07$).

Being reminded of animal nature. Participants were reminded of their animal nature both in the type of events and in both the conditions. In single-sample t tests, participant mean animal reminder rating within each event type and within each condition was significantly above a floor effect (2): physical disgust events (human-plus-animal condition [$M = 3.85, SD = 1.92$] and human-only condition [$M = 3.30, SD = 1.64$]; and norm violations (human-plus-animal condition [$M = 4.36, SD = 1.99$] and human-only condition [$M = 3.71, SD = 2.09$]), $t_s(99) > 7.92, p_s < .001, d_s > 0.79$.

More importantly, the manipulation was effective. Animal reminder rating in the human-plus-animal condition was greater than in the human-only condition: In an analysis of variance on the animal reminder rating with condition (human-only v. human-plus-animal) and event-type (physical disgust v. norm violation) and as fixed factors, there was a significant effect for condition, $F(1, 396) = 9.7 \times$ Event type interaction, $F(1, 396) = 0.07, p = .795$. For the effect of condition, animal reminder rating in the human-plus-animal condition ($M = 4.11, SD = 1.97$) was greater than that in the human-only condition ($M = 3.51, SD = 1.89$). For the effect of event type, the animal reminder rating for norm violation ($M = 4.04, SD = 2.07$) was greater than for physical disgust event ($M = 3.57, SD = 1.81$).

Disgust reactions in the two conditions. The hypothesis tested was that an animal reminder leads to lessened disgust for a physical disgust event, but to increased disgust for a norm violation. The hypothesis was not supported. Indeed, both for physically disgusting events and for norm violation events, animal reminders lessened disgust. In an analysis of variance on the composite disgust score (*disgusted* and *grossed-out* averaged, Cronbach's $\alpha = .86$) with condition (human-only v. human-plus-animal) and event type (physical disgust v. norm violation) as fixed factors,

there was a significant effect for condition, $F(1, 396) = 4.59, p = .033, \eta^2 = .01$, and for event-type, $F(1, 396) = 99.58, p < .001, \eta^2 = .20$, but, critically, no significant Condition \times Event-Type interaction, $F(1, 396) = 0.92, p = .338$. For the effect of condition, the composite disgust score in the human-only condition ($M = 2.68, SD = 2.40$) was greater than that in the human-plus-animal condition ($M = 2.23, SD = 2.31$). For the effect of event type, the composite disgust score for physically disgusting event ($M = 3.51, SD = 2.25$) was greater than for norm violation ($M = 1.40, SD = 1.99$).

Disgust reaction for each event separately. In the study design, pictures were nested within event-type; a set of 5 pictures presented physically disgusting events and another set of 5 pictures presented norm violations. Because of this nested design, in the results reported above, the individual pictures were neglected to examine the Condition \times Event type interaction. Here the Condition \times Picture interaction was further examined for each event type separately. For physically disgusting pictures, similar to the overall analysis, the composite disgust score in the human-only condition ($M = 3.84, SD = 2.10$) was greater than that in the human-plus-animal condition ($M = 3.18, SD = 2.34$). In an analysis of variance on the composite disgust score with condition (human-only v. human-plus-animal) and picture (5 levels) as fixed factors, there was a significant effect for condition, $F(1, 190) = 4.75, p = .031, \eta^2 = .02$, and for picture, $F(4, 190) = 6.62, p < .001, \eta^2 = .12$ (see Table 3 for the main effect of picture), but not for Condition \times Picture interaction, $F(4, 190) = 0.32, p = .862$. Analyses for *disgusted* and *grossed-out* ratings separately showed the same pattern, even though, for *disgusted*, the difference between the conditions was not significant. (See Table S3 in the supplemental materials for the analyses for *disgusted*, *grossed-out*, and each of the other emotions.)

