

DISGUST: CHARACTERISTIC FEATURES, SOCIAL MANIFESTATIONS, AND CLINICAL IMPLICATIONS

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Emotions have been a long-standing cornerstone of research in social and clinical psychology. Although the systematic examination of emotional processes has yielded a rather comprehensive theoretical and scientific literature, dramatically less empirical attention has been devoted to disgust. In the present article, the nature, experience, and other associated features of disgust are outlined. We also review the domains of disgust and highlight how these domains have expanded over time. The function of disgust in various social constructions, such as cigarette smoking, vegetarianism, and homophobia, is highlighted. Disgust is also becoming increasingly recognized as an influential emotion in the onset, maintenance, and treatment of various phobic states, Obsessive-Compulsive Disorder, and eating disorders. In comparison to the other emotions, disgust offers great promise for future social and clinical research efforts, and prospective studies designed to improve our understanding of disgust are outlined.

The nature, structure, and function of emotions have a rich tradition in the social and clinical psychology literature (Cacioppo & Gardner, 1999). Although emotion theorists have contested over the number of discrete emotional states and their operational definitions (Plutchik, 2001), most agree that emotions are highly influential in organizing thought processes and behavioral tendencies (Izard, 1993; John-

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son–Laird & Oatley, 1992). Emotions have been a popular subject of basic and applied research over the last several decades. Closer inspection of the extant research base reveals an interesting preference for the systematic examination of certain emotions over others. One such “forgotten emotion” in the experimental literature has been disgust (McNally, 2002; Phillips, Senior, Fahy, & David, 1998; Woody & Teachman, 2000).

Disgust has been identified as one of the basic emotions, recognizable across diverse cultures. Culture, in turn, largely shapes what an individual or society deems to be “disgusting.” Developmentally, disgust tendencies change over time. Learned experiences account for considerable individual differences in either the inoculation or vulnerability to stimuli that elicit disgust reactions. Experimentally, disgust is relatively easy to elicit under controlled laboratory settings without risking significant ethical concerns (Rozin, Lowery, & Ebert, 1994). Although other primary emotional states, such as fear, anger, and sadness, have an established research tradition, less empirical interest has been invested in disgust (Royzman & Sabini, 2001). Does there exist an aversion to the study of disgust?

To illustrate the limited research attention to disgust relative to other emotions, we conducted a general literature search limited to the terms “fear,” “anger,” and “disgust,” utilizing the PsychInfo reference database from 1960 through 2003. As shown in Figure 1, fear and anger display an upward trend, receiving considerable empirical attention over time. Disgust, conversely, shows a relative paucity of research interest, perhaps partially due to its lack of “decorum” or attractiveness in comparison to the other emotions (Miller, 1997). Advocates for this understudied emotion suggest that disgust has considerable research potential (Rozin & Fallon, 1987), perhaps emerging as the basic emotion of interest for the 21st century (Power & Dalgleish, 1997).

In the present article, we provide an overview of the past, present, and future of disgust. Beginning with a working definition of disgust, we present a discussion on the experience of disgust and highlight the rather broad range of elicitors that can become associated with this emotion. Particular emphasis is then devoted toward reviewing the evolving role of disgust in both social contexts and clinical disorders. Finally, new directions for future theoretical and scientific developments with disgust and its related emotions are proposed.

DEFINING DISGUST

Few words elicit such an innate, visceral response as disgust. Origins of the word itself began appearing in 16th-century France and 17th-century England (Miller, 1997). Disgust has become part of our everyday

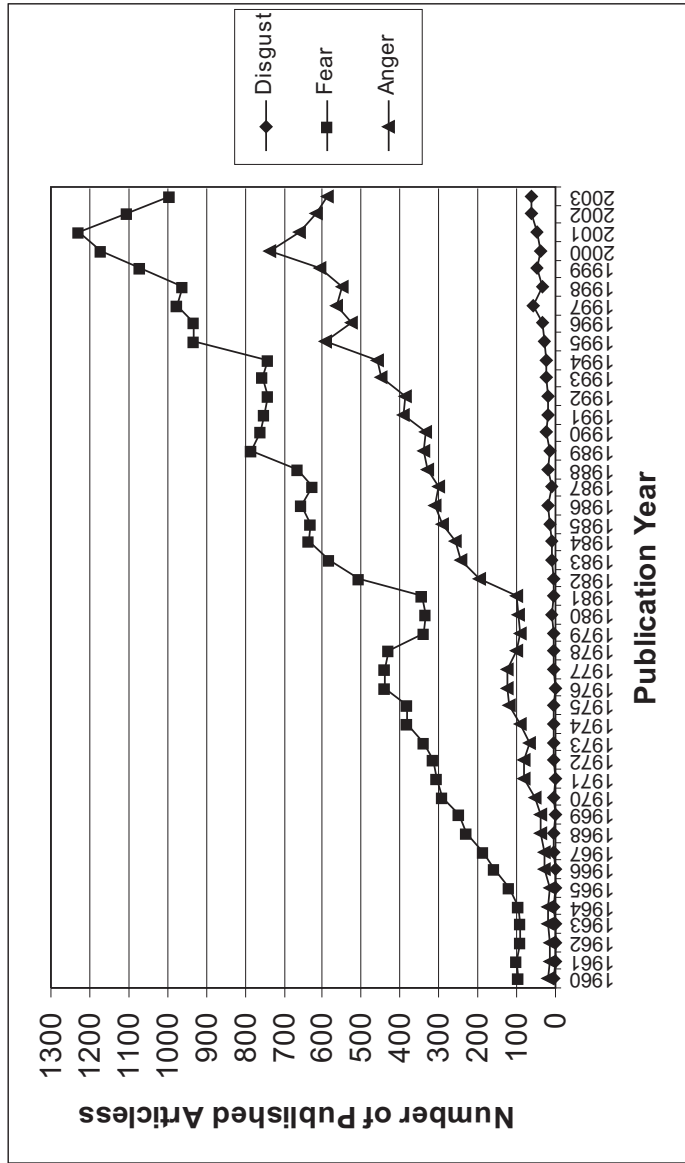


FIGURE 1. PsychInfo literature search of published articles on "fear," "anger," and "disgust" from 1960 through 2003.

nomenclature, encompassing a variety of synonyms, including revulsion, repugnance, abhorrence, repulsion, antipathy, aversion, loathing, sicken, appall, and nauseate. At its basic definition, disgust means “bad taste.” The gustatory emphasis on disgust is linked to its evolutionary adaptive value of protecting the organism from ingesting potentially harmful substances, thereby promoting disease avoidance (Haidt, McCauley, & Rozin, 1994; Rozin & Fallon, 1987). The theoretical meaning of disgust can be traced back to Darwin (1872/1965) who first noted that disgust “...refers 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). The emotion of disgust also has a history of being “pathologized” in the psychiatric literature, with Freud (1905/1953) arguing that the manifestation of disgust served to restrict sexual fantasies to socially acceptable practices. Tomkins (1963), alternatively, suggested that disgust served as a primary reaction to unwanted intimacy.

Contemporary definitions of disgust derive in large part from Angyal’s (1941) “narrow” description of disgust as revulsion at the prospect of (oral) incorporation of an offensive substance. For instance, Davey (1994b) posits that disgust is related to a form of “rejection” characterized by a desire to distance oneself from contamination stimuli, nausea, and a feeling of revulsion. As with Davey’s description, most definitions of disgust appear to be related to the actual or threatened oral incorporation of contaminated or unwanted stimuli. Accordingly, it has been suggested that disgust may function primarily as a guardian of the mouth, thereby highlighting its uniqueness from other emotions (Haidt, Rozin, McCauley, & Imada, 1997). The gustatory emphasis has necessitated theorists to draw the distinction between distaste and disgust. Rozin and Fallon (1987) suggest that distaste is a type of food rejection, motivated by sensory characteristics such as taste, smell, and texture. Disgust, on the other hand, is a form of food rejection motivated by ideational factors (i.e., the origin of the disgust stimulus) and perceptions of its potential threat relevance (i.e., contamination capabilities). Rozin, Haidt, and McCauley (2000) note that four critical properties of contagion define disgust: (1) physical contact is required; (2) the effect of contact is dose-insensitive in that even brief contact leads to contamination; (3) the effect of contamination is permanent; (4) the negative contagious effects are more powerful than the positive contagious effects. Although contagion is part of the definition of disgust, contagion properties do not define disgust. However, the belief that disgust elicitors hold contagion properties represents a dynamic feature that can greatly influence approach and avoidance behaviors.

