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Children's Extension of Disgust to Physical and Moral Events

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Adults use the terms *revolting*, *gross*, and *disgusting* to describe entities and actions, such as feces, rotten food, and sex with corpses, which elicit a certain visceral response. But adults also apply such expressions to certain sociomoral transgressions, such as cheating on one's spouse or stealing from the poor. Here, the authors explore whether young children associate disgust with physical and moral events by endorsing either verbal or facial expressions of disgust. Results indicate that children in Grades K, 2, and 4 ($N = 167$) label moral violations "disgusting" more often than nondisgusting physical acts or neutral negative acts but less often than physically disgusting acts. Likewise, children associate facial expressions of disgust with moral violations. These findings are discussed in the context of different theories about the relationship between physical disgust and moral disgust.

Keywords: disgust, morality, children, language, faces

> "I think all of those remarks are disgusting, to be perfectly frank, because of course President Bush cares about everyone in our country," the First Lady said Thursday in an interview with American Urban Radio Networks.
>
> —Associated Press, September 9, 2005

Disgust is a universal human emotion, linked to a characteristic set of physiological responses and a distinct facial expression (Ekman & Friesen, 1975; see Rozin, Haidt & McCauley, 2000, for review). The physiological response of disgust is elicited by a certain set of entities, including feces, vomit, blood, and rotten meat, and has been speculated to have evolved so as to keep us away from certain potentially dangerous or unhealthy substances (Pinker, 1997).

This is the standard view, defended by Darwin (1872/1965) and others, but it might be incomplete. Many scholars have pointed out that the notion of disgust—or at least the *language* of disgust—extends more broadly. When asked to list disgusting items, adults will list substances such as feces and vomit, but they will also include racists, hypocrites, liberals, conservatives, and other morally disfavored entities (Rozin et al., 2000). Disgust language is frequently used in writing and casual conversation to describe events such as cheating on one's spouse, stealing money from a poor person or, as in the quote that begins this article, saying that the president does not care enough about minorities. Yet none of these acts necessarily involve any of the physical elicitors of disgust. This extension of disgust language to the sociomoral domain is not a quirk of either English or of Western culture; it is found in other cultures, and is arguably universal (Haidt, Rozin, McCauley, & Imada, 1997).

One theory of this extension is that although disgust originally evolved as a rejection response to certain potential foods, and thus a defense of the physical body, it has been expanded to a more abstract defense of the soul, and hence anything that reminds us that we are animals elicits disgust. Some moral violations are thought of as animalistic and hence disgusting (Rozin et al., 2000). A related proposal is that disgust has an essentially moral aspect to it. Kass (2002), for instance, has suggested that, on some occasions, "repugnance is the emotional expression of deep wisdom, beyond wisdom's power completely to articulate it" (p. 150), and Miller (1998) has proposed that "there are certain large constraints on being human and we have certain emotions that tell us when we are pressing against these constraints in a dangerous way" (p. 86) and views disgust as one of those emotions.

On the other extreme, one might argue that the only events and entities that we really find disgusting are those related to feces, vomit, and the like; disgust is just not an abstract emotion (Bloom, 2004; Royzman & Sabini, 2001). From this perspective, when we describe moral acts as disgusting, we are using disgust as a metaphor, to say that we are *disgusted* by our government's tax policy is akin to saying that we are *thirsty* for knowledge or *lusting* after a new car. It is a potent metaphor; to say that something is disgusting is to mark it as objectively and concretely vile, and it taints whoever endorses it (Miller, 1997).

The theories differ, then, as to whether or not visceral disgust (what Rozin calls "core disgust") and moral disgust are the same sort of thing, and this issue is being addressed in many ways (e.g., Bloom, 2004; Haidt et al., 1997; Nabi, 2002; Royzman & Sabini, 2001; Simpson, Carter, Anthony, & Overton, 2006), including with fMRI methods (Harris & Fiske, 2006; Moll, de Oliveira-Souza, Bramati, & Grafman, 2002; Moll et al., 2005). Here we provide some developmental data that bear on this issue.