For pictures presenting norm violation, the composite disgust score in the human-only condition ($M = 1.53, SD = 2.11$) was greater than that in the human-plus-animal condition ($M = 1.28, SD = 1.85$). However, this difference was not significant. In an analysis of variance on the composite disgust score with condition

Table 3
Mean (and Standard Deviation) Composite Disgust Score for Each of Five Physical Disgust and Five Norm Violation Pictures of a Human Action, Overall and for the Two Conditions, Study 3

Picture	Overall	The difference between conditions				
		Human-plus-animal	Human-only	Difference	95% Confidence Interval	Effect Size (Cohen's d)
Physical disgust						
Mucus	4.77 _a (1.89)	4.50 (2.13)	5.05 (1.62)	-.55	-1.76, .66	-.29
Wound	3.80 _{ab} (2.20)	3.60 (2.35)	4.00 (2.07)	-.40	-1.82, 1.02	-.18
Body hair	3.32 _{bc} (2.45)	3.15 (2.70)	3.50 (2.21)	-.35	-1.93, 1.23	-.14
Lice	3.25 _{bc} (2.15)	2.60 (2.15)	3.90 (2.00)	-1.30	-2.63, .03	-.62
Sweat	2.41 _c (1.92)	2.07 (1.73)	2.75 (2.07)	-.67	-1.90, .55	-.35
Norm violation						
Cheating	2.26 _a (2.43)	2.32 (2.67)	2.20 (2.24)	.12	-1.45, 1.70	.05
Showing off	1.90 _{ab} (2.24)	1.55 (1.71)	2.25 (2.66)	-.70	-2.13, .73	-.31
Not helping	1.11 _b (1.35)	1.07 (1.38)	1.15 (1.37)	-.07	-.95, .80	-.06
Fighting	.90 _b (1.73)	.92 (1.71)	.87 (1.79)	.05	-1.07, 1.17	.03
Dominating	.85 _b (1.65)	.52 (1.03)	1.17 (2.07)	-.65	-1.70, .40	-.40

Note. Means on an 8-point scale (0 = no to 7 = extremely). The composite disgust score is the average of *disgusted* and *grossed-out* ratings. The pictures are ranked on the basis of overall mean values. For overall mean values, different subscripts in the column indicate a significant difference between the emotion intensity. The comparisons were based on one-way analysis of variance with Bonferroni correction on the composite disgust score with picture (5 levels) as between-subject variable.

(human-only v. human-plus-animal) and picture (5 levels) as fixed factors, there was a significant effect for picture, $F(4, 190) = 4.35$, $p = .002$, $\eta^2 = .08$ (see Table 3 for the main effect of picture), but not for condition, $F(1, 190) = 0.83$, $p = .362$, and not for Condition \times Picture interaction, $F(4, 190) = 0.80$, $p = .797$. Analyses for *disgusted* and *grossed-out* ratings separately showed the same pattern. (See Table S3 in the supplemental materials for the analyses for *disgusted*, *grossed-out*, and each of the other emotions.)

Disgust reaction for each picture separately. Because of the importance of the Animal Reminder Hypothesis, the data were further explored to search for some type of event in which the animal reminder augmented the disgust response. Similar to Study 2, both Animal Reminder Hypotheses fared poorly when results were analyzed separately for each picture. Table 3 shows the mean and standard deviation of the composite disgust scores in the human-plus-animal and the human-only conditions separately for each of the 10 pictures. Animal reminder hypotheses would predict a positive difference score for each picture, as there would be an increment in disgust in the human-plus-animal condition. With one exception, the pictures were not subject to a ceiling effect: Only the mucus picture was rated above the scale midpoint as disgusting even in the human-alone condition, and thus each of the pictures provided ample room for an explicit animal reminder to increase disgust reaction. However, for each of the pictures presenting physical disgust events, the reverse was found: The composite disgust score in the human-only condition was more than in the human-plus-animal condition, even though this difference was not statistically significant in any one picture. (Lack of significance is likely related to the modest n (20) for each picture separately and the relatively large variances obtained.) Three of the pictures presenting norm violation, again, had a reverse pattern to that predicted by the Animal Reminder Hypotheses: The composite disgust score in the human-only condition was more than in the human-plus-animal condition. In 2 of the pictures, however, the composite disgust score in the human-plus-animal condition was more than in the human-only condition. For each of these 5 pictures, the difference between the conditions was not statistically significant.