DISMANTLING THE EXPERIENCE OF DISGUST

A useful starting point for understanding the range of disgust responses from the simple to the complex is to first identify its unique physiological, behavioral, and interpretive components. Research into the physiological and neurobiological correlates of disgust has received far less systematic attention than other emotional states (Vrana, 1993). In contrast to the more physiologically activating emotions of excitement, fear, and anger, disgust appears to be largely mediated by the parasympathetic branch of the autonomic nervous system (Levenson, 1992). Measurable consequences of parasympathetic activity include reductions in heart rate, (Levenson, Ekman, & Friesen, 1990), blood pressure (Sledge, 1978), respiration rate (Curtis & Thyer, 1983), and skin temperature (Zajonc & McIntosh, 1992). Increased salivation (Carlson, 1994) and gastrointestinal mobility (Ekman, Levenson, & Friesen, 1983), precursors to nausea and vomiting, have also been observed.

The last decade has witnessed dramatic technological advances in our ability to evaluate and map the involvement of various brain structures in the recognition, regulation, and expression of emotion. Despite these advances, the differentiation of disgust from other negative affective states can be challenging due to the shared involvement of multiple brain regions in the processing of emotion, such as the amygdala, basal ganglia, hippocampus, orbitofrontal cortex, and occipito-temporal cortices (Adolphs, 2002). Emerging findings from functional neuroimaging studies (e.g., Calder, Lawrence, & Young, 2001) and brain injury research (e.g., Calder, Keane, Manes, Antoun, & Young, 2000) suggest the unique involvement of the insular cortex, a structure responsible for the integration of sensory and visceral information and parasympathetic cardiovascular regulation, in the processing of facial expressions of disgust.

The behavioral manifestations of disgust, including facial expressions and action tendencies, all appear consistent with its functional value of protecting the individual from unwanted contact and incorporation of aversive stimuli. The well-defined facial expression of disgust is characterized by a furrowing of the eyebrows, closure of the eyes and pupil constriction, wrinkling of the nose, upper lip retraction and upward movement of the lower lip and chin, and drawing the corners of the mouth down and back (Levenson, 1992; Vrana, 1993). This unique "gaping" facial expression is readily identifiable across different cultures (Ekman, 1982). Facial EMG at the levator labii region provides a reliable, physiological index that appears to be unique to the emotion of disgust (de Jong, Peters, & Vanderhallen, 2002; Vrana, 1993). Consistent with its functional value, facial features of the disgust response also appear to be

directed at either discouraging entry of substances into gustatory and olfactory apertures (e.g., closing of the mouth), or the immediate expulsion of noxious substances that have already been incorporated (Plutchik, 1980; Rozin et al., 2000). In a thorough analysis of the facial expression of disgust, Rozin et al. (1994) found that nose wrinkling is associated with either irritating or offensive smells and, to a lesser extent, bad taste. The gape and tongue extrusion is associated primarily with offensive foods and oral irritation. The raised upper lip was associated with a much broader range of disgust elicitors (e.g., body envelope violations, inappropriate sex, poor hygiene, and death), aversive interpersonal contacts, and moral offenses.

The dominant action tendency for disgust is behavioral avoidance (Izard, 1993), which serves a defensive function for the individual. Observed avoidance can include both active and passive features. Active avoidance, or escape responding, involves moving away from the disgusting stimulus upon exposure. Preemptive behaviors may gradually arise over time in which an individual chooses not to enter into situations in which the threat-relevant stimuli may be present. Passive avoidance strategies, which do not involve active escape, are often initiated once the individual is exposed to disgust-related material. Examples of passive strategies include pushing the stimulus away, closing of the eyes, looking away, or plugging one's nose. Active avoidance, therefore, involves some form of escape from the stimulus whereas passive avoidance is often related to a rejection of the offensive material. Previous research suggests that disgust-mediated avoidance is more likely to involve passive avoidance and rejection, as opposed to active avoidance and escape behaviors (Roseman, Wiest, & Swartz, 1994; Rozin et al., 2000).

The interpretive component of the disgust response can involve beliefs directly related to the threat value of the stimulus and/or concerns about one's own physiological and behavioral reactions to the repulsive material (Rozin et al., 2000). Stimuli that become associated with disgust are often avoided due to concerns over possible infection, contamination, and disease acquisition (Angyal, 1941; Rozin & Fallon, 1987). Estimation biases, such as the combination of overestimating the likelihood that an object contains disease-carrying characteristics with an overestimation of one's own vulnerability to being infected, can serve a central role in more profound manifestations of avoidance and rejection. Contamination-related beliefs may also be rigidly held even in spite of objective evidence to the contrary. The sympathetic laws of contagion and similarity can be useful in further explaining this process (Haidt et al., 1994). The law of contagion operates according to the principle of "once in contact, always in contact," in that previously benign objects can ac-

quire enduring, even permanent infectious qualities after even brief contact with a disgusting stimulus (Nemeroff & Rozin, 1994). For instance, individuals will often refuse to drink from a glass that has been repeatedly and thoroughly sanitized if it had once been used to hold dog feces (Rozin & Nemeroff, 1990). The law of similarity suggests that objectively safe objects may be avoided and rejected if they resemble a threat-relevant disgust elicitor in some way. For example, fudge shaped like dog feces may be rendered completely inedible due to its shared visual representation (Rozin, Millman, & Nemeroff, 1986). The cultural equivalent of the two laws of sympathetic magic is reflected in the common phrase "you are what you eat," which has been found to be prevalent in American culture (Nemeroff & Rozin, 1989).

Disgust stimuli also have the propensity to elicit self-directed concerns over one's own physiological reactivity and behavioral responses. Unpleasant sensory experiences of sight, smell, sound, taste, and touch to disgust elicitors can have long-lasting effects on an individual's behavior. Likewise, anticipatory fears and embarrassment over experiencing nausea, vomiting, dizziness, and fainting can also develop, and in more extreme cases, become associated with a fairly considerable degree of functional impairment (Rachman, 1990). Disgust is a highly evaluative emotion, influenced to a great extent by our culture, established social norms, and personal experiences. Differences in what an individual judges to be disgusting, revolting, or repugnant may vary widely not only between cultures, but also within cultures. Given exposure to the same disgusting stimulus, one individual may find it humorous while another may find it horrific.

DEVELOPMENTAL CONSIDERATIONS OF DISGUST

Like other emotions, disgust shows developmental changes over time. Although there is some evidence suggesting that children as young as four years old may experience contamination sensitivity (Siegal & Share, 1990), studies exposing children to various disgust stimuli (i.e., imitation feces, foods, animals) have generally indicated that most children below eight years of age lack the cognitive abilities to experience disgust (cf. Rozin & Fallon, 1987; Rozin, Hammer, Oster, Horowitz, & Marmora, 1986). However, the available evidence suggests that roughly from two or three to seven to nine years of age, children may learn via observation to reject disgust stimuli, even though they might not necessarily find such stimuli disgusting per se (Rozin & Fallon, 1987). The curious absence of disgust in the first years of life suggests that disgust may not be as evolutionarily prepared as other emotions, such as fear. This absence does not necessarily undermine its biological centrality, as

it is quite possible that maternal monitoring and safety-related behaviors during this period render the development of a full disgust response as less imperative. Furthermore, considering the adaptive value of disgust in protecting the organism through sanitation and prevention of disease does support the evolutionary view (Matchett & Davey, 1991; Ware, Jain, Burgess, & Davey, 1994) and its natural selection as part of our response repertoire in promoting survival (Haidt et al., 1997).

A cultural view may better account for the sequence of events in the developmental evolution of this emotion (Rozin & Fallon, 1987). Previous research noting the absence of disgust during the earlier years of life may lend support to a cultural rationale for the etiology of disgust (Rozin & Fallon, 1987). The absence of disgust, as defined by Rozin and colleagues (2000), in animals also lends support to a culturally derived emotion. What is deemed to be disgusting and to be avoided varies considerably by culture, is perpetuated by societal norms, and is taught and modeled by individuals. Growing evidence suggests that the social influences of disgust are more important in our development of avoidance and rejection tendencies than its evolutionary preparedness (Haidt et al., 1997). While humans are increasing cognizant of which foods to avoid, they may be less aware of various social and interpersonal interactions that are potentially being mediated by disgust. The implications of a culturally based approach versus that of the evolutionary functionality of disgust represent an interesting departure for future research.

