CHAPTER 40

Disgust

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For North Americans, elicitors of disgust come from nine domains: food, body products, animals, sexual behaviors, contact with death or corpses, violations of the exterior envelope of the body (including gore and deformity), poor hygiene, interpersonal contamination (contact with unsavory human beings), and certain moral offenses (Haidt, McCauley, & Rozin, 1994; Rozin, Haidt, McCauley, & Imada, 1997). What unites these disparate domains? Although all involve negative or unpleasant events, there are many kinds of negative events, such as pain, confrontations, and frightening interactions, that are not disgusting. The goal of this chapter is to make sense of this varied set of elicitors—that is, to describe the meaning of disgust within both developmental and cultural contexts. We argue for a path of development in individuals and cultures that extends from the presumed origin of disgust as a rejection response to bad tastes, in the service of protecting the body, to the full range of elicitors listed above, more appropriately described as in the service of protecting the soul.

DEFINING DISGUST

There are two classic papers describing disgust, published some 70 years apart. The first, a chapter in Darwin's The Expression of the Emotions in Man and Animals (1872/1965), defined disgust as referring to "something revolting, primarily in relation to the sense of taste, as actually perceived or vividly imagined; and secondarily to anything which causes a similar feeling, through the sense of smell, touch and even of eyesight" (p. 253). Darwin related disgust not only to the experience of revulsion but to a characteristic facial expression. The second paper, by psychoanalyst Andras Angyal (1941), held that "disgust is a specific reaction towards the waste products of the human and animal body" (p. 395). Angyal related the strength of disgust to the degree of intimacy of contact, with the mouth as the most sensitive focus.

Tomkins's (1963) description of disgust expanded on Angyal's idea that disgust is a reaction to unwanted intimacy. According to Tomkins, disgust is "recruited to defend the self against psychic incorporation or any increase in intimacy with a repulsive object" (p. 233). Our own definition of disgust, or what we call "core disgust" in this chapter, derives from those of Darwin, Angyal, and Tomkins: "Revolution at the prospect of (oral) incorporation of an offensive object. The offensive objects are contaminants; that is, if they even briefly contact an acceptable food, they tend to render that food unacceptable" (Rozin & Fallon, 1987, p. 23).

All of these definitions, and many others, focus on the mouth and real or imagined inges-
tion. Tomkins (1963, 1982) held that of all the emotions, disgust has the clearest linkage to a specific motivation (hunger), and functions to oppose this motive. Ekman and Friesen (1975) see disgust as an aversion that centers on oral rejection. Wierzbicka (1986) defines disgust as feeling bad about another person’s action. This feeling is “similar to what one feels when one has something in one’s mouth that tastes bad and when one wants to cause it to come to be out of one’s mouth” (p. 590).

Some have proposed sources other than ingestion as the origin of disgust. Freud (1905/1953) predictably linked it to sex, and others (e.g., Renner, 1944; Plutchik, 1980) see its origin as a defense against infection, with the skin playing a central role.

Miller (1997), in his broad review of disgust in the context of Western culture and history, disputes the claim that disgust originated as a food-related emotion. He argues that touch and smell are the senses most closely related to disgust, and that taste became associated with disgust more recently. Although we agree with Miller’s characterization of disgust in its current form as largely a social and moral emotion, we believe that the arguments for a food origin are very convincing (Rozin & Fallon, 1987). The facial expression of disgust can be seen as functional in rejecting unwanted foods and odors, and the most distinct physiological concomitant of disgust—nausea—is a food-related sensation that inhibits ingestion.

Another conception of the core of disgust, framed in terms of the concept of pollution, comes from Mary Douglas’s (1966) classic anthropological work, *Purity and Danger*. She relates dirt and pollution to a sense of violation of accepted categories, sometimes described as “matter out of place.” This captures the “uncanniness” of disgust, and no doubt is a significant part of the meaning of disgust. However, there is no substantial argument for this as the origin of disgust.

In keeping with our supposition that disgust originated as a food rejection is Darwin’s (1872/1965) claim that it is the phylogenetic residue of a voluntary vomiting system. Darwin designates the gape as the primary facial indicant of disgust; gapes have been described for a number of species, and indeed function to promote egress of substances from the mouth. Darwin (1872/1965) claims that disgust has food origins, holding that “The term ‘disgust,’ in its simplest sense, means something offen-

disgust as the basic emotion.

Disgust is on almost every list of basic emotions that has at least four emotions in it, from Darwin’s onwards (see, e.g., Ortony, Clore, & Collins, 1988, p. 27). Disgust emerges as a basic emotion whether the primary criterion is facial (Darwin, 1872/1965; Ekman & Friesen, 1975), semantic (Johnson-Laird & Oatley, 1989), or eclectic (Izard, 1977; Scherer, 1986, 1997). Disgust stands out among the basic emotions in that it is specifically related to a particular motivational system (hunger) and to a particular part of the body (mouth). Disgust is also important for social and developmental psychology in that, along with fear, it is a primary means for socialization.

Paul Ekman (1992) has provided the clearest articulation of the characteristics of a basic emotion, and disgust meets all nine of his criteria. We consider here four of the most critical properties thought to be essential to any basic emotion.

**Behavioral Component**

Disgust is manifested as a distancing from some object, event, or situation, and can be characterized as a rejection.

**Physiological Component**

Two types of physiological changes have been associated with disgust. One distinguishes disgust from other emotions: Only disgust is associated with a specific physiological state. This physiological state, nausea, is typically measured by self-report. Although nausea is neither a necessary nor a sufficient condition for the experience of disgust, it is correlated with disgust. Another specific physiological aspect of disgust has been suggested by Angyal (1941), who pointed to increased salivation (itself associated with nausea and as a response to bad tastes) as a concomitant of disgust.