Summary. The findings of Study 2 were replicated: Adding an explicit and vivid animal reminder to disgusting events made them *less* disgusting. This effect was clear for physical disgust events, but may not hold for all norm violations. Still, for norm violations, there was no increment in disgust by adding an animal reminder.

General Discussion and Conclusion

The most disgusting events we humans encounter are events we share with nonhuman animals. Such disgusting things remind us that we, too, are animals. However, these events appear not to be disgusting *because* they remind us we are animals. Animal reminders per se are not disgusting. In a previous set of studies, pleasant events that remind us of our animal nature did not elicit disgust (Kollareth & Russell, 2016). Thus, the remaining question was whether or not this was true for *unpleasant* animal reminders.

In an initial study, participants were shown photographs of unpleasant events and reminded that animals, too, undergo such events. Some of these photographs presented humans facing dan-

ger, others suffering. These unpleasant animal reminders failed to elicit disgust. They elicited fear and sadness instead.

Of course, some unpleasant events both remind us of our animal nature and elicit disgust. However, it is not clear if an event's ability to remind us of our animal nature is what elicits the disgust. The animal reminder property is confounded with other properties of the event. The Unpleasant Animal Reminder Hypothesis predicts that augmenting the animal reminder aspect of an event augments the disgust elicited. In a second study, participants saw photographs of human actions that elicit disgust: in one condition, with an animal reminder, in the other condition, without. Adding the animal reminder (an explicit statement and a picture of an animal) indeed reminded participants of the animal nature of the human action. However, surprisingly, adding an animal reminder *decreased* the amount of disgust elicited. This result replicated in a third study.

It might be argued that the pictures of animals distracted participants from their disgust reaction, but this argument is implausible: When rating their disgust reaction, the participants were looking at the human picture. Whether or not the animal picture was distracting, it was a clear and vivid reminder that animals do what humans do, and that reminder, whatever other properties it might have had, was predicted by both hypotheses here tested to increase the disgust at the human picture. That did not happen.

The finding poses a challenge to the hypothesis of an animal reminder as the cause of disgust. One previous study had challenged the generality of the Animal Reminder Hypothesis by showing that only unpleasant—but not pleasant—animal reminders are disgusting (Kollareth & Russell, 2016). The present study adds to this challenge by showing that not all unpleasant animal reminders are disgusting and that even the unpleasant animal reminders that do elicit disgust may not do so, because they remind us of our animal nature.

The empirical findings here are consistent with previous arguments against the Animal Reminder Hypothesis: Animals that are far removed from humans such as spiders and snakes are more disgusting than animals that more closely resemble humans (Royzman & Sabini, 2001). Many indigenous cultures emphasize human beings' continuity and relationship to, not separation from, the animal world (Salmon, 2000). Human beings readily and favorably compare themselves to some animals, yet are not disgusted (Tybur et al., 2013). There is no evolutionary account for being disgusted by animal reminder because such disgust in this case would not have aided survival or reproduction (Al-Shawaf & Lewis, 2013). Other views that highlight the importance of human-animal relationships undermine the view that animal reminders are disgusting (Amiot & Bastian, 2015; Herzog, 2010).

The three studies reported here, although informative tests of the Animal Reminder Hypothesis, had many limitations. The number of pictures was small. Although some pictures were emotionally evocative, others were not. Sometimes it is difficult to capture normative violations in still photographs, and perhaps short videos would be more efficient. All participants were Americans recruited through Amazon Mechanical Turk. Perhaps the manipulations—a photo of an animal and statement reminding participants that animals engage in actions similar to that of the human—were too explicit to have any effect, and more subtle animal reminders might have a different effect. The study used self-report measures

of disgust. Perhaps other measures—facial expressions, neural reactions, physiological symptoms, and so forth—would yield different results. On the other hand, there is no agreement on the right way to assess disgust, and lack of progress on this front presents an additional challenge to any hypothesis (including the Unpleasant Animal Reminder Hypothesis) that uses the concept of disgust.