Even infants are sensitive to expressions of disgust by the adults around them (Hertenstein & Campos, 2004), and children begin to reject certain disgusting objects, such as feces, as foods by about the age of 2 or 3 (Rozin, Hammer, Oster, & Marmora, 1986). However, a more nuanced understanding of disgust, including properties such as contamination, does not appear until a few years

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later (Fallon, Rozin, & Pliner, 1984; Rozin & Fallon, 1987; see Bloom, 2004, for review). This is the first attempt, however, to ask children of different ages about the events that they see as "disgusting" and to see whether children associate verbal and facial expressions of disgust with sociomoral transgressions that do not involve the corporeal signatures of visceral disgust.

Experiment 1

Method

Participants. Participants included 20 kindergarteners ($M = 6$ years 0 months; 10 boys), 20 second graders ($M = 7$ years 11 months; 12 boys), and 20 fourth graders ($M = 9$ years 11 months; 10 boys). Participants were recruited from public elementary schools in a rural community in northwest Alabama. Participants were primarily Caucasian Americans, with a small minority of African Americans, and were lower-middle to middle class.

Materials and procedure. The session began with the following instructions: "Have you ever heard someone say that something is disgusting? In this game, we are going to talk about what kinds of things can be called disgusting." Children were then presented with 16 brief questions all in the following form: "Can [action] be called disgusting?" (see Appendix). (We had originally planned to ask "Is this disgusting?" but pilot studies revealed some children—mostly boys—will construe this as a challenge and insist that, for them, nothing is disgusting.) Eight actions involved physical behaviors, further divided into four behaviors that adult pilot participants consistently indicated as disgusting (e.g., putting your hand in some slime) and four nondisgusting behaviors using the same verbs (e.g., putting your hand in fresh water). The other eight actions involved nonphysical negative behaviors, divided into four moral violations (e.g., being very mean to someone) and four neutral, but still negatively valenced, acts (e.g., watching a sad movie with a friend). Items were presented in two different pseudorandom orders, where no two items from the same category appeared consecutively. For each question, children were instructed to respond "yes" or "no" and responses were recorded manually and audiotaped.

Results

Responses were scored so that participants received 1 point for each time that they endorsed an action as "disgusting," yielding a score of 0 to 4 for each of the four types of actions. A 3 (grade) × 4 (question type) repeated measures analysis of variance (ANOVA) demonstrated a significant main effect for question type, $F(3, 171) = 149.77$, $p < .001$, $\eta^2 = .724$, but no significant main effect of age or significant interaction (see Figure 1).

Children across all ages were more likely to describe the disgusting physical items as disgusting ($M = 3.75$) than the nondisgusting physical items ($M = 0.45$), $t(59) = 28.16$, $p < .001$. They were also more likely to endorse the moral violations as disgusting ($M = 1.52$) than the negative, neutral acts ($M = 0.40$), $t(59) = 5.53$, $p < .001$. But, they were significantly less likely to endorse the moral violations as disgusting than they were to endorse the disgusting physical items, $t(59) = 9.78$, $p < .001$. There was no significant difference between the nondisgusting physical items and the negative, neutral items. Taken together, these results suggest that children apply the term *disgusting* to nonphysical moral violations beginning at a young age, although they still apply it more consistently to physically disgusting events.