In spite of a large literature devoted to the
search for physiological signatures of different emotions, we know of no experimental studies of the relation of disgust to nausea or salivation. Rather, the study of the physiological side of disgust has been limited to the standard set of autonomic responses explored by psychophysicologists. In this limited arena, it appears that disgust is associated with either minimal or a predominantly parasympathetic response, whereas fear and anger are associated with a predominantly sympathetic response (Levenson, Ekman, & Friesen, 1990; Levenson, 1992).

Expressive Component

The expressive component of disgust has been studied almost entirely with reference to the face. The characteristics of the "disgust face" have received particular attention from Darwin (1872/1965), Izard (1971), Ekman (1972; Ekman & Friesen, 1975), and Rozin, Lowery, and Ebert (1994). Scholars are not in complete agreement about a prototypical disgust face. Darwin emphasized the gape (in the Facial Action Coding System [FACS; Ekman & Friesen, 1978]), the gape is Action Unit [AU] 25 or 26, but he also referred to retraction of the upper lip (AU 10) and, to some extent, the nose wrinkle (AU 9), dropping of the mouth corners (AU 15), and a few other movements. Izard (1971) also emphasizes the gape and the upper lip retraction, with some associated movements. Ekman and Friesen (1975) focus on lip retraction (AU 10) and nose wrinkle (AU 9), along with a raising of the lower lip (AU 17). Finally, Rozin et al. (1994) suggest that the precise facial configuration may relate to the nature of the elicitor. It is clear from all of these accounts that activity centers around the mouth and nose, and that the movements tend either to discourage entry into the body (e.g., nose wrinkle, lower lip raise) or to encourage discharge (gape with or without tongue extension).

The *Natyashastra* (Masson & Patwardhan, 1970), an ancient Hindu treatise on drama (see Shweder & Haidt, Chapter 26, this volume), treats disgust as one of eight basic emotions. As described by Hejmadi (2000), the multiple portrayals of disgust designated in this document are dynamic (as opposed to the standard "frozen face" used in almost all Western research) and involve actions of the whole body, especially the hands. North American subjects, as well as Indians, are able to identify these disgust expressions (in both free report and forced choice among 11 emotion words) remarkably well (Hejmadi, Davidson, & Rozin, in press).

There is also an auditory expressive component to disgust, associated with an increase in fundamental frequency in speech (Scherer, 1986).

Qualia

*Qualia*, the mental or feeling component of emotion, may be at once the most central component of disgust and the most difficult to study. The *qualia* of disgust is often described as revulsion. In comparison to other basic emotions, the experience of disgust appears to be rather short in duration (Scherer & Wallbott, 1994). Disgust is often invoked in humor, and laughter is a common response (as opposed to the disgust face) in some disgust-eliciting situations.

CORE DISGUST

We have argued above that disgust began its evolutionary life as a distaste response, focused on the mouth. However a major theme of this chapter is that the elicitors and meaning of disgust have expanded far beyond distaste, such that there is now a qualitative difference between the two, and hence that distaste and disgust now constitute distinct psychological categories. In this and subsequent sections we chronicize the expansion of disgust from core disgust, through animal-nature disgust, interpersonal disgust, and moral disgust.

Disgust as a Category of Food Rejection

Disgust has been described as one of four categories of food rejection, the others being distaste (rejection motivated by bad sensory properties), danger (rejection motivated by fear of harm to the body), and inappropriateness (rejection of a food culturally classified as not edible) (Fallon & Rozin, 1983; Rozin & Fallon, 1987). Disgust is differentiated from danger and distaste in that the basis for rejection is ideational (knowledge of the nature or origin of an elicitor). Disgust differs from the category of inappropriateness (e.g., paper, marigolds, and sand) in that disgusting potential foods are thought to be offensive and contaminating.
Properties of Core Disgust

By the definition we have offered for core disgust, three components are required for the occurrence of the emotion: (1) a sense of oral incorporation (and hence a linkage with food or eating); (2) a sense of offensiveness; and (3) contamination potency.

Oral Incorporation

Rozin and Fallon (1987) have noted that the mouth is the principal route of entry of material things into the body, and hence can be thought of as the gateway to the body. Since putting external things into the body can be thought of as a highly personal and risky act, the special emotion associated with ingestion is understandable. The aversion response to an offensive entity in the mouth is usually stronger than response to the same entity on the body surface near but not inside the mouth, or inside the stomach (Rozin, Nemeroff, Gordon, Horowitz, & Voet, 1995).

The threat of oral incorporation is framed by a widespread belief that one takes on the properties of the food one eats ("You are what you eat"). This belief has been thought to be characteristic primarily of members of traditional cultures. Frazer (1890/1922), in The Golden Bough, noted: "The savage commonly believes that by eating the flesh of an animal or man, he acquires not only the physical but even the moral and intellectual qualities which are characteristic of that animal or man" (p. 573). This idea is consistent with common sense, since it is a general experience that when two things combine (in this case, a food and a person), the product has resemblances to both. Nemeroff and Rozin (1989) have found, using indirect methods (the Asch impressions technique), that even U.S. college students attribute boar-like qualities to boar eaters, and turtle-like qualities to turtle eaters.

Offensive Entities: Animals and Their Products

Angyal (1941) held that the center of disgust is animal (including human) waste products, which he saw as debasing. It is hard to avoid the conclusion that waste products have a special role in disgust. Body products are usually a focus of disgust, and are central to the related anthropological concept of pollution (Douglas, 1966; Meigs, 1978, 1984). There is widespread historical and cultural evidence for aversion to virtually all body products, including feces, vomit, urine, and blood (especially menstrual blood). For example, blood pollution at birth was a central aspect of ancient Greek religion (Parker, 1983).