The findings invite exploration and clarification. First, there was an unexpected reduction in disgust overall in Study 2 when explicitly reminded of animal nature. This effect was then replicated in Study 3. Moreover, the lack of a significant condition \times picture interaction in either study did not justify concluding that different pictures had a different effect. Still, perhaps in some cases being reminded of animal nature leads to more disgust, but in others to less disgust. There were differences for individual pictures: Eight of the 10 pictures in both Studies 2 and 3 saw a reduction in disgust with the explicit animal reminder. For four pictures—cannibalism, hygiene, cheating, and fighting—the animal reminder increased disgust, albeit by a very small amount and not significantly. For 3 of these pictures, the effect sizes were negligible, d s below 0.06. However, for cannibalism, there was a small effect size, $d = 0.24$. Perhaps cannibalism can give future researchers hints of cases where the Animal Reminder Hypothesis holds.

Another area for exploration is the effect of animal reminders for those who are prone to disgust. Research has examined individual differences in disgust sensitivity—how prone a person is to feeling disgust (Inbar, Pizarro, Knobe, & Bloom, 2009; Jones & Fitness, 2008; Terrizzi, Shook, & Ventis, 2010). In the studies reported here, there were large variances in the disgust reactions. Perhaps animal reminders are subject to individual differences—some find them disgusting, others do not.

Perhaps the Animal Reminder Hypothesis can be revised. Perhaps animal reminders lead to a lessened disgust because of a more conscious processing of the stimuli in the explicit animal reminder condition. Even though in both the conditions participants indicated their emotional reaction to the human picture, in the explicit animal reminder condition, disgust reaction may have been a less automatic response. Perhaps disgust reaction to animal reminders is more a nonconscious response. Still, revising the Animal Reminder Hypothesis to be restricted to nonconscious processing would be a major alteration.

Other studies have shown a link between dehumanization and disgust (Harris & Fiske, 2006; Sherman & Haidt, 2011; Skinner & Hudac, 2017). Perhaps being animal-like in some specific social context elicits disgust. However, others have pointed to emotions other than disgust such as anger, fear, envy, and contempt, involved in the process of dehumanization (Cottrell & Neuberg, 2005; Esses, Veenvliet, Hodson, & Mihic, 2008).

Current evidence suggests the following tentative conclusion. Disgusting events are animal reminders, but animal reminders per se are not disgusting. Pleasant events that remind us of our animal nature are not disgusting. Even some unpleasant events that reliably remind us of our animal nature are not disgusting, but elicit fear or sadness. Some unpleasant events that reliably remind us of our animal nature are disgusting, but not because they remind us of our animal nature. Indeed, in these cases, an explicit reminder of our animal nature tends to lessen disgust.