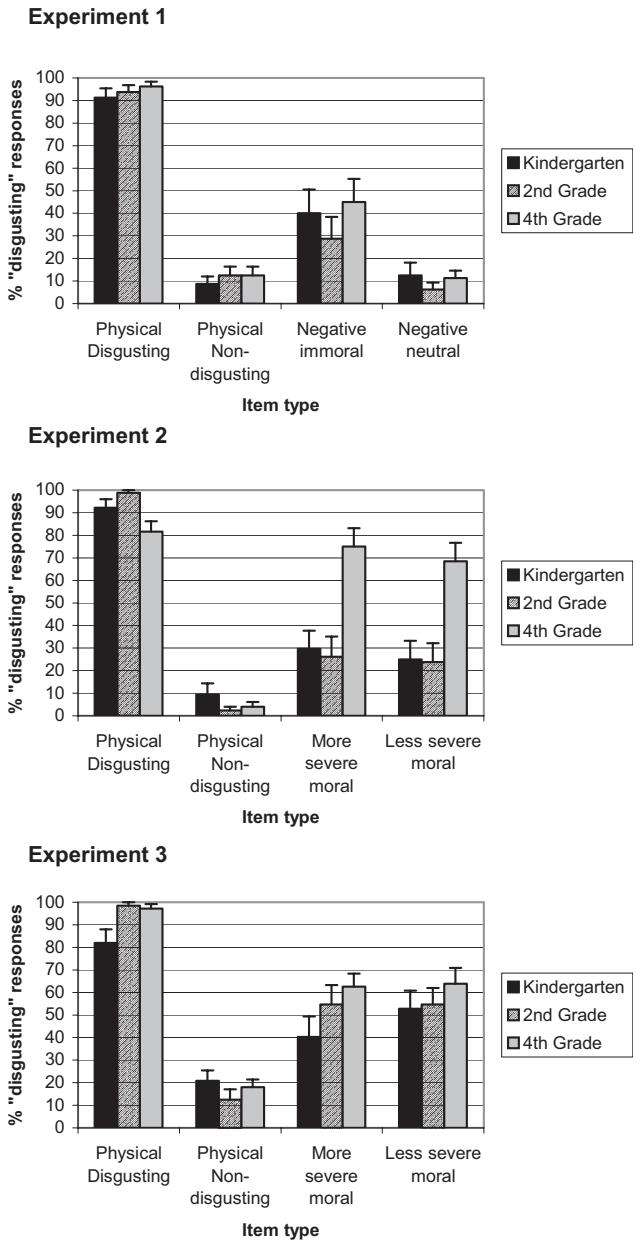

Figure 1. Mean percentage of "disgusting" responses for each type of item in Experiments 1, 2, and 3.

A closer examination of scores for the moral violation items revealed a bimodal distribution, where 28.3% of all participants endorsed every moral violation as disgusting (yielding a score of 4), whereas 53.3% of all participants did not endorse a single moral violation as disgusting (yielding a score of 0; see Figure 2). This pattern suggests that, for each age group, a subset of children perceives the term *disgusting* as applicable to various examples of moral violations but not to other negative acts, as suggested by consistently low scores on the negative, neutral items.

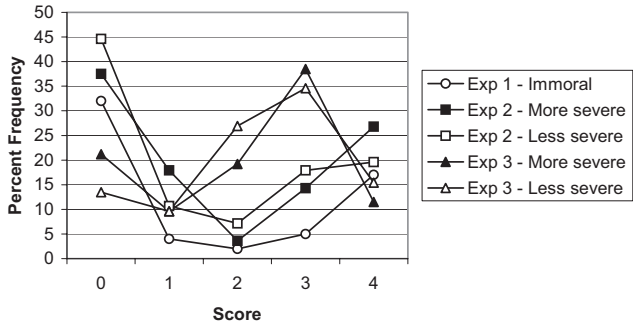

Figure 2. Percentage of participants with each score for the negative immoral items in Experiment 1 and for each type of moral item in Experiments 2 and 3.

Experiment 2

For adults, not every immoral act is described as "disgusting." Whereas it sounds right to use the term for the murder of a baby, for instance, it would be odd to extend it to an act of shoplifting—even if you believe shoplifting to be wrong. The severity of the act might play a role here; given the highly charged nature of words like *disgusting* and *revolting*, it would be inappropriate to apply them to minor transgressions. In addition, Rozin et al. (2000) have argued that adults express true sociomoral disgust only when evaluating moral violations that are seen as revealing a certain lack of humanity—as animal-like.