In accord with Angyal's (1941) suggestion of an animal focus for disgust, Rozin and Fallon (1987) have proposed that the elicitor category for core disgust is all animals and their products as potential foods. Soler (1973/1979) argues that animal food prohibitions, such as those of the ancient Hebrews, should be seen as the rule, and that ingestion of a few animals or of specific animal parts is the exception. Thus Adam and Eve began as vegetarians, and it was only after the flood that animals were allowed by God into the human culture.

Almost all cultures eat a very small subset of potential animal foods. In North American culture, we consume only a small number of the hundreds of thousands of potentially edible animal species, and we tend to avoid the viscera, head, and a number of other parts of the few mammals that we do consume. Furthermore, as Angyal (1941) pointed out, in many cultures some care is taken to disguise the animal origin of animal food by cutting, chopping, and other culinary preparations, as well as by having names for animal foods (e.g., "pork," "beef," in English) that are distinct from the corresponding animal names.

Animals and their products seem cross-culturally to be the most favored of foods, and at the same time the most tabooed. In short, animal foods are emotionally charged (Tambiah, 1969) and tend to give rise to ambivalent responses. Many animal taboos involve disgust. Some animals are disgusting because they bear some resemblance to body products such as mucus (e.g., slugs), or because they are commonly in contact with rotting animal flesh, feces, or other human wastes (e.g., flies, cockroaches, rats, vultures, and other scavengers). Carnivorous land animals eat raw, often decaying animal flesh, and produce putrid feces. They are therefore disgusting at both ends. Herbivores are much less likely to be prohibited cross-culturally. Even the hunter-gatherer Kung bushmen, who eat a much wider variety of species than we do, reject rodents, carnivores, and most insects (Howell, 1986).

Two other categories of animal food prohibitions deserve mention. Animals that are in some sense clandestine (e.g., otherwise dangerous) and distinctly seer (danger) and those animals harmful to humans (Davey, 1993; Jain, Burgess, 1993) offer even less to the animal's base-soft disgust than fear.

Contamination

The contamination of a potential disgusting entity is universal among college students. A brief review of this phenomenon is thus justified, since many offenses of this nature are potentially small and large.

Disgust was common to Darwin (1872/1984) classic works.

Rozin and his colleagues often use the term "disgust" for pathetic magicians (1871/1974; 1902/1972), with contact, also in 1987; Rozin & Rozin and his colleagues often use the term "disgust" for pathetic magicians (1871/1974; 1902/1972), with contact, also in 1987; Rozin & Rozin and his colleagues often use the term "disgust" for pathetic magicians (1871/1974; 1902/1972), with contact, also in 1987; Rozin & Rozin and his colleagues often use the term "disgust" for pathetic magicians (1871/1974; 1902/1972), with contact, also in 1987; Rozin &
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some sense close to humans, either in appearance (e.g., other primates) or by virtue of a relationship with humans as pets, are rarely eaten. And finally, there is a group of anomalous animals that seem to produce a mixture of fear (danger) and disgust (e.g., spiders and snakes). These animals are feared, though they are rarely harmful to humans. Davey and his colleagues (Davey, 1993; Matchett & Davey, 1991; Ware, Jain, Burgess, & Davey, 1994; Webb & Davey, 1993) offer evidence that the aversion to these animals is based more on a motivation of dis-gust than fear.

Contamination

The contamination response (e.g., the rejection of a potential food if it even briefly contacted a disgusting entity) appears to be powerful and universal among adults. North American college students reject liked beverages after they have briefly contacted a sterilized cockroach (Rozin, Millman, & Nemeroff, 1986), and virtually all North Americans reject foods that have been handled or bitten by either unsavory or disliked persons (Rozin, Nemeroff, Wane, & Sherrod, 1989). Although this aversion is typically justified as an avoidance of disease, removal of this possibility (e.g., by sterilizing the offending dead cockroach) typically has only a small effect. The contamination property of disgust was commented upon, in passing, by both Darwin (1872/1965) and Angyal (1941) in their classic works.

Rozin and his colleagues have suggested that contagion effects may be instances of the sympathetic magical law of contagion (Tylor, 1871/1974; Frazer, 1890/1922; Mauss, 1902/1972), which essentially holds that "once in contact, always in contact" (Rozin & Fallon, 1987; Rozin & Nemeroff, 1990).

The law of contagion as applied to disgust is potentially crippling; everything we might eat or touch is potentially contaminated. We deal with this problem in a number of ways. First, contamination rules are developed in some cultures, such as the explicit rules establishing a threshold for contamination in the Hebrew dietary system (Grunfeld, 1982). These rules provide ritualistic relief but not necessarily psychological relief of a sense of contamination (Nemeroff & Rozin, 1992).

Most often, framing is the strategy that keeps potential contamination out of consideration— as when we do not think of the people in the kitchen who prepare our food in a restaurant, or the animal that was the source of our meat, or the fact that our bodies contain a host of disgusting substances. Indeed, as Allport (1955) noted and as a recent study has confirmed (Rozin, Haidt, McCauley, Dunlop, & Ashmore, 1999), we are disgusted by our own saliva as soon as it leaves our bodies, as when we reject drinking a glass of water that we have just spit into. The framing solution fails when the source of contamination/disgust is too salient. Thus, although we normally handle money without thinking of who touched it before us, this strategy might not protect us in the unusual case of a dollar handed over by a vagrant.

A second law of sympathetic magic, the law of similarity, accounts for some other aspects of disgust. The law of similarity, also dating from Tylor, Frazer, and Mauss (see Rozin & Nemeroff, 1990, and Nemeroff & Rozin, in press, for reviews), holds in one form that if things are superficially similar, then they resemble each other in a deep sense as well. In other words, appearance is reality. It accounts for the frequency observation that objects that look like something disgusting, but are known not to be, are often treated as disgusting. Thus we find that many North American college students are reluctant to consume imitation dog feces that they know are made out of chocolate fudge (Rozin, Millman, & Nemeroff, 1986). A combination of the laws of contagion and similarity causes many North Americans to say that they would be reluctant to consume a favorite beverage stirred by a brand-new comb or contaminated with a plastic replica of an insect (Rozin et al., 1989).