References

- Al-Shawaf, L., & Lewis, D. M. G. (2013). Exposed intestines and contaminated cooks: Sex, stress, & satiation predict disgust sensitivity. *Personality and Individual Differences, 54*, 698–702. <http://dx.doi.org/10.1016/j.paid.2012.11.016>
- Amiot, C. E., & Bastian, B. (2015). Toward a psychology of human–animal relations. *Psychological Bulletin, 141*, 6–47. <http://dx.doi.org/10.1037/a0038147>
- Beck, R. (2011). *Unclean: Meditations on purity, hospitality, and mortality*. Eugene, OR: Wipf and Stock.
- Chapman, H. A., & Anderson, A. K. (2012). Understanding disgust. *Annals of the New York Academy of Sciences, 1251*, 62–76. <http://dx.doi.org/10.1111/j.1749-6632.2011.06369.x>
- Cottrell, C. A., & Neuberg, S. L. (2005). Different emotional reactions to different groups: A sociofunctional threat-based approach to “prejudice.” *Journal of Personality and Social Psychology, 88*, 770–789. <http://dx.doi.org/10.1037/0022-3514.88.5.770>
- Cox, C. R., Goldenberg, J. L., Pyszczynski, T., & Weise, D. (2007). Disgust, creatureliness and the accessibility of death-related thoughts. *European Journal of Social Psychology, 37*, 494–507. <http://dx.doi.org/10.1002/ejsp.370>
- Esses, V. M., Veenvliet, S., Hodson, G., & Mihic, L. (2008). Justice, morality, and the dehumanization of refugees. *Social Justice Research, 21*, 4–25. <http://dx.doi.org/10.1007/s11211-007-0058-4>
- Fultz, J., Schaller, M., & Cialdini, R. B. (1988). Empathy, sadness, and distress: Three related but distinct vicarious affective responses to another’s suffering. *Personality and Social Psychology Bulletin, 14*, 312–325. <http://dx.doi.org/10.1177/0146167288142009>
- Goldenberg, J. L., Pyszczynski, T., Greenberg, J., & Solomon, S. (2000). Fleeing the body: A terror management perspective on the problem of human corporeality. *Personality and Social Psychology Review, 4*, 200–218. http://dx.doi.org/10.1207/S15327957PSPR0403_1
- Goldenberg, J. L., Pyszczynski, T., Greenberg, J., Solomon, S., Kluck, B., & Cornwell, R. (2001). I am not an animal: Mortality salience, disgust, and the denial of human creatureliness. *Journal of Experimental Psychology: General, 130*, 427–435. <http://dx.doi.org/10.1037/0096-3445.130.3.427>
- Haidt, J., McCauley, C., & Rozin, P. (1994). Individual differences in sensitivity to disgust: A scale sampling seven domains of disgust elicitors. *Personality and Individual Differences, 16*, 701–713. [http://dx.doi.org/10.1016/0191-8869\(94\)90212-7](http://dx.doi.org/10.1016/0191-8869(94)90212-7)
- Haidt, J., Rozin, P., McCauley, C., & Imada, S. (1997). Body, psyche, and culture: The relationship between disgust and morality. *Psychology and Developing Societies, 9*, 107–131. <http://dx.doi.org/10.1177/09713369700900105>
- Hamerman, E. J. (2016). Cooking and disgust sensitivity influence preference for attending insect-based food events. *Appetite, 96*, 319–326. <http://dx.doi.org/10.1016/j.appet.2015.09.029>
- Harris, L. T., & Fiske, S. T. (2006). Dehumanizing the lowest of the low: Neuroimaging responses to extreme out-groups. *Psychological Science, 17*, 847–853. <http://dx.doi.org/10.1111/j.1467-9280.2006.01793.x>
- Herz, R. (2012). *That’s disgusting: Unraveling the mysteries of repulsion*. New York, NY: Norton.
- Herzog, H. (2010). *Some we love, some we hate, some we eat: Why it’s so hard to think straight about animals*. New York, NY: Harper.
- Inbar, Y., Pizarro, D. A., Knobe, J., & Bloom, P. (2009). Disgust sensitivity predicts intuitive disapproval of gays. *Emotion, 9*, 435–439. <http://dx.doi.org/10.1037/a0015960>
- Jones, A., & Fitness, J. (2008). Moral hypervigilance: The influence of disgust sensitivity in the moral domain. *Emotion, 8*, 613–627. <http://dx.doi.org/10.1037/a0013435>
- Kasperbauer, T. J. (2015). Animals as disgust elicitors. *Biology & Philosophy, 30*, 167–185. <http://dx.doi.org/10.1007/s10539-015-9478-y>