This raises the possibility that the relatively low level of moral disgust responses in Experiment 1 (significantly lower than the core disgust responses) is because our immoral acts were just not bad enough. The simplest way to address this would be to expose children to new stories with severe moral violations (genocide, etc.), but this poses both ethical and practical problems. Instead, in Experiment 2, we presented children with stories that differed in the extent of their moral wrongness. If children are sensitive to moral factors in their judgments of disgust, they should tend to rank the worse stories as "disgusting" more often than the less bad stories.

Method

Participants. Participants included 16 kindergarteners (M = 6 years 3 months; 7 boys), 21 second graders (M = 8 years 3 months; 12 boys), and 19 fourth graders (M = 10 years 4 months; 11 boys). Participants were recruited from public elementary schools in the same rural community as Experiment 1.

Materials and procedure. Instructions and the question format were identical to Experiment 1. The same eight physical behaviors were presented and the other eight items involved moral violations similar to those presented in Experiment 1. However, in this experiment, the moral violations were altered to include four instances where the violation involved an act of personal betrayal or disloyalty (e.g., stealing money from a small child, telling mean lies about a good friend) and four instances involving the same basic actions but without the additional violation of social behavior (e.g., stealing candy from a store, telling mean lies about a bad person; see Appendix). Items were presented in two different pseudorandom orders and were recorded in an identical manner as Experiment 1.

Results

Participant responses were scored as in Experiment 1. A 3 (grade) × 4 (question type) repeated measures ANOVA demonstrated a significant main effect for question type, $F(3, 159) = 140.08$, $p < .001$, $\eta^2 = .725$, a significant main effect of age, $F(2, 53) = 5.79$, $p = .005$, $\eta^2 = .179$, and a significant interaction, $F(6, 159) = 12.97$, $p < .001$, $\eta^2 = .329$ (see Figure 1).

Children across all ages were much more likely to describe the disgusting physical items as disgusting (M = 3.64) than the nondisgusting physical items (M = 0.20), $t(55) = 32.88$, $p < .001$. They were also more likely to call the more severe sociomoral violations disgusting (M = 1.75) than the less severe ones, (M = 1.57), $t(55) = 2.10$, $p = .04$. There remained clear distinctions between scores on the physical items and severe sociomoral violations, $t(55) = 7.30$, $p < .001$, and the physical items and less severe sociomoral violations, $t(55) = 6.33$, $p < .001$. Thus, children distinguished between all four types of items when judging whether the term disgusting was applicable.

Post hoc Tukey least significant difference tests revealed that the main effect of age was driven by the fact that fourth graders were generally more likely to label items as disgusting than were second graders, $p = .009$, or kindergarteners, $p = .003$. A series of one-way ANOVAs further revealed that the Age × Question Type interaction was driven by differences between the fourth graders and the younger children on the physically disgusting and more severe sociomoral items. Fourth graders were more likely to label both the more severe, $F(2, 55) = 10.54$, $p < .001$, and the less severe moral violations, $F(2, 55) = 9.36$, $p < .001$, as disgusting than were their younger counterparts. A bimodal distribution where 26.8% of all participants endorsed every severe sociomoral violation as disgusting and 37.5% of all participants did not endorse any severe sociomoral violations as disgusting also emerged (see Figure 2). Therefore, there seems to be an overall increase in labeling a nonphysical event disgusting as children mature, yet there remains a subset of children in each grade that never does so.

The results of Experiment 2 replicated Experiment 1 in that children consistently applied the appropriate label to the physical items. Similarly, a large minority of children consistently labeled the moral violations as disgusting, and they were more likely to do so in more severe cases. However, the difference between the two types of moral items is relatively subtle—it is significant only when all of the children are summed, not for any of the age groups taken individually.