ANIMAL-NATURE DISGUST

Our discussion of disgust up to this point has focused on issues surrounding food and eating. We have presented core disgust as an oral defense in relation to potential foods, body products, and some animals. However when we asked North American and Japanese respondents to list the things they thought were disgusting, fewer than 25% of listed examples came from the three core disgust domains (Haidt, Rozin, McCauley, & Imada, 1997). Many of the other exemplars could be classified into four additional domains: inappropriate sexual acts, poor hygiene, death, and violations of the ideal body "envelope" or exterior form
(e.g., gore, deformity, obesity). In the four additional domains, the focus of threat spread from oral incorporation to contact with the body in general, and even offensive sights. This spread is captured in a psychoanalytic treatment of disgust: “In summary, any modality that represents a means of entry into the self or body—the mouth, the nose, the skin, the eyes—seems to play a part in the disgust experience” (Miller, 1986, p. 300).

Death and Disgust
Contact with death and corpses is a particularly potent elicitor of disgust. Two of the items in our 32-item Disgust Scale (discussed in more detail later) that correlate most highly with the total scale score fall into the death category: “Your friend’s pet cat dies, and you have to pick up the dead body with your bare hands” and “It would bother me tremendously to touch a dead body.” Furthermore, individuals who score high on disgust sensitivity also score high on a fear-of-death scale (Haidt et al., 1994).

The prototypical odor of disgust is the odor of decay, which is the odor of death. The centrality of death in disgust suggests a more general construal of disgust within a modified psychoanalytic framework. Rather than as a defense against coprophilia or sexuality, disgust can be understood as a defense against a universal fear of death. Becker (1973) has argued that the most important threat to the psyche is not sexuality and aggression, but the certainty of death. Only human animals know they are to die, and only humans need to repress this threat. In this framework, Becker’s “dental of death” is served by disgust, which helps to suppress thoughts or experiences that suggest human mortality.

These speculations about death lead naturally to an overarching description of disgust elicitors: Anything that reminds us that we are animals elicits disgust (Rozin & Fallon, 1987). An examination of the seven domains of disgust elicitors we have identified thus far suggests that disgust serves to “humanize” our animal bodies. Humans must eat, excrete, and have sex, just like animals. Each culture prescribes the proper way to perform these actions—by, for example, placing most animals off limits as potential foods, and all animals and most people off limits as potential sexual partners. People who ignore these prescriptions are reviled as disgusting and animal-like. Furthermore, we humans are like animals; in having fragile body envelopes that, when breached, reveal blood and soft viscera that display our commonalities with animals. Human bodies, like animal bodies, die. Envelope violations and death are disgusting because they are uncomfortable reminders of our animal vulnerability. Finally, hygienic rules govern the proper use and maintenance of the human body, and the failure to meet these culturally defined standards places a person below the level of humans. Animals are (often inappropriately) seen as dirty and inattentive to hygiene. Insofar as humans behave like animals, the distinction between humans and animals is blurred, and we see ourselves as lowered, debased, and (perhaps most critically) mortal.

Elia (1939/1978), in The History of Manners, concludes that “people, in the course of the civilizing process, seek to suppress in themselves every characteristic that they feel to be ‘animal’” (p. 120). Tambiah (1969) emphasizes the importance of this distinction for humans, and points to the paradox of human fascination for and aversion to animals. Ortner (1973) notes that the one body product that does not reliably elicit disgust is tears, and these are seen as uniquely human. And Leach (1964) has pointed out that animal words are used as insults in many cultures. In general, the ethnographic literature is filled with references to the fact that humans consider themselves better than animals, and they work to maintain a clear animal–human boundary. Violations of that boundary—for example, treating an animal as a person in a pet relationship—are rather rare cross-culturally.

Miller’s (1997) broad, historically based conception of disgust comes to a conclusion like ours: “... ultimately the basis for all disgust is us—that we live and die and that the process is a messy one emitting substances and odors that make us doubt ourselves and fear our neighbors” (p. xiv).

INTERPERSONAL DISGUST
The fact that direct or indirect contact with other people can elicit disgust was noted by Darwin (1872/1965). Furthermore, Angyal (1941) noted that other waste products.
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Disgust-producing events ranked a close second to anger-producing events in a cross-national study of “unfairness” in emotion-elicitng situ-

When we elicited lists of disgusting things from North American and Japanese informants, we found that the majority of instances referred to moral offenses (Haidt et al., 1997). Some of these items involved some sexuality or gore (e.g., being sexually molested, reading reports of Serbian atrocities), and are thus easily assim-

However, the word “disgusting” is often used as a synonym for “immoral” in situations that do not seem to be reminders of our animal nature.

Thus our subjects have told us that racists, child abusers, hypocrites, Republicans, and liberals are all disgusting. It is our guess that moral off-

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MORAL DISGUST

In an extensive recent cross-cultural study of emotional responses in 37 different cultures, Scherer (1997) reports on the sequence of appraisals that his theory of emotion proposes. Surprisingly, disgust shows the highest score on immorality of all seven emotions surveyed (including anger and shame). In a related study,
inal acts with "normal" human motivations, such as robbing banks, are seen as immoral but not disgusting. This kind of disgust may represent a more abstract set of concerns about the human–animal distinction, focusing not so much on the human body as on the human body–politic—that is, the human as a member of a cooperating social entity.