PSYCHOMETRIC ASSESSMENT OF DISGUST

As with other emotions, enhancing our understanding of the individual differences in disgust requires the development of reliable measures of the construct. The documented emphasis on the relation between disgust and oral incorporation served as the impetus for the development of the first self-report measure of disgust, the Disgust Questionnaire (DQ; Rozin, Fallon, & Mandell, 1984). Although developed as a measure of contagion, the DQ has been used as a measure of "disgust sensitivity" or one's "proneness" toward being disgusted. Certain authors have cautioned, however, that measures such as the DQ have limited utility given its sole focus on food-related elicitors (Arrindell, Mulkens, Kok, & Vollenbroek, 1999).

Stimuli capable of eliciting disgust, however, represent a broad range extending beyond food and food rejection tendencies. The apparent diversity of disgust elicitors has led some researchers to posit that disgust may not represent a unitary construct (Olatunji, Sawchuk, Lohr, & de Jong, 2004). Approaching disgust as multidimensional has resulted in

the development of more comprehensive and heterogeneous self-report measures. The most commonly used disgust measure in the contemporary empirical literature is the Disgust Scale (DS; Haidt et al., 1994), which assesses the intensity of disgust reactions across several domains: Animals, Body Products, Death, Envelope Violations, Food, Hygiene, Sex, and Sympathetic Magic (improbable contamination). More recently, the Disgust Emotion Scale (DES; Kleinknecht, Kleinknecht, & Thorndike, 1997) has been introduced as an alternative measure of disgust across multiple domains: Animals, Injections and Blood Draws, Mutilation and Death, Rotting Foods, and Odors. However, no published reports have directly evaluated the psychometric properties of the DES. The identification of specific disgust domains does not imply that they are mutually exclusive categories. Assessing the variety of elicitors has given researchers the opportunity to further examine the boundaries of disgust by determining whether certain types of stimuli are more closely related (e.g., blood and death) than others (e.g., blood and food).

THE DOMAINS OF DISGUST

A basic theme across varying definitions of disgust emphasizes the oral function of food rejection (e.g., Angyal, 1941; Darwin, 1872/1965; Ekman & Friesen, 1975; Tomkins, 1963). A common account of disgust highlights this idea: "Revulsion 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. 21). Indeed, when asking an individual what s/he finds disgusting, one's "gut reaction" often involves recounting an offensive eating experience. As one moves beyond the basic foundation of food, an incredibly diverse range of stimuli, situations, and behaviors can become powerful elicitors of disgust. Rozin & Fallon (1987) initially proposed the consolidation of disgust elicitors into the following domains: animalness, spoilage and decay, distance from humans, anomaly, and feces. An alternate approach has also been forwarded by Rozin and colleagues (2000) who suggest a four-factor model of disgust: core, animal-reminder, interpersonal, and socio-moral disgust elicitors; however, there is some overlap in the interpersonal and socio-moral disgust domains.

CORE AND ANIMAL-REMINDER DISGUST

Core disgust elicitors are characterized by three main components (Rozin et al., 2000): a real or perceived threat of oral incorporation, a re-

active sense of aversion or offensiveness, and an evaluation of the substance as a contaminant. Foods, bodily waste products, and animals are subsumed within this category. The sight of moldy bread, the smell of spoiled milk, and the taste of rotting fruit can all carry seemingly objective qualities that warrant repugnance and avoidance. Many other potential food products are equally rejected, however, oftentimes based on more subjective appraisals. A sterilized cockroach dipped in a glass of juice, a spider having brief contact with a cookie, a piece of fudge shaped like dog feces, and unfamiliar ethnic foods can spur avoidance based on their perceived disease-carrying characteristics. Considerable cross-cultural variation exists in this category as many foods considered palatable in one culture may be viewed as entirely offensive in another.

Animals having the propensity to evoke disgust may also show some degree of cross-cultural variability. Meat is often prepared in a manner that disguises its animal features (Angyal, 1941). Many potentially edible and nutritious parts of the animal, including entrails, eyes, brains, are routinely discarded. Animals seemingly close to humans by means of being a pet (e.g., dogs) or sharing physical resemblance (e.g., primates) are rarely consumed (Rozin et al., 2000). Features of animals that resemble bodily waste products, such as the mucous-like appearance of snails, worms, and slugs, also routinely evoke repulsion. "Scavengers" found habituating in garbage, piles of feces, and rotting carcasses (e.g., rats, maggots, and flies), are commonly deemed to be disgusting, viewed as carriers of disease, and are subsequently avoided.

In contrast to the food and animal domains, considerably less cross-cultural variation exists in regard to the evaluation of bodily waste products. Aversion toward excrement, urine, mucous, blood, bile, and vomit is a shared reaction across many cultures. Considerable efforts are usually made to initially prevent direct physical contact with these bodily substances (e.g., toilet paper, Kleenex). Likewise, we are subsequently motivated to completely remove these byproducts from our presence (e.g., flushing the toilet), due to their offensiveness and perceived threat of contagion. Bodily products, such as hair, found in our meal may render it less appetizing, especially if it is a hair that we do not recognize as our own.

Reminders of our own mortality and inherent animalistic nature constitute the second domain of disgust elicitors. Attitudes and practices surrounding sex, personal hygiene, injury to the body, and death are shaped by cultural standards. Collectively known as the "animal-reminder" domain, disgust-mediated rejection appears to serve a defensive function by maintaining the hierarchical division between humans and animals (Haidt et al., 1994). Sexual practices and grooming behaviors among nonhuman and infrahuman species may be viewed as offen-

sive and primitive. Most cultures highly regulate sexual and hygienic behaviors. Considerable efforts are made to maintain the positive attributes of passion and intimacy with sex. Incest and gaining sexual gratification through unconventional means are oftentimes considered repulsive. Likewise, washing, grooming, dressing, and deodorizing are expected personal responsibilities. Those individuals who deviate from these established norms and practices are quickly marginalized, rejected, and devalued as appearing “unsanitary” and less than human.

Injuries that expose our blood, veins, tissues, and bones can evoke strong feelings of aversion, and even nausea. When separated from the host, our internal biological features are virtually indistinguishable from other animals in general and mammals in particular (Haidt et al., 1994). Even needed medical procedures designed to improve our longevity, such as blood draws and surgical interventions, may be delayed and avoided secondary to their propensity to elicit intense disgust. Death is the most definitive reflection of our mortality and issues of death, mortality, and decay are the central property of the animal–reminder disgust domain. In support of this notion, Goldenberg et al. (2001) found that reminders of death led to an increased emotional reaction of disgust to animals, and mortality salience led to a greater preference of an essay describing people as distinct from animals. Corpses and cues representative of death (e.g., graveyards, funeral homes, caskets) can evoke a unique interplay between the emotions of disgust and fear. In general, humans tend to avoid direct physical contact with corpses. Furthermore, the very concept of ceasing existence is avoided in many cultural and religious practices given the emphasis on the continuance of life, namely spiritual, following corporal death.

INTERPERSONAL AND SOCIAL/MORAL DISGUST

Interpersonal, social, and moral situations can readily become the focus of disgust and aversion (Power & Dalglish, 1997). Although the majority of the research on disgust comes from English-speaking cultures, the evolution of disgust from food–related matters to the socio-moral/interpersonal domain has also been observed in French, German, Russian, Spanish, Japanese, and Chinese cultures (Haidt et al., 1997). Theoretically, disgust may be conceptualized as a specific reaction to something that is offensive to the self because of its nature of origin (Fallon & Rozin, 1983). Disgust may therefore be related to interpersonal/socio-moral processes by affirming our unique humanity (Rozin, Haidt, & McCauley, 1999).