Experiment 3

The patterns seen in Experiments 1 and 2 raise the question of why some children consistently designate immoral acts as disgusting, whereas other children of their same age do not. If such expressions are a metaphorical way of expressing disapproval for another person's behavior, then the difference may lie in language skills: Those children who describe immoral acts as disgusting may have had more exposure to this kind of expression or have a greater capacity for using metaphorical language in general. In contrast, if the emotion of disgust genuinely extends to the moral

realm, then the difference is not specific to language, but instead it may relate to cognitive and emotional development. More generally, the question arises as to whether children will judge these immoral acts as disgusting in a nonlinguistic context. To explore this, the judgments in Experiment 3 involved asking children to evaluate a facial expression of disgust.

Method

Participants. Participants included 18 kindergarteners (M = 6 years 4 months; 9 boys), 15 second graders (M = 8 years 3 months; 7 boys), and 18 fourth graders (M = 10 years 3 months; 8 boys). Participants were recruited from public elementary schools in the same rural community as the previous experiments.

Materials and procedure. Rather than use the term *disgusting* as in the previous experiments, children indicated whether a disgust face (drawn from Ekman & Friesen's classic set, 1975; see Figure 3) could be associated with the event in the story. The session began with the following instructions: "Some faces go with certain stories and some do not. In this game, I want you to tell me if the face I show you could go with the story." Children then heard two brief examples. The first example was, "Someone was walking through the woods and saw a very scary bear. Could this face go with the story?" and the child was presented with a fear face. In the second example, the child was told, "Someone went to the circus and saw a funny clown. Could this face go with the story?" and was presented with a sad face. All children answered these pretest questions correctly. The test stimuli were then presented using the following format: "Someone [performed an action]. Could this face go with the story?" The faces were never described to the children—in particular, the words *disgusting*, *gross*, and so on, were never used. The actions described were the same 16 actions that were presented in Experiment 2 and the same pseudorandom orders and recording procedures were used.

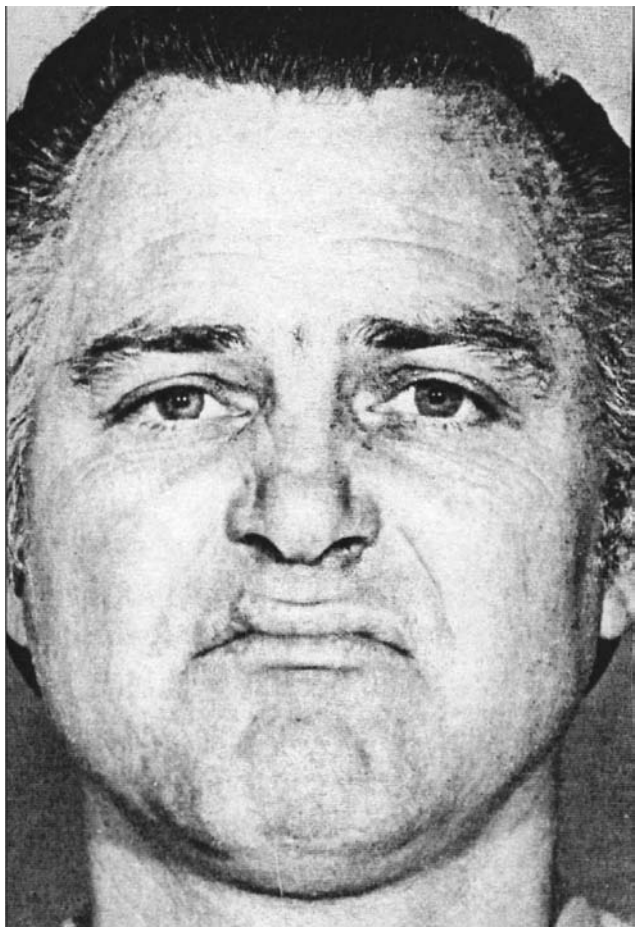

Figure 3. Disgust face used in Experiment 3. Reprinted with permission from the "Pictures of Facial Affect" set, copyright by Dr. Paul Ekman.