Shweder, Much, Mahapatra, and Park (1997) offer a theory of moral judgment that may help clarify the moral significance of disgust, contempt, and anger (the three other-condemning moral emotions; Izard’s [1977] "hostility triad"). The theory proposes that three codes of ethics underlie the morality of most cultures. One code, called the "ethics of community," focuses on issues of duty, hierarchy, and the proper fulfillment of one’s social roles. Violations of this code seem to elicit the emotion of contempt. A second code, the "ethics of autonomy," encompasses issues of rights and justice. This is the most fully elaborated code in Western societies, where violations of this code are usually associated with anger. A third code, called the "ethics of divinity," focuses on the self as a spiritual entity and seeks to protect that entity from degrading or polluting acts. We propose disgust as the emotion that guards the sanctity of the soul as well as the purity of the body. Hence we see a rough match between Shweder et al.’s three moral codes and the three other-directed moral emotions. We call this the "CAD triad hypothesis" (community–contempt, autonomy–anger, divinity–disgust) (Rozin, Lowery, Inada, & Haidt, 1999).

We have tested these predictions in a study of Japanese and U.S. college students, in which they were presented with situations in which one or the other of the moral codes were violated (Rozin, Lowery, et al., 1999). Subjects were asked to select either the relevant face (from a set of contempt, anger, and disgust faces) or the relevant word ("contempt," "anger," "disgust," or their Japanese translations). In both cultures, there was a substantial though far from perfect match between the Shweder et al. code and the emotion predicted.

The disgust–morality linkage may have developed in two directions. On the one hand, events that are widely considered to be disgusting (such as eating dog meat) may be treated as moral in some cultural contexts, such as those cultures in which the divinity code is operative. On the other hand, rather than assimilating moral violations to what is already disgusting, there seems to be some extension of the sense of disgust to a wide range of moral violations that have no obvious relation to the traditional disgust elicitors.

Disgust plays a special role in the moral domain as a means of socialization. Insofar as entities viewed as immoral are also disgusting, there is no temptation to have traffic with these entities. For example, as cigarette smoking has moved from being a preference to a negative moral value in the United States, there is an accompanying increase in disgust responses to cigarettes, cigarette smoke, cigarette residues (e.g., ashes), and cigarette smokers (Rozin & Singh, 1999). This process of conversion of an entity from a preference into a value has been called "moralization" (Rozin, 1997). It is often associated with the recruitment of a disgust response to the entity or activity in question. In the case of vegetarians, a disgust response to meat is more common in moral vegetarians than in health vegetarians (Rozin, Markwith, & Stoess, 1997).

**PREADAPTATION AND THE CULTURAL EVOLUTION OF DISGUST**

We believe that the "output" side of disgust (physiology, behavior, expression) has remained relatively constant in cultural evolution, and still bears noticeable similarities to its animal precursors. However, the elicitors and meaning of disgust have been transformed and greatly expanded in cultural evolution.

We have suggested a course of biological and cultural evolution of disgust, summarized in Table 40.1 (Rozin, Haidt, & McCauley, 1993; Rozin, Haidt, et al. 1997). The proposed origin is the rejection response to bad-tasting foods, even though taste in the mouth ultimately has little to do with the emotion of disgust. However, oral rejection remains an organizing principle of disgust reactions, in what we have called "core disgust." Core disgust can be thought of as a guardian of the mouth, and therefore as a guardian of the physical body. Food and its potential contaminants (body products and some animals) are the elicitors for core disgust.

Disgust then expanded further to become a guardian of the temple of the body, responding to any evidence that our bodies are really no different from animal bodies (i.e., animallike disgust in the domains of sexuality, body

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TABLE 40.1 Proposed Pathway of Expansion of Disgust and Disgust Elicitors

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<tr>
<td>Function</td>
<td>Protect body from poison</td>
<td>Protect body from disease/infection</td>
<td>Protect body and soul, denial of mortality</td>
<td>Protect body, soul, and social order</td>
<td>Protect social order</td>
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<tr>
<td>Elicitors</td>
<td>Bad tastes</td>
<td>Food/eating, body products, animals</td>
<td>Sex, death, hygiene, envelope violations</td>
<td>Direct and indirect contact with strangers or undesirable</td>
<td>Certain moral offenses</td>
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DEVELOPMENT OF DISGUST

Of the four categories of food rejection, it appears that the only category that is visible in infancy is distaste (e.g., bitterness). In parallel with the results from rats and other animals, there appears to be an innate and present-at-birth rejection of bitter substances in humans, accompanied by a gape (Peiper, 1963; Steiner, 1979). The danger category emerges in the first few years of life, and disgust breaks off from distaste at some later point, perhaps between 4 and 8 years, for U.S. children (Rozin, Hammer, Oster, Horowitz, & Marmara, 1986; Rozin, Fallon, & Augustoni-Ziskind, 1986). Thus, although 3-year-olds typically reject feces as food, it is not clear that this rejection has contaminating or offensive features, and it may be no...
different from a distaste, or a distaste combined with danger. So far as we know, there is no sense of offensiveness or rejection outside of the sensory realm in either infants or nonhumans, and hence no gape elicitors other than certain negative tastes. Disgust seems to require enculturation—a supposition confirmed by Malson's (1964/1972) review of some 50 feral humans, none of whom showed any sign of disgust.

Origins of Disgust: Feces and Decay

For adults, feces seems to be a universal disgust substance (Angyal, 1941; Rozin & Fallon, 1987), with the odor of decay as perhaps the most potent sensory attribute associated with disgust. It is also conceivable that vomit is a primary substance for disgust. Since feces, vomit, and decay are probably associated with disease vectors, it would be reasonable to suppose that there would be an innate rejection of such things. However, none seems to be reliably present in nonhuman animals, and children do not show rejection of feces early in life. Rather, it appears that the infant may be attracted to feces, and that disgust is a powerful cultural force that turns this attraction into aversion (Freud, 1910/1957; Jones, 1912/1948). The preponderance of evidence suggests that there are no inately negative nonirritant odors, and that a rejection of decay odors (without a referent object present) appears somewhere between 3 and 7 years of age (Engen & Corbit, 1970; Pető, 1936; Schmidt & Beauchamp, 1988; Stein, Ottenberg, & Roulet, 1958; but see Steiner, 1979).