Interpersonal disgust functions to protect the “soul” and maintain one’s personal territory and integrity. Four domains of interpersonal

disgust elicitors have been proposed (Rozin, Markwith, & McCauley, 1994). First, strangeness refers to unwanted contact with unfamiliar individuals or materials of unknown origin. An individual may experience reluctance and aversion, for instance, when asked to wear a sweater previously worn by a stranger. Second, moral taint refers to repugnance directed at those individuals engaging in irreprehensible behaviors. Enemies, molesters, and rapists are often deemed to be interpersonally offensive and thus avoided. Similarly, those who behave without dignity (Rozin, Lowery, Imada, & Haidt, 1999), or with hypocrisy, cruelty, fawning, and betrayal (Miller, 1997) may also become associated with disgust. Contact with strangers and those designated as interpersonally offensive does carry a degree of contamination threat (Rozin et al., 1994). Contamination in this case is not related to disease acquisition, but rather in acquiring the characteristics, behaviors, or qualities of the undesirable individual. Third, disease refers to aversive reactions toward those stricken with illness. Disgust reactivity may not necessarily be motivated by disease acquisition, but rather by avoidance of the reminder of our human vulnerability and frailty. Fourth, misfortune refers to a sense of repulsion around individuals who have been disfigured in some way. Amputees, for example, may also be avoided due to human frailty concerns or simply viewing "unfortunate" individuals as less than human. Consideration of these domains may help explain individual differences in aversions to wearing used clothing, sharing food, buying used products, or willingness to get into close proximity to physically diseased, disfigured, or "immoral" people (Rozin, 1999).

Moral disgust operates to protect and preserve social order, and historically, has been largely shaped by religious and legal institutions. Racism, child abuse, and incest are among the most common examples associated with moral disgust. Overt, physical acts, such as murder or rape, are typically involved in evaluations of moral violation. Two pathways are implicated in the association of disgust with morality (Rozin, 1999). In the first pathway, the experience of disgust generalizes from body-oriented domains (i.e., hygienic concerns) to any offensive situation (i.e., lawyers chasing ambulances). Thus, disgust reactions may also generalize to social situations that elicit a sense of offensiveness without the property of contamination. In the second pathway, cultural influences may shape otherwise normal elicitors of disgust to take on moral evaluation. In certain religions, for example, sustaining the purity of the body is a moral duty and disgust reactions are embedded into these religious moral codes (e.g., the Book of Leviticus in the Old Testament). These doctrines, therefore, serve the function of protecting the soul from moral pollution and degradation (Rozin, Haidt, McCauley, Dunlop, & Ashmore, 1999).

DISGUST IN SPECIFIC SOCIAL CONTEXTS

The potential impact of interpersonal/sociomoral disgust can be readily observed in contemporary social constructions and movements. The experience of aversion toward individuals outside one's social circle (Rozin et al., 2000) is common in many cultures. For instance, in Hindu culture, one's social status may be diminished by eating food that is prepared by someone of a lower social group (Appadurai, 1981). Moralization is a central process by which disgust becomes recruited in specific social movements (Rozin, 1999). This process results in the accretion of moral values to attitudes, products, and entities that previously had no such moral ramification (Rozin, 1997). Moralization is particularly important given that government agencies may be forced to take action, and scientific organizations may be more inclined to provide evidence confirming the new morality entity (Rozin, 1999). Disgust amplifies moral feelings by promoting bodily purity during socialization (Rozin et al., 2000). The recruitment of disgust in the process of moralization of certain attitudes, products, and/or social entities may then lead to avoidance and marginalization (Rozin & Singh, 1999).

DISGUST AND CIGARETTE SMOKING

Cigarette smoking provides one exemplar in which disgust has transformed a once social preference into a moral value. Approximately 50 years ago, cigarette smoking was a natural part of our social culture, and was treated as a matter of personal preference (Rozin & Singh, 1999). More recently, however, cigarette smoking has transformed from a mere preference into a moral violation among many. The connection between disgust and the moralization of cigarette smoking is supported by the observation that many people readily experience significant aversion to even minute (i.e., odors) contact with the "offensive" substance. Rozin (1999) notes, "when disgust becomes linked to an entity or activity, rejection or avoidance of that activity becomes highly motivated and internalized." (p. 218). One key aspect of disgusting stimuli is their propensity for contamination, infection, and disease acquisition. The link between disgust and the internalization of the moral implications of cigarette smoking can be found in the potential for cigarettes to result in heart disease and lung cancer. Reactions of disgust and the moralization of cigarette smoking may also be due to the observation that smoking is harmful to other people. Second-hand smoke, eye irritation, and residual ashes all represent pollutants imposed on others. The bonding of disgust with moral consideration has been used to support the restriction

and prohibition of cigarette smoking initiated by government agencies, various institutions, and the scientific community.

Rozin & Singh (1999) examined the role of disgust in the moralization of cigarette smoking in three generations of American college students, their parents, and their grandparents. Factor analytic findings revealed that disgust reactions to smoking and moral beliefs about smoking loaded on the same factor. Furthermore, disgust measures correlated more strongly and positively with moral judgments of smoking than did smoking-related health concerns. Indeed, rationales for not smoking often include consideration of potential side effects (i.e., bad breath, wrinkled skin, stained teeth, environmental pollution) that may be regarded with disgust (Rozin, 1999). In efforts to decrease smoking behavior, media advertisements have recognized that a very effective way to enforce the prohibition of cigarette smoking is by linking it to disgust (Rozin & Singh, 1999).

DISGUST AND VEGETARIANISM

A second venue in which disgust may play a key role is in the process of becoming a vegetarian (Rozin, Markwith, & Stoess, 1997). Vegetarianism has evolved into a rather noticeable social movement in contemporary society and has become increasingly common in the United States. A review of the literature suggests that moral vegetarians avoid or reject meat consumption by associating it with animal cruelty and environmental degradation (Fessler, Arguello, Mekdara, & Macias, 2003). Moral vegetarians have also been reported to find meat to be disgusting (e.g., Rozin et al., 1997). Moral vegetarians may perceive meat eating as immoral, thereby fostering the motivation to view meat as disgusting. Similarly, blood is a documented elicitor of disgust that may be related to the avoidance of red meat among vegetarians. Furthermore, disgust reactions to meat involve a number of domains, such as contact with animals, food contamination, death, and bodily envelope violation, thereby amplifying its experience (Fessler et al., 2003).

In an examination of the relationship between disgust and vegetarianism, Rozin et al. (1997) found that moral vegetarians showed significantly higher meat disgust scores than did vegetarians who avoided meat due to health concerns. Moral vegetarians also reported more intense emotional reactions to the consumption of meat and held stronger beliefs of animal-like changes subsequent to meat ingestion than health vegetarians. Heightened disgust sensitivity (individual differences in the propensity to react with disgust) in moral vegetarians appears to be consistent with the notion that disgust is linked to purity concerns, and may further function to maintain the human-animal border (Haidt et al.,

1994). The phrase “you are what you eat” may have particular salience to moral vegetarians (Nemeroff & Rozin, 1989), as meat consumption risks the blurring of the human–animal/animal–human boundary (Rozin & Fallon, 1987).

DISGUST AND HOMOPHOBIA

The term homophobia suggests that fear and anxiety are the *only* emotions mediating overt behavior. However, this may be misleading given that there is no empirical evidence suggesting that individuals characterized as “homophobic” engage in behaviors consistent with those of other phobic disorders (Rowan, 1994). Aggressive homophobic behaviors are often inconsistent with fear (Ernulf & Immala, 1987) and a fear–based model of homophobia may capture only one dimension of a rather complex and multidimensional phenomenon (Neisen, 1990). The manifestation of homophobia also includes a wide range of negative emotions (Bhugra, 1987), including anger and contempt (Rozin et al., 1999). Homosexuality may be seen as a departure from the cultural norm regarding human sexuality, with such departures being aligned with disgust (Rozin et al., 2000). The relation between disgust and homosexuality may be due to the religious function of disgust in promoting notions of purity, sacredness, and morality.

Given disgust–based appraisals of certain sexual matters and the recent expansion of the boundaries of disgust to include social/moral and interpersonal contexts, disgust may play a role in the formation of negative attitudes toward homosexuality. Although no studies to date have directly examined the role of disgust in homophobia, disgust may be socially engineered rather than biologically prepared, functioning to marginalize homosexuals from the normative group (Nussbaum, 1999). Historically, disgust serves the function of protecting the organism from contact with contaminated and offensive stimuli (Angyal, 1941). Homosexual individuals may therefore be negatively evaluated due to heightened concerns over HIV contamination (Rozin et al., 1994). “Homophobic disgust” may then involve concerns about bodily products, such as blood and semen, and their potential for disease consequence (Nussbaum, 1999).