Results

Experiment 3 was scored identically to the previous two experiments. A 3 (grade) × 4 (question type) repeated measures ANOVA demonstrated a significant main effect for question type only, $F(3, 147) = 91.27$, $p < .001$, $\eta^2 = .651$ (see Figure 1).

The results of Experiment 3 closely resemble the earlier experiments in that children showed different responses for the two types of physical items (M = 3.69 for physical disgusting items; M = 0.69 for physical nondisgusting items), $t(51) = 20.65$, $p < .001$. This suggests that children understood the task and were able to apply the disgust face appropriately. On the sociomoral items, children endorsed the disgust face at approximately the same rates for both categories (M = 2.10 for more severe items; M = 2.29 for less severe items), $t(51) = 1.17$, $p = .249$, although they were significantly more likely to endorse the disgust face for each kind of sociomoral violation than for the physical nondisgusting items: for severe items, $t(51) = 7.44$, $p < .001$; for less severe items: $t(51) = 8.28$, $p < .001$. They were less likely to endorse the disgust face for each kind of sociomoral violation than for the physical disgusting items: for severe items, $t(51) = 7.62$, $p < .001$; for less severe items, $t(51) = 7.21$, $p < .001$. Unlike Experiments 1 and 2, the sociomoral scores did not show a bimodal distribution (see Figure 2).

General Discussion

In three experiments, children were asked what types of behaviors can be called "disgusting" or whether a disgust face is applicable to a given behavior. The children in kindergarten, second grade, and fourth grade consistently distinguished between physically disgusting and nondisgusting events. They also consistently judged moral violations to be disgusting, more so than merely negative events but less so than physical events, and were sensitive to the severity of the moral violations when using the word *disgusting*, although not when judging the appropriateness of a disgust face.

Our findings have implications for the ongoing debate about the nature of moral disgust. The findings that even kindergarteners will describe immoral actions as "disgusting" and state that such actions "go with" a disgusted face suggest that the extension of disgust is unlikely to be limited to purposeful acts of rhetoric, contrary to a strong version of the metaphor proposal. Young children's use and comprehension of metaphors continue to develop from preschool well into adolescence (see Vosniadou, 1987, for a review), and they are closely related to factors such as the child's prior conceptual knowledge and familiarity with the con-

text of the metaphor. It has also been suggested that metaphor production may actually decline during the elementary school years as children focus more on the literal meanings of words (Gardner, Winner, Bechhofer, & Wolf, 1978). Although differences in understanding metaphors or exposure to disgust language may underlie some of the individual differences seen among children in our tasks, it is unlikely that the kindergarteners would have endorsed the disgust expressions at rates so similar to the second and fourth graders if the ability to understand or produce metaphors was the sole basis for their judgments. Likewise, children's use of the basic language of disgust with respect to physical events (e.g., saying "yucky") emerges in the second or third year (Bretherton & Beeghly, 1982), yet children may not have a full command of the meaning of emotion terms such as *disgust* (and their corresponding faces) until early elementary school (Russell & Widen, 2002).

On the other hand, children at all ages are much less prone to associate immoral acts with disgust language or disgust faces than they are to associate disgust with physically disgusting acts, and some children apparently do not apply disgust language to morality at all. The bimodal distribution of responses among children of all ages in Experiments 1 and 2 may be explained by cultural learning factors such as increased exposure to disgust language in the context of morality in some families. Unfortunately, we do not have data available about family use of disgust terms for moral violations. However, given the consistency of this pattern across age groups and the relative cultural homogeneity of this particular community (there is little student mobility in this area and most parents come from similar educational and religious backgrounds), it seems unlikely that differences in exposure to disgust expressions can fully account for our findings. Our findings may also have been limited by the forced-choice design of our tasks; future research would benefit from designs that allow for a wider range of response choices and probe for multiple emotions.