Toilet Training

Given the centrality of toilet training in psychoanalytic theory, and the fact that toilet training is one of the earliest arenas for socialization, it is surprising how little is known about the process. Although children do not seem to have an aversion to feces before toilet training (Rozin, Hammber, et al., 1986), it is not clear whether the feces avoidance that appears subsequently should be characterized as disgust, as opposed to avoidance or distaste. In the period following toilet training, feces does not seem to have contaminating properties (Fallon, Rozin, & Pliner, 1984), but children do develop an aversion for substances resembling feces (e.g., mud, dirt, and mushy substances) and sometimes a marked concern for cleanliness (Senn & Solnit, 1968; Ferenczi, 1914/1952). There may be a latency period between completion of toilet training and the emergence of feces as a particularly negative disgust substance some years later. It seems likely that toilet training, with all of the attendant negative affect toward feces from significant others, plays an important role in the development of disgust.

Processes Accounting for the Spread of Response from Feces in Young Children

We believe that there is a spread of rejection responses following toilet training and the rejection of feces, but little is known about the mechanisms and events that account for this spread. Rozin and Fallon (1987) categorize these processes as "primary" (meaning that a new rejection is learned from the reactions of others or from some new information) and "secondary" (meaning that the acquisition is related to an existing disgust substance). Primary disgusts are probably frequently induced by the display of disgust in others (Tomkins, 1963), by a process that is not well understood.

Secondary disgusts may occur by two pathways (Rozin & Fallon, 1987). One is generalization, based on similarity, from existing disgust substances such as feces (Ferenczi, 1914/1952; Tomkins, 1963; Darwin, 1872/1965). Another pathway is evaluative conditioning (Martin & Levey, 1978; Baeyens, Crombez, Van den Bergh, & Eelen, 1988; Rozin & Zellner, 1985), a form of Pavlovian conditioning in which a valenced entity (an unconditioned stimulus—e.g., an already disgusting entity) is paired with a previously neutral entity, with the result that the neutral entity (the conditioned stimulus) changes in valence in the direction of the unconditioned stimulus.

Contamination Sensitivity

The idea of contamination is quite sophisticated in requiring a separation of appearance and reality. There is no sensory residue of past contamination in a contaminated entity; it is the history of contact that is critical (Rozin & Nemeroff, 1990; Nemeroff & Rozin, in press). Furthermore, contamination implies some conception of invisible entities (e.g., traces of cockroach) that are the vehicle of contamination. The notion of invisible entities and the notion that appears cognitive achievement, and both sedent (Piaget & In the human emotion: guilt, which also form until the age

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tion, and both seem to be absent in young chil-
dren (Piaget & Inhelder, 1941/1974; Flavell, 1986).
This cognitive limitation may be the
principal barrier to a full childhood acquisition
of disgust. The cognitive sophistication of dis-
gust puts it in the company of other uniquely
human emotions such as pride, shame, and
guilt, which also do not assume an adult-like
form until the age of 7 or 8 (Harris, 1989).

Rozin and his colleagues have found that a
clear contamination response to disgusting con-
tacts with a favored beverage (e.g., dog feces or
a grasshopper as contaminants in milk or juice)
does not appear until about 7 years of age in
North American children (Fallon et al., 1984;
Rozin, Fallon, & Augston-Ziskind, 1985,
1986). However, Siegal (1988), using more sen-
sitive procedures, has reported contamination
responses in Australian children by 4 years of
age.

Parent–Child Transmission of
Disgust Sensitivity

One study of disgust transmission across gen-
erations predated the development of our more
comprehensive Disgust Scale (described be-
low) and used an unvalidated scale of contami-
nation sensitivity (focusing on disgust in a con-
tagion context) developed by Rozin, Fallon, and
items) was given to University of Pennsylvania
students and their parents, and the mid-par-
ent–child correlations was $r = .52$ (Rozin et al.,
1984). This relationship was confirmed in a
study in Britain ($r = .33$; Davey, Forster, &
Mayhew, 1991). These substantial correlations
are much higher than correlations for food pre-
ferences (ranging between 0 and .30) from the
same U.S. sample that generated the .52 corre-
lation for disgust/contamination. That is, the
family resemblance pattern for disgust/contamination
sensitivity was more in line with correla-
tions obtained for values (e.g., attitudes to
abortion) than with those for preferences
(Rozin, 1991).

It seems reasonable to attribute the
parent–child resemblance in disgust sensitivity
to social transmission in childhood. This pre-
sumption is supported by evidence for minimal
heritability in a twin study using a short (5-
item) version of the Contamination Scale used
by Rozin et al. (1984): Monozygotic twins
showed a correlation of .29 on this scale, while
 dizygotic twins showed a correlation of .24
(Rozin & Millman, 1987).

We do not know how disgust is transmitted,
but children have ample opportunities to ob-
serve and be informed about their parents’ atti-
itudes and responses in disgust situations, in-
cluding toilet training.

DISGUST ACROSS CULTURES

Almost the entire literature on disgust comes
from the approximately 6% of the world in
which English is the native language. Consis-
tent with our claim that the cultural evolution
of disgust has involved a conservative output sys-
tem and a flexible and expanding input/evalu-
ative (elicitor/meaning) system, we hold that
the principal cultural differences in disgust have to
do with the input/evaluative system. Cultures
may differ in the particular elicitors of disgust
within one of the domains we have described.
Thus, while most cultures value decayed/fer-
mented food of a special sort, that special sort
is different for different cultures (e.g., cheese
for Europeans, meat for Inuit, fish for South-
east Asians in their fermented fish sauce). Each
of these desirable exceptions in a particular cul-
ture is viewed by those in most other cultures as
disgusting. Furthermore, the act of kissing,
which involves an intimate exchange of body
fluid, varies from being considered disgusting
in all cases in some cultures to being consid-
ered highly desirable with certain intimates in
other cultures. Similarly, cultures differ about
whether dogs are best friends or dirty scav-
engers, or about whether or not corpses should
be touched during mourning. In spite of these
differences, it appears that core disgust and ani-
mal-nature disgust look relatively similar
across cultures, and there seems to be a “pre-
paredness” (Seligman, 1971) to attach disgust
to certain sorts of things (e.g., food), and not
others (e.g., flowers, machines).