THE PATHOLOGIZING OF DISGUST

Fear, sadness, and anger have long been recognized as emotional processes that can become centrally involved in psychiatric and behavioral disturbances of anxiety, depression, and hostility. Despite the fact that disgust is part of our basic repertoire of emotions, capable of eliciting

fairly intense physical reactions, being associated with strong avoidance action tendencies, and evaluations of certain objects and situations as threatening, surprisingly little theoretical and empirical attention has been given to the role disgust may play in human misery and psychiatric disorders. Theory suggests that when intense disgust becomes associated to the self or a vital aspect of the self, the vulnerability to emotional disorders may be intensified (Power & Dalglish, 1997). Although the study of disgust and its role in psychiatric disturbances is still in its infancy (McNally, 2002), the last decade has witnessed an increasing recognition and understanding of how disgust may become involved in the onset and maintenance of phobic states, Obsessive–Compulsive Disorder, and eating disorders.

DISGUST IN SPECIFIC PHOBIAS

The relative contributions of fear and disgust in mediating phobic behavior have received increasing theoretical and empirical attention over the last decade. Fearful responding toward and avoidance of circumscribed objects and situations are generally consistent with the traditional conceptualization of phobic states (Lang, 1985). The observation that individuals may concurrently report the experience of aversion, repugnance, and nausea upon exposure to certain animals and blood–injury stimuli has led to the inclusion of other emotional states, such as disgust, in influencing phobic behavior. Across many animal phobias, fearful avoidance tends to serve a predator–defensive function, in that such animals are avoided due to fears of being attacked and physically harmed. Spider phobics, for instance, often perceive a spider’s movements to be fast, unpredictable, and aggressive in nature. Although fears of being bitten may be a dreaded outcome, contact with spiders may be also avoided due to their perceived dirtiness, ugliness, and to their potential as a disease vector.

The recognition that a number of fear–relevant, yet nonpredatory animals (e.g., spiders, snakes, rats, cockroaches, maggots, worms, slugs) can evoke strong reactions of disgust suggests that phobic avoidance may be mediated at least in part by concerns over contamination (Davey, 1994a). Avoidance behavior in this context appears to serve a disease–avoidance, as opposed to a predator–defense, function (Matchett & Davey, 1991). Physical features of the animal itself and the places where it can be found both contribute to its negative evaluation as a carrier of disease. Various physical characteristics, such as slimy, scaly, and hairy, serve as potent cues for disgust and contamination. Likewise, animals that are perceived to reside in areas containing dirt, garbage, de-

caying material, and sewage, may also lead to assumptions that they are infectious carriers of germs, bacteria, and disease.

The sum of the animal phobia–disgust literature suggests that self-report measures of disgust tend to be moderately and positively correlated with various small animal fears (Mulken, de Jong, & Merckelbach, 1996). Spider-fearful subjects rate pictures of spiders as significantly more disgusting than their nonphobic counterparts, although fear ratings also tend to be higher than the disgust ratings (Sawchuk, Lohr, Westendorf, Meunier, & Tolin, 2002). Recent research also suggests that disgust is a stronger predictor than anxiety of avoidance of spiders (Woody, McLean, & Klassen, 2005). Over the course of exposure therapy, disgust ratings of spiders tend to decline (de Jong, Andrea, & Muris, 1997), although the slope of the decline may be more gradual for disgust than fear (Smits, Telch, & Randall, 2002). Pre-treatment disgust sensitivity, however, does not appear to be predictive of treatment outcome in spider phobia (Merckelbach, de Jong, Arntz, & Schouten, 1993).

Clinical and experimental findings suggest that disgust plays an even more prominent role in blood–injection–injury (BII) phobia, in comparison to animal phobias (Page, 1994). BII phobia is a disorder characterized by extreme aversion to the sight of blood or injuries, receiving injections, or invasive medical procedures. Exposure to blood, veins, and mutilation tends to evoke reactions of nausea, aversion, and disgust, at times even in the complete absence of any reported fear. The striking facial expression of disgust is commonly observed among individuals sensitive to BII material. Perhaps the most unique feature of BII phobia that does not appear to occur in any other phobic or anxiety disorder is the experience of vasovagal syncope or fainting upon exposure to threat-relevant stimuli. Approximately 70 to 80% of BII phobics report a history of partial and full fainting episodes in the presence of blood (Marks, 1988). Furthermore, BII phobics with a familial history of fainting experiences are more prone to fainting themselves in comparison to BII phobics without a family history of syncope (Kleinknecht & Lenz, 1989). The physiological response pattern of fainting in response to blood and mutilation suggests the involvement of a biphasic process. The biphasic response is characterized by an initial increase in sympathetic nervous system arousal rapidly followed by activation of the parasympathetic nervous system. The dramatic shift from sympathetic to parasympathetic activity produces a marked decline in heart rate and blood pressure, thus resulting in dizziness and/or fainting (Öst, Sterner, & Lindahl, 1984). The emotion of disgust also appears to be highly regulated by the parasympathetic nervous system (Levenson, 1992), thus furthering speculation that disgust may serve a central role in BII-related phobias.

As observed in the animal phobia literature, analogue and clinical BII phobics report greater disgust reactions toward stimuli directly related to blood–injury concerns than nonfearful and anxious controls (Tolin, Sawchuk, & Lee, 1999). A similar pattern holds true when rating pictures and videos of injections and surgical procedures (Hepburn & Page, 1999; Sawchuk et al., 2002). In contrast to analogue spider phobics who predominantly report fear when evaluating spiders, BII phobics endorse significantly greater disgust than fear when evaluating scenes of blood, mutilation, and surgeries (Sawchuk et al., 2002). Using a conditioning paradigm, Schienle, Stark, and Vaitl (2001) demonstrated that compared to controls, individuals high in BII fears rated disgusting but fear–irrelevant pictures as more disgusting and showed stronger facial expressions of disgust as assessed by electromyographic activity (EMG).

Additional studies have found that BII phobics are characterized by generalized disgust sensitivity, in that they tend to find elicitors completely unrelated to their phobic concerns (e.g., feces, rotting foods, smells) as more disgusting than their nonfearful counterparts (Tolin, Lohr, Sawchuk, & Lee, 1997). This finding has led to the speculation that elevated disgust sensitivity may serve as a potential risk factor in the development of BII phobia (Page, 1994). Some studies have failed to find robust relations between measures of BII fear and disgust sensitivity (e.g., Muris et al., 2000). However, the majority of these studies utilized the DQ and as noted earlier, the DQ is not an adequate measure of the disgust sensitivity construct. Although studies directly examining the link between disgust sensitivity and fainting proneness are sparse, surprisingly little support has been found for the role of disgust in predicting fainting history (Kleinknecht et al., 1997).

DISGUST IN OBSESSIVE COMPULSIVE DISORDER

Recurring intrusive thoughts of contamination are reported in over 50% of individuals diagnosed with Obsessive-Compulsive Disorder (OCD), and especially among those individuals with compulsive cleaning and washing rituals (Olatunji et al., 2004). The functional value of intense washing rituals upon perceived contact with contaminants serves a protective, sanitizing function as these persons attempt to disinfect themselves and the environments in which they live. OCD sufferers may not only perceive themselves to be more vulnerable to infection in comparison to the average person, but they also tend to fear rapid, spreading contamination upon exposure to agents believed to be dirty (Riskind, Abreu, Strauss, & Holt, 1997). Fairly profound avoidance behavior may evolve over time as compulsive washers will make active attempts to avoid situations and objects that even provoke obsessional thoughts of

infection (Rachman & Shafran, 1998). The motivation for avoidance among OCD washers shares remarkable similarities to the disease-avoidance function in various small animal phobias.

Power and Dagleish (1997) proposed that disgust is functional in the etiology and maintenance of contamination-related obsessions and washing compulsions in OCD. The underlying relation between disgust and OCD may be mediated by the fear of contamination (e.g., Sawchuk, Lohr, Iolin, Lee, & Kleinknecht, 2000). Indeed, studies have found significant correlations between self-report measures of disgust sensitivity and measures of OCD symptoms (e.g., Muris et al., 2000). Previous research has also noted global measures of disgust to be a better predictor of compulsive washing and checking behaviors than other measures of anxiety and depression (Mancini, Gagnani, & D'Olimpio, 2001; Thorpe, Patel, & Simonds, 2003). As an extension of descriptive research highlighting a positive association between self-report measures of disgust and OCD-related contamination concerns (Sawchuk et al., 2000; Ware et al., 1994), recent investigations have begun to examine disgust responses among subclinical and clinical OCD subjects. Individuals classified as high in contamination fear report significantly greater disgust sensitivity across a broad range of disgust elicitors in comparison to low-contamination-fearful participants (Olatunji et al., 2004). Those disgust domains particularly capable of contagion, such as hygiene, mutilation, and animals, have been found to be more predictive of contamination fear than disgust elicitors with less propensity for infection (e.g., sex). OCD patients with primary contamination fears scored significantly higher on measures of disgust sensitivity than nonanxious controls, and marginally higher than other OCD patients without contamination fears (Woody & Tolin, 2002). Studies have also shown that participants with OCD symptoms demonstrate behavioral avoidance of disgusting stimuli (Tsao & McKay, in press).