As discussed earlier, our moral violations were not particularly severe. It might be that if they were more "animalistic," any differences between core disgust and moral disgust would dissolve. This is an important direction for further research, although one problem with making these stories too severe is that severe moral violations often elicit thoughts and images of core disgust events, which include corpses and violations of the body envelope. This problem arises with some recent adult fMRI studies. For instance, Harris and Fiske (2006) found that pictures of "out-groups," such as the homeless and drug addicts, generate an amygdala response associated with disgust, but these pictures included depictions of people injecting themselves with needles, something that would elicit core disgust, and so the neural response might have little to do with social categorization per se. Moll et al. (2005) explored contrasting neural signatures of disgust stimuli versus what they described as "indignation" stimuli, but, as they themselves noted, their indignation stimuli were themselves disgusting. (They include, for instance, "You took your mother out to dinner. At the restaurant, she saw a dead cockroach floating on the soup pan.") To fairly test whether moral disgust really is disgust, one needs to construct immoral events that do not contain, or elicit, features of core disgust.

Suppose it turns out that certain moral violations *do* elicit an affective and neural disgust response in adults, even if they lack the features of core disgust (see Jones, 2007, for a review of unpublished research along those lines). If so, it would raise the question of *why*: Why would people respond to someone who raids a pension fund with the same visceral response that they respond to dog feces? As noted earlier, it has been suggested that all forms of disgust are elicited by reminders of our animal nature. But this seems unlikely, given that many reminders of our animal nature (such as the fact that people have DNA) are not disgusting at all, and some good candidates for morally disgusting entities (such as Nazis or hypocrites) have nothing much to do with nonhuman animals. Theoretically, the connection between core disgust and moral disgust remains a mystery.

What we know is that children come to find entities like feces and vomit to be disgusting, and they are able to describe them as such, and that adults direct the language of disgust to what they see as moral violations, such as unfair accusations about a loved one. Our current findings suggest some parallels and some differences in how children think about core disgust versus moral disgust. These do not resolve the puzzle we started with, but they do constrain the scope of possible solutions and suggest future lines of developmental research—such as examining the correlates of individual differences and contrasting different types of stories—that are worth pursuing.

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Appendix

Stimuli Used in Experiments 1, 2, and 3

Experiment 1

Physical Disgusting

1. Smelling a rotten piece of fruit
2. Falling into a pile of garbage
3. Touching a worm
4. Putting your hand in some slime

Physical Nondisgusting

1. Smelling a fresh piece of bread
2. Falling into a pile of sand
3. Touching a rock
4. Putting your hand in some fresh water

Negative Immoral

1. Being very mean to someone
2. Teasing someone so much that they cry
3. Making a new rule that is really unfair
4. Breaking your friend's favorite toy on purpose

Negative Neutral

1. Watching a sad movie with a friend
2. Failing a test in school
3. Knocking down a tower you built out of blocks
4. Breaking your friend's favorite toy by accident

Experiments 2 and 3

Physical Disgusting

1. Smelling a bottle of rotten milk
2. Falling into a pile of garbage
3. Touching a worm
4. Putting your hand in some slime

Physical Nondisgusting

1. Smelling a fresh piece of bread
2. Falling into a pile of sand
3. Touching a rock
4. Putting your hand in some fresh water

More Severe Moral Violation

1. Stealing money from a little kid to buy candy
2. Making up mean lies about a good friend
3. Breaking a promise to a person who is very sick
4. Cheating on a test to win a special award

Less Severe Moral Violation

1. Stealing candy from the checkout line at a supermarket
2. Making up mean lies about a bad person
3. Breaking a promise to a person who is very rude
4. Cheating on a test to keep from failing a class

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