It is primarily in the last two steps of the ex-
pansion of disgust that cultural differences
seem to become most important. Interpersonal
disgust appears to be most highly elaborated
in India. Moral disgust in the United States is trig-
gered most strongly by acts of brutality, or acts
in which someone strips others of their dignity
(e.g., racism). In Japan, participants applied the
word ken-o more to situations in which there
had been a failure to achieve a good fit in their
social relationships, such as when somebody else ignored them or unfairly criticized them. We believe that U.S. disgust may be guarding against threats to an individualist, rights-based social order, whereas Japanese ken-ō may be guarding against threats to a more collectivist, interdependent social order (Haidt et al., 1997).

An additional cultural difference is found in the moral significance attached to the kinds of biological activities that disgust regulates. Some cultures have highly elaborated the ethics of divinity (Shweder et al., 1997), and therefore see issues of purity and pollution as central to morality. Middle-class North Americans, on the other hand, see little connection between morality (justice and rights) and matters of personal hygiene. Cultures should therefore differ in the degree to which disgust is related to moral judgment. Haidt, Koller, and Dias (1993) asked North Americans and Brazilians of higher and lower socioeconomic status about a number of actions that were disgusting yet harmless, including incestuous kissing, eating one's dead pets, and eating a chicken one has just had sex with. They found that North Americans of higher socioeconomic status separated their emotional reactions from their moral judgments, while other groups were more likely to condemn disgusting actions, even when they were harmless. Miller (1997) suggests that many Westerners may be uncomfortable using disgust as a moral emotion because it is often at odds with an egalitarian ethos: Disgust puts people down, and it is easily used to condemn people whose only "crime" is that they are obese, are deformed, or have sexual preferences at odds with those of the majority.

INDIVIDUAL DIFFERENCES IN DISGUST SENSITIVITY

Based on the first seven domains of disgust elicitors, together with the fundamental role of contagion in all of these categories, we constructed a paper-and-pencil scale to measure individual differences in disgust in the United States and in Japan (Haidt et al., 1994). The 32-item Disgust Scale includes two true–false and two disgust-rating items for each of the seven disgust domains, and four similar items tapping sympathetic magical thinking. In addition to revealing wide variation in disgust sensitivity, the Disgust Scale has demonstrated positive intercorrelations of disgust sensitivities across the different domains of elicitors—that is, evidence that the domains converge on a common dimension of sensitivity to disgust. Recent additional validation emerged from a series of "hands-on" laboratory experiences in which the Disgust Scale predicted the degree to which subjects would actually engage in a wide range of disgust activities ($r = -.42$; Rozin, Haidt, et al., 1999).

Correlations with other scales have begun to locate disgust sensitivity in relation to other individual difference measures (Haidt et al., 1994). The Disgust Scale showed a moderate positive correlation (.39) with a scale measuring fear of death (Boyar, 1964), and a moderate negative correlation (-.46) with a scale measuring sensation seeking. In our initial Disgust Scale research (Haidt et al., 1994), women were substantially more sensitive to disgust than men; the mean difference amounted to more than half a standard deviation. There are hints, however, that sensitivity to disgust declines after the teen years, and declines more for women than for men. Druschel and Sherman (1994), and Quigley, Sherman, and Sherman (1996) found that Disgust Scale scores were lower for older than for younger undergraduates. Similarly, Doctoroff and McCauley (1996) found only a small and nonsignificant tendency for higher female scores when the Disgust Scale was completed by respondents (mean age 57) to a survey mailed to suburban residents from a commercial mailing list. Convergent evidence for the increased disgust sensitivity of females, as well as additional validation for the Disgust Scale, is provided by Oppliger and Zillmann (1997). They found that disgust sensitivity is negatively related to the enjoyment of disgust humor, and that male college students show more amusement than females in both ratings of and facial reactions to disgust humor.

Besides gender, the demographic variable most correlated with Disgust Scale scores is social class. Blue-collar workers in our initial studies were more disgust-sensitive than were students and middle-class managers (Haidt et al., 1994). This result was confirmed by Doctoroff and McCauley (1996), who found education to be negatively correlated with Disgust Scale scores ($r = -.32$). Recently, another scale of disgust sensitivity has been introduced, consisting of ratings of the disgustiness of 30 stimuli/events. This scale (Disgust Experience Scale) has more items related to blood, injection, and injury than in the original Disgust Scale (Kleinknecht, 1997).

There are alterations in disgust sensitivity across the study of individuality. Templer, (1984) construct attitudes toward society (e.g., "The movements both sides were conservative") among an in-between nation. Even among the higher on various (including self-esteem) aspects, and the sensitivity to disgust, Quigley et al. undergraduates, the correlations with quality are type and within social contexts. There are concepts of the quality of contagion and contagion which is a significant detection among in a manner disorder (e.g., Pundt et al., 1997 below). Summary, a qualitative of OCD, Power a that when contain disgust is the point when checking is a causal motivator. A linkage is very present.