Functional magnetic resonance imaging (fMRI) studies have also provided support for the proposed role between disgust and OCD with obsessive washers displaying activation of the insula (which is important for the perception of disgust) secondary to the presentation of disgusting pictures (Phillips et al., 2000). A recent study found a different distribution of brain activation mainly in the insula during disgust-inducing visual stimulation in comparison to neutral stimulation among OCD subjects (Shapira et al., 2003). Sprengelmeyer, Young, Pundt et al. (1997) have demonstrated that a sample of OCD patients shows a deficit in the recognition of facially expressed disgust; however, subsequent studies have not replicated this finding (Parker, McNally, Nakayama, & Wilhelm, 2004; Rozin, Taylor, Ross, Bennett, & Hejmadi, 2005). Cognitive appraisals based on magical thinking may be useful in illuminating the

relation between disgust and OCD. In a recent study, Tolin, Worhunsky, and Nicholas (2004) touched a clean pencil to an object that OCD patients identified as contaminated. A second pencil was touched to the first pencil and was then rated and this process was continued for 12 pencils. The results indicated that those subjects with OCD seemed to perceive a "chain of contagion" in which successive degrees of removal from the original object were not rated as less contaminated. Thus it appears that thought processes related to magical thinking (once in contact always in contact) have some value in better understanding OCD. Although descriptive and experimental research continues to implicate disgust in OCD, to date, no studies have examined whether changes occur in overall disgust sensitivity during the course of treatment interventions.

DISGUST AND EATING DISORDERS

Eating disorders such as anorexia nervosa and bulimia nervosa consist of maladaptive patterns of eating that primarily affect women in adolescence or early childhood (O'Brien & Vincent, 2003; Tuschen-Caffier, Vogele, Bracht, & Hilbert, 2003). Due to the life-threatening nature of eating disorders, studies have begun to identify various emotional states, such as anxiety and depression, which may operate as potential risk factors (e.g., Faiburn, Cooper, & Shafran, 2003). Historically, the emotions that have been attributed to the etiology and maintenance of eating disorders are fear and anxiety (i.e., fear of weight gain). However, recent theorists have implicated the role of disgust in eating disorders (e.g., Power & Dagleish, 1997). This follows the documented association between the emotion of disgust and the evaluation and incorporation of foods (i.e., Rozin & Fallon, 1987) and research has shown that food is a major focus of concern for persons with eating disorders (Harvey, Troop, Treasure, & Murphy, 2002).

Elevated disgust responses among bulimia nervosa and anorexia nervosa disorders may be apparent in two domains. First, food itself tends to be negatively evaluated and may acquire threatening and nausea-provoking properties. Second, the negative evaluation of one's own body (and its products) as disgusting or grotesque is commonly observed. Clinical observation would indicate that disgust-based reactions provide defining features of eating disorders (Phillips et al., 1998). For instance, there is the avoidance of foods that are considered to be fattening and there are also aversive reactions toward certain body parts that are perceived to be fat or prone to becoming fat. Furthermore, societal pressure to be thin provides a context in which overeating and being overweight is viewed with disgust. Indeed there is evidence that those

who eat unhealthy and fattening foods have been rated as less attractive and likable (Stein & Nemeroff, 1995).

Disgust may also be implicated in the development and maintenance of eating disorders, given that several derivatives of disgust (i.e., shame, avoidance, submissive behavior, and helplessness) are commonly associated (Troop, Murphy, Bramon, & Treasure, 2000). Although empirical studies investigating the proposed association between disgust and eating disorders have been limited, interesting findings have been generated from this sparse literature. First, measures of disgust sensitivity do tend to correlate positively with eating disorder symptoms in females, as opposed to males (Davey, Buckland, Tantow, & Dallos, 1998). Second, when comparing samples with and without eating disorders, significant group differences emerge only on those disgust domains directly related to food, the physical body, and bodily products (Davey et al., 1998; Troop et al., 2000; Troop, Treasure, & Serpell, 2002). This pattern of disgust sensitivity to a more refined, disorder-specific range of disgust elicitors in eating disorders is somewhat contrasted by generalized disgust reactivity to a broader range of disgust domains in specific phobias and OCD. Third, high-caloric foods and overweight body shapes tend to be evaluated as more disgusting and fearful by women reporting more abnormal eating attitudes than those women without such attitudes toward eating (Harvey et al., 2002). Finally, women in remission from an eating disorder show significant reductions in bodily focused disgust sensitivity in comparison to those females continuing to meet diagnostic criteria (Troop et al., 2002). The clinical and in remission groups do not, however, appear to display any differences in disgust sensitivity toward foods.

DISGUST AND PSYCHOPATHOLOGY: A CRITICAL APPRAISAL

The culmination of the current research appears to suggest that heightened disgust sensitivity may operate as a potential diathesis factor in the etiology of specific phobias, OCD, and eating disorders (e.g. Phillips et al., 1998) and the examination of disgust in behavioral and psychiatric disorders has several opportunities for future research (Phillips et al., 1998). From a nosological approach, those disorders sharing both a common and dominant theme of disgust may eventually warrant a reclassification in the diagnostic system as "Aversion Disorders." Doing so may help differentiate those disorders from mood and anxiety disorders that are essentially characterized by sadness and fear, respectively. However, this shift would be contingent upon future studies demonstrating that the proposed influence of disgust remains strong after other emotional factors have been controlled, and that targeting disgust modifica-

tion during treatment has an incrementally better outcome. To date, available evidence suggests that the majority of the disorders that are mediated by disgust consist of anxiety and eating disorders. A number of authors have argued that disgust tends not to be centrally implicated in these problems, may be expressed as a magnified component of general negative affectivity or neuroticism, and has little effect on the outcome of existing treatment interventions (Druschel & Sherman, 1999; Thorpe & Salkovskis, 1998). Thus, future research along these lines must demonstrate with component-controlled descriptive and experimental studies that the role of disgust in various disorders is independent and not accounted for by covariance with other negative affective states (i.e., trait anxiety).

In addition to component-controlled evaluations, more careful consideration must be given to the assessment of "disgust sensitivity." To the extent that the DS and the DES are regarded as measures of individual differences in the propensity to experience or respond with disgust (i.e., disgust sensitivity), the significant positive correlations between these measures and various disorders would support the consideration of heightened disgust sensitivity as a vulnerability to developing specific disorders. However, close examination of current measures of disgust sensitivity indicates that they are contextually bound measures in that they assess disgust reactions to specific stimuli (i.e., "A bottle of your own blood") and situations (i.e., "As part of a sex education class, you are required to inflate a new lubricated condom, using your mouth"). Thus, a more conservative interpretation of the research literature on disgust and psychopathology is that some disorders (i.e., BII) correspond with heightened reactivity to stimuli or situations (i.e., injections and blood draws) that involve disgust. The development of more comprehensive and trait-like measures of disgust will be necessary to determine the extent to which disgust predispositions (i.e., trait disgust) contribute to the etiology of disorders independent of context.

PALATABLE APPROACHES TO STUDYING DISGUST

Disgust has arguably been the most understudied of all emotions (McNally, 2002). The unique expansion of disgust from our mouth (oral incorporation) to our minds (psychological contamination) as well as its role as a means of socialization suggests that programmatic research is needed to further evaluate this complex emotion. As the role of disgust in multiple contexts, such as concerns of oral incorporation of contaminated foods, defense against reminders of our animal nature, and in specific social/moral and interpersonal contexts, continues to be identified, the opportunities for related research may be unlimited.

WHERE CAN DISGUST GO FROM HERE?