- Kollareth, D., & Russell, J. A. (2016). Is it disgusting to be reminded that you are an animal? *Cognition and Emotion*, 1–15. <http://dx.doi.org/10.1080/02699931.2016.1221382>
- Nussbaum, M. C. (2004). *Hiding from humanity: Disgust, shame and the law*. Princeton, NJ: Princeton University Press.
- Olatunji, B. O., Williams, N. L., Tolin, D. F., Abramowitz, J. S., Sawchuk, C. N., Lohr, J. M., & Elwood, L. S. (2007). The disgust scale: Item analysis, factor structure, and suggestions for refinement. *Psychological Assessment*, 19, 281–297. <http://dx.doi.org/10.1037/1040-3590.19.3.281>
- Poulton, R. G., & Andrews, G. (1994). Appraisal of danger and proximity in social phobias. *Behaviour Research and Therapy*, 32, 639–642. [http://dx.doi.org/10.1016/0005-7967\(94\)90019-1](http://dx.doi.org/10.1016/0005-7967(94)90019-1)
- Royzman, E. B., & Sabini, J. (2001). Something it takes to be an emotion: The interesting case of disgust. *Journal for the Theory of Social Behaviour*, 31, 29–59. <http://dx.doi.org/10.1111/1468-5914.00145>
- Rozin, P., & Fallon, A. E. (1987). A perspective on disgust. *Psychological Review*, 94, 23–41. <http://dx.doi.org/10.1037/0033-295X.94.1.23>
- Rozin, P., & Haidt, J. (2013). The domains of disgust and their origins: Contrasting biological and cultural evolutionary accounts. *Trends in Cognitive Sciences*, 17, 367–368. <http://dx.doi.org/10.1016/j.tics.2013.06.001>
- Rozin, P., Haidt, J., & McCauley, C. R. (1999). Disgust: The body and soul emotion. In T. Dalgleish & M. J. Power (Eds.), *Handbook of cognition and emotion* (pp. 429–445). New York, NY: Wiley.
- Rozin, P., Haidt, J., & McCauley, C. R. (2000). Disgust. In M. Lewis & M. Haviland-Jones (Eds.), *Handbook of emotions* (2nd ed., pp. 637–651). New York, NY: Guilford Press.
- Rozin, P., Haidt, J., & McCauley, C. R. (2008). Disgust. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotions* (3rd ed., pp. 757–776). New York, NY: Guilford Press.
- Salmon, E. (2000). Kincentric ecology: Indigenous perceptions of the human–nature relationship. *Ecological Applications*, 10, 1327–1332.
- Sherman, G. D., & Haidt, J. (2011). Cuteness and disgust: The humanizing and dehumanizing effects of emotion. *Emotion Review*, 3, 245–251. <http://dx.doi.org/10.1177/1754073911402396>
- Skinner, A. L., & Hudac, C. M. (2017). “Yuck, you disgust me!” Affective bias against interracial couples. *Journal of Experimental Social Psychology*, 68, 68–77. <http://dx.doi.org/10.1016/j.jesp.2016.05.008>
- Strohming, N. (2014). Disgust talked about. *Philosophy Compass*, 9, 478–493. <http://dx.doi.org/10.1111/phc3.12137>
- Terrizzi, J. A., Jr., Shook, N. J., & Ventis, W. L. (2010). Disgust: A predictor of social conservatism and prejudicial attitudes toward homosexuals. *Personality and Individual Differences*, 49, 587–592. <http://dx.doi.org/10.1016/j.paid.2010.05.024>
- Tybur, J. M., Lieberman, D., Kurzban, R., & DeScioli, P. (2013). Disgust: Evolved function and structure. *Psychological Review*, 120, 65–84. <http://dx.doi.org/10.1037/a0030778>
- van Overveld, M., de Jong, P. J., Peters, M. L., & Schouten, E. (2011). The disgust scale-R: A valid and reliable index to investigate separate disgust domains? *Personality and Individual Differences*, 51, 325–330. <http://dx.doi.org/10.1016/j.paid.2011.03.023>

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