Another clinical work on the work on animal colleagues. These involving predation invoke fear, where that do not threaten (rats, spiders, snails in the case of human subjects). Matchett & Davey, 1991; Ware et al., 1994).
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There are abundant possible linkages between disgust and psychopathology. In an early study of individual differences in disgust sensitivity, Templer, King, Brooner, and Corgiat (1984) constructed a 26-item scale to measure attitudes toward body products and body elimina- (e.g., “The smell of other persons’ bowel movements bothers me”). They found that scores were higher (attitudes were more negative) among an inpatient psychiatric population than among a sample of the general population. Even among the latter, high scorers also scored higher on various measures of psychopathology (including neuroticism and obsessiveness), suggesting a link between anxiety and disgust sensi- tivity.

Quigley et al. (1996) reported that among undergraduates, the Disgust Scale is positively correlated with obsessive-compulsive personality type and with dependent personality type. There are conceptual links between cleaning obsessions or compulsions and both disgust and contagion sensitivity, and recent research indicates a deficit in disgust facial expression detection among patients with obsessive-compulsive disorder (OCD; Sprengelmeyer, Young, Pudt et al., 1997; see “Disgust and the Brain” below). Summarizing a set of studies that suggest a qualitative difference between two forms of OCD, Power and Dalgleish (1997) suggest that when contamination (cleaning) is salient, disgust is the principal motivator, whereas when checking is salient, anxiety is the principal motivator. Altogether, the disgust-OCD linkage is very promising.

Another clinical connection is suggested by the work on animal phobias by Davey and his colleagues. These authors argue that phobias involving predatory animals (sharks or lions) invoke fear, whereas phobias involving animals that do not threaten significant physical harm (rats, spiders, snakes, slugs, maggots) are motivated primarily by disgust (Davey, 1993; Matchett & Davey, 1991; Webb & Davey, 1993; Ware et al., 1994). This distinction is buttressed by a number of experimental and psychometric findings. Nonpredatory animal phobias are correlated with disgust sensitivity, but predatory animal phobias are not (Matchett & Davey, 1991; Ware et al., 1994). The two types of ani- mal phobias are almost uncorrelated. Priming experiences consisting of threatening visual ex- posure to violent materials increased fear responses only to predatory animals, whereas priming with disgust materials increased fear only to nonpredatory animals (Webb & Davey, 1993). A particularly clear link between disgust and phobias has recently been demonstrated with respect to blood-injection-injury phobias, using both disgust sensitivity measures and emotion-specific ratings of blood-injection-injury images by phobic patients (Tolin, Lohr, Sawchuk, & Lee, 1997).

A detailed discussion of the pathologies of disgust has been provided by Power and Dal- gleish (1997), who propose a major role for dis- gust (self-disgust) in problems of depression. A plausible linkage between disgust and eating disorders has also been proposed (Quigley et al., 1996). There is recent evidence supporting such a link: Enhanced disgust sensitivity to food and related stimuli has been found in females with eating disorders (Davey, Buckland, Tantow, & Dallos, 1998).

Very low activation of basic emotions can also have pathological consequences, though very low fear or anger does not align with any important categories of psychopathology. On the other hand, one might imagine that very low disgust might generate a highly antisocial person, since disgust is in many respects the emo- tion of civilization.

**DISGUST AND THE BRAIN**

There is universal agreement that disgust is fundamentally a negative emotion, and it should not be surprising that disgust experiences are associated with brain activation in the right frontal area (Davidson, 1992). Recently, Sprengelmeyer, Young, Calder, and their col- leagues (Sprengelmeyer et al., 1996; Sprengelmeier, Young, Sprengelmeyer, et al., 1997) reported that people with Huntington's disease, caused by late-onset degeneration of the basal ganglia, show a remarkably specific deficit in identifying disgust facial (and vocal) expres- sions. To this date, there is no information on deficits in production of emotional expressions. The same disgust recognition deficit is seen in people who are carriers of the Huntington's gene, but are still too young to show any of the classical symptoms. Magnetic resonance imag- ing evidence from normal subjects also sug- gests activation of basal ganglia structures,
among others, when subjects view disgust faces (Phillips et al., 1997).

Reasoning from the common basal ganglia involvement in Huntington's disease and OCD (Rapoport, 1989, Sprengelmeyer, Young, Pundt, et al. (1997) also examined recognition of disgust expressions by people with OCD, and discovered the same specific and severe disgust recognition deficit. This work shows a surprisingly high degree of emotion-specific brain localization, and also provides an important tool for the study of disgust by identifying people who fail to perceive its expression.

CONCLUSION

Darwin and Angyal presented insightful and prescient analyses of the emotion of disgust many decades ago. In spite of its frequent occurrence and general classification as a basic emotion, there has been surprisingly little empirical investigation of disgust until the last 15 years. As a result, there are many unanswered questions. We know very little about the history of disgust. It is absent in nonhuman primates, yet extremely frequent and probably universal in contemporary humans. We do not know much about the sequence of events that introduced and expanded disgust over historical time (but see Miller, 1997, for the most thorough analysis of this expansion for Western cultures). We do not know whether the acceptance of the theory of evolution, and hence of human continuity with animals, played a role in the development or expression of animal-nature disgust. We do not know how disgust originates in development, nor what the principal causes of differences in disgust sensitivity are, nor why it is a focus of humor (especially in children). Many of the fundamental questions posed by Darwin's and Angyal's analyses remain unanswered.

Our analysis suggests a cultural evolution of disgust that brings it to the heart of what it means to be human. We have suggested that disgust originated as a rejection response to bad tastes, and then evolved into a much more abstract and ideational emotion. In this evolution the function of disgust shifted: A mechanism for avoiding harm to the body became a mechanism for avoiding harm to the soul. The elicitors of disgust may have expanded to the point that they have in common only the fact that decent people want nothing to do with them. At this level, disgust becomes a moral emotion and a powerful form of negative socialization. We have presented a skeleton of evidence in support of this analysis, but there are many alternatives and points of difficulty. The complexity of disgust reflects the complexity of a species that is both animal and human.

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