More social research will be needed to identify additional contexts in which disgust may be implicated. As an emotion inherent in the process of socialization, it will be important to clarify the role that disgust may play in the legal process (e.g., Nussbaum, 1999). Racial attitudes and ethnic prejudices may be encouraged through the association of disgust directed at those perceived to be outside one's social circle (Rozin et al., 2000). Avoidance of contact with members outside one's ethnic or social group hinders exposure to corrective information and reinforces existing belief systems. The intergenerational transmission of such negative evaluative attitudes is likely due to social learning (Rozin et al., 1984). It is possible that a within-family cross-sectional/generation-stratified assessment of disgust and racial attitudes may help to clarify this assumption. In a similar manner, recent studies have indicated that disgust may be functional in prejudicial attitudes and avoidance of people with physical disabilities, possibly due to disease-avoidance (Park, Faulkner, & Schaller, 2003) and disgust-related misfortune (Rozin et al., 1994). The modification of racial and prejudicial attitudes and behaviors has represented a long-standing challenge for society. While disgust is widely observed in various social situations, it will also be necessary to determine that this is a relation by association rather than disgust as an emotion acquiring a moralization function, and perhaps exploring ways that social-related disgust can be reduced may offer an important direction for future inquiry.

The available literature is largely biased toward describing and examining the ways disgust has become sensitized in our culture, through social codes, and in clinical problems. A novel approach may be invested toward learning more about those individuals who display relatively little, if any, disgust reactivity. For instance, is it possible that those employed in solid waste management, garbage disposal, medical specialties (e.g., surgery, proctology), and mortuary industries are somehow disgust "insensitive." Lower reactivity to disgust stimuli could be due to a temperamental predisposition, something that is acquired over time through habituation and desensitization secondary to routine, frequent exposure, or a combination of the two. Alternatively, it is possible that low disgust reactivity may help to inoculate individuals from developing racial attitudes and ethnic prejudices, thereby promoting approach and exposure to diversity.

Future research must also consider the use of more complex statistical methods to better determine the structure of disgust. Rozin et al., (2000) propose a four-factor model of disgust: core, animal-reminder, interpersonal, and socio-moral disgust elicitors. However, Marzillier and

Davey (2004) conducted hierarchical agglomerative cluster analysis to categorize the emotional profiles of disgust-evoking stimuli and found only two clusters of stimuli corresponding to: (1) "primary" disgust items containing a range of disgust-relevant items characterized by their ability to elicit fear of oral incorporation and their animal origin; and (2) "complex" disgusts, consisting mainly of behaviors or activities that are considered to be socially or morally unacceptable. Of note was that animal-reminder disgust was not extracted, thus questioning its validity as a separate and distinct disgust domain. Contemporary studies must also move beyond specific phobias, OCD, and eating disorders to other areas of psychopathology in which disgust may become implicated. In a recent study, Schienle et al. (2003) found heightened disgust sensitivity in schizophrenic patients. The study also found that the presence of psychotic symptoms (irrespective of schizophrenic subtypes) significantly predicted enhanced disgust sensitivity. Although preliminary evidence appears to implicate disgust sensitivity in the etiology of specific disorders, there are considerable individual differences in what people find disgusting and how they respond to such elicitors. Thus, initial assessment and treatment planning may need to be tailored on an individual basis (Woody & Teachman, 2000).

Rarely are emotions experienced in a mutually exclusive manner. Several complex emotional responses containing a disgust component can be observed in various social and clinical domains. For instance, recent research suggests that anger and contempt may have some overlap with disgust, with the interaction of these three emotions having implications for maintaining the moral codes of community, autonomy, and divinity (Rozin et al., 1999). As mentioned earlier, the dominant response of disgust is rejection/avoidance. If disgust is centrally involved in racist attitudes and prejudicial behaviors, why then is aggressive approach behavior observed as opposed to passive avoidance and rejection (e.g., Ernulf & Immala, 1987)? The answer may lie in understanding the blending of alternate emotions such as anger and fear. The concurrent presence of anger and fear may override the dominant action tendency of disgust, thereby resulting in approach-aggression.

Other complex emotional states observed in clinical disorders, such as guilt and shame, may also involve disgust (Power & Dalgleish, 1997). Guilt is an unpleasant feeling with accompanying beliefs that one should have acted differently out of a sense of responsibility. Shame, in a similar manner, can be experienced as the result of profound negative self-evaluation. Disgust directed toward the self may not only lead to a condition of self-loathing, but may possibly be involved as a vulnerability to the onset of depression (Power & Dalgleish, 1997). Other theorists have suggested that disgust may also be partially involved in the experi-

ence of embarrassment in social phobia and horror in Posttraumatic Stress Disorder (McNally, 2002). Future research may also consider the role that disgust may play in sexual disorders. Sex is highly suggestive of our underlying animal nature, with disgust evolving to patrol the animal–human border (Goldenberg et al., 2001). Perhaps heightened disgust sensitivity in this area may predict the rejection of sexual intimacy or the development of sexual aversions.

DISGUSTING METHODS

Gaining a better understanding of the function of disgust in social and clinical domains will necessitate the expansion of improved means of assessing this construct. An advantage to the systematic examination of disgust is that this emotion can be easily and ethically evoked within the controlled research setting. The available research on disgust has been primarily limited to the use of self-report measures. More objective observational methods, such as coding facial expressions and physiological reactivity, can augment existing research in this area. The ecological validity of experimental studies can be greatly enhanced by emphasizing the use of Behavioral Avoidance Tasks (BATs; see Rozin, Haidt et al., 1999 for examples). By promoting realistic exposure to disgust stimuli (e.g., eating soup from a thoroughly cleaned but used dog bowl), researchers may begin to obtain a better understanding of those individual differences in what people perceive to be threat-relevant (Rozin et al., 1999).

The association of magical thinking or psychological contamination with disgust may also present a viable opportunity for researchers to incorporate basic information-processing paradigms (i.e., Stroop, Dot Probe, and Signal Detection Tasks). The differential processing of fear and anger cues has been well documented in the research literature using similar paradigms. However, very little is known of the differential processing of disgust-relevant information. The limited research does suggest that there may be an attentional bias toward disgust secondary to emotional priming (Charash & McKay, 2002), although this finding has yet to be replicated. The Implicit Association Test (IAT) may also offer some promise in assessing information biases for disgust stimuli. The IAT may be particularly useful in assessing memory-based cognitive structures that are specific to disgust (see Teachman & Woody, 2003 for an example). With the IAT, social researchers can attempt to determine if there is indeed some specificity of associations between certain social categories (e.g., homosexual, heterosexual) with disgust-relevant semantic information (e.g., revolting, appealing). Clinical research may

also incorporate the IAT as a means of separating the co-occurrence of implicit disgust and fear in specific disorders (i.e., OCD).

CONCLUSION

Disgust is a basic emotion that was initially described as the oral incorporation of contaminated foods. An evolved understanding of disgust has more recently begun to implicate this emotion in other socio-moral, interpersonal, and clinical domains. In lieu of these advances, a review of the literature continues to indicate that disgust is an understudied emotion. Given the relevance of disgust in multiple social and clinical contexts, further systematic examination of this emotion both alone and in combination with other affective states may ultimately help improve our understanding of human behavior (Woody & Teachman, 2000). Many unanswered questions about disgust remain. To date we only have an emerging knowledge about the history of disgust, the sequence of events that contributed to its evolution from oral to moral contexts, its developmental trajectory, or the principal contributors to observed individual differences in reactivity (Rozin et al., 2000). It is possible that advancing methodological approaches to studying disgust may provide social and clinical psychologists with the opportunity to begin to answer these and many more questions. Although we concur with the sentiment that disgust is the forgotten emotion (Phillips et al., 1998), we also hold the sentiment that disgust has indeed arrived (McNally, 2002). Perhaps in several years, disgust may be reframed as the unforgettable emotion.

REFERENCES

- Adolphs, R. (2002). Neural systems for recognizing emotion. *Current Opinion in Neurobiology*, *12*, 169–177.
- Angyal, A. (1941). Disgust and related aversions. *Journal of Abnormal and Social Psychology*, *36*, 393–412.
- Appadurai, A. (1981). Gastro-politics in Hindu South Asia. *American Ethnologist*, *8*, 494–511.
- Arrindell, W. A., Mulkens, S., Kok, J., & Vollenbroek, J. (1999). Disgust and the sex difference in fears to common indigenous animals. *Behaviour Research and Therapy*, *37*, 273–280.
- Bhugra, D. (1987). Homophobia: A review of the literature. *Marital Therapy*, *2*, 169–177.
- Cacioppo, J. T. & Gardner, W. L. (1999) Emotion. *Annual Review of Psychology*, *50*, 191–214.
- Calder, A.J., Keane, J., Manes, F., Antoun, N., & Young, A.W. (2000). Impaired recognition and experience of disgust following brain injury. *Nature Neuroscience*, *3*, 1077–1078.
- Calder, A.J., Lawrence, A.D., & Young, A.W. (2001). Neurobiology of fear and loathing. *Nature Reviews Neuroscience*, *2*, 352–363.

- Carlson, N.R. (1994). *Physiology of behavior* (5th ed.). Needham Heights, MA: Allyn & Bacon.
- Charash, M., & McKay, D. (2002). Attention bias for disgust. *Journal of Anxiety Disorders*, *16*, 529–541.
- Curtis, G.C., & Thyer, B. (1983). Fainting on exposure to phobic stimuli. *American Journal of Psychiatry*, *140*, 771–774.
- Darwin, C. (1872/1965). *The expression of the emotions in man and animals*. Chicago: University of Chicago Press.
- Davey, G. C. L. (1994a). Self-reported fears to common indigenous animals in an adult UK population: The role of disgust sensitivity. *British Journal of Psychology*, *85*, 541–554.
- Davey G.C.L. (1994b) Disgust. In V.S. Ramachandran (Ed.) *Encyclopaedia of human behavior*. San Diego, CA: San Diego Press.
- Davey, G.C.L., Buckland, G., Tantow, B., & Dallos, R. (1998). Disgust and eating disorders. *European Eating Disorders Review*, *6*, 201–211.
- de Jong, P.J., Andrea, H., & Muris, P. (1997). Spider phobia in children: Disgust and fear before and after treatment. *Behaviour Research and Therapy*, *35*, 559–562.
- de Jong, P.J., Peters, M., & Vanderhallen, I. (2002). Disgust and disgust sensitivity in spider phobia: Facial EMG in response to spider and oral disgust imagery. *Journal of Anxiety Disorders*, *16*, 477–493.
- Druschel, B. A., & Sherman, M. F. (1999). Disgust sensitivity as a function of the big five and gender. *Personality and Individual Differences*, *26*, 739–748.
- Ekman, P. (1982). *Emotion in the human face* (2nd ed.). New York: Cambridge University Press.
- Ekman, P., & Friesen, W. V. (1975). *Unmasking the face*. Englewood Cliffs, NJ: Prentice Hall.
- Ekman, P., Levenson, R.W., & Friesen, W.V. (1983). Autonomic nervous system activity distinguishes among emotions. *Science*, *221*, 1208–1210.
- Ernulf, K. E., & Immala, S. M. (1987). *The relationship between affective and cognitive components of homophobic reaction*. *Archives of Sexual Behavior*, *16*, 501–509.
- Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A “transdiagnostic” theory and treatment. *Behavior Research and Therapy*, *41*, 509–528.
- Fallon, A. E., & Rozin, P. (1983). The psychological bases of food rejections by humans. *Ecology of Food and Nutrition*, *13*, 15–26.
- Fessler, D. M. T., Arguello, A. P., Mekdara, J. M., & Macias, R. (2003). Disgust sensitivity and meat consumption: A test of an emotivist account of moral vegetarianism. *Appetite*, *41*, 31–41.
- Freud, S. (1905/1953). Three essays on the theory of sexuality. In J. Strachey (Ed.), *The standard edition of the complete psychological works of Sigmund Freud*, (Vol. 7, pp. 123–231). London: Hogarth Press.
- Goldenberg, J. L., Pyszcznski, 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.
- 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.
- 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.
- Harvey, T., Troop, N. A., Treasure, J. I., & Murphy, T. (2002). Fear, disgust, and abnormal eating attitudes: A preliminary study. *International Journal of Eating Disorders*, *32*, 213–218.

- Hepburn, T., & Page, A. (1999). Effects of images about fear and disgust upon responses to blood-injury phobic stimuli. *Behavior Therapy, 30*, 63–77.
- Izard, C. E. (1993). Organizational and motivational functions of discrete emotions. In M. Lewis & J. M. Haviland (Eds.), *Handbook of emotions*. New York: The Guilford Press.
- Johnson-Laird, P. N., & Oatley, K. (1992). Basic emotions, rationality, and folk theory. *Cognition and Emotion, 6*, 201–223.
- Kleinknecht, R.A., Kleinknecht, E.A., & Thorndike, R.M. (1997). The role of disgust and fear in blood and injection-related fainting symptoms: A structural equation model. *Behaviour Research and Therapy, 35*, 1075–1087.
- Kleinknecht, R. A., & Lenz, J. (1989). Blood/injury fear, fainting and avoidance of medically-related situations: A family correspondence study. *Behaviour Research and Therapy, 27*, 537–547.
- Lang, P.G. (1985). The cognitive psychophysiology of emotion: Fear and anxiety. In A.H. Tuma & D. Maser (Eds), *Anxiety and the anxiety disorders*. Hillsdale, NJ: LEA.
- Levenson, R.W. (1992). Autonomic nervous system differences among emotions. *Psychological Science, 3*, 23–27.
- Levenson, R.W., Ekman, P., & Friesen, W.V. (1990). Voluntary facial action generates emotion-specific autonomic nervous system activity. *Psychophysiology, 27*, 363–384.
- Mancini, F., Gragnani, A., & D'Olimpio, F. (2001). The connection between disgust and obsessions and compulsions in a non-clinical sample. *Personality and Individual Differences, 31*, 1173–1180.
- Marks, I.M. (1988). Blood-injury phobia: A review. *American Journal of Psychiatry, 145*, 1207–1213.
- Marzillier, S. R., & Davey, G. C. (2004). The emotional profiling of disgust-eliciting stimuli: Evidence for primary and complex disgusts. *Cognition and Emotion, 18*, 313–336.
- Matchett, G., & Davey, G. C. L. (1991). A test of the disease-avoidance model of animal phobias. *Behaviour Research and Therapy, 29*, 91–94.
- McNally, R. J. (2002). Disgust has arrived. *Journal of Anxiety Disorders, 16*, 561–566.
- Merckelbach, H., de Jong, P. J., Arntz, A., & Schouten, E. (1993). The role of evaluative learning and disgust sensitivity in the etiology and treatment of spider phobia. *Advances in Behaviour Research and Therapy, 15*, 243–255.
- Miller, W. I. (1997). *The anatomy of disgust*. Cambridge, MA: Harvard University Press.
- Mulkens, S. A., de Jong, P. J., & Merckelbach, H. (1996). Disgust and spider phobia. *Journal of Abnormal Psychology, 105*, 464–468.
- Muris, P., Merckelbach, H., Nederkoorn, S., Rassin, E., Candel, I., & Horselenberg, R. (2000). Disgust and psychopathological symptoms in a nonclinical sample. *Personality and Individual Differences, 29*, 1163–1167.
- Neisen, J. H. (1990). Heterosexism: Redefining homophobia for the 1990s. *Journal of Gay & Lesbian Psychotherapy, 1*, 21–35.
- Nemeroff, C., & Rozin, P. (1989). "You are what you eat": Applying the demand-free "impressions" technique to an unacknowledged belief. *Ethos: The Journal of Psychological Anthropology, 17*, 50–69.
- Nemeroff, C., & Rozin, P. (1994). The contagion concept in adult thinking in the United States: Transmission of germs and of interpersonal influence. *Ethos, 22*, 158–186.
- Nussbaum, M. C. (1999). "Secret sewers of vice": Disgust, bodies, and the law. In S. A. Bandes (Ed.), *The passions of law* (pp. 19–62). New York: New York University Press.
- O'Brien, K.M., & Vincent, N.K. (2003). Psychiatric comorbidity in anorexia and bulimia nervosa: Nature, prevalence, and causal relationships. *Clinical Psychology Review, 23*, 57–74.
- Olatunji, B. O., Sawchuk, C. N., Lohr, J. M., & de Jong, P. J. (2004). Disgust domains in the prediction of contamination fear. *Behaviour Research and Therapy, 42*, 93–104.

- Öst, L.-G., Sterner, U., & Lindahl, I.-L. (1984). Physiological responses in blood phobics. *Behaviour Research and Therapy*, 22, 109–117.
- Page, A. C. (1994). Blood–injury phobia. *Clinical Psychology Review*, 14, 443–461.
- Park, J. H., Faulkner, J., & Schaller, M. (2003). Evolved disease–avoidance process and contemporary anti–social behavior: Prejudicial attitudes and avoidance of people with physical disabilities. *Journal of Nonverbal Behavior*, 27, 65–87.
- Parker, H. A., McNally, R. J., Nakayama, K., & Wilhelm, S. (2004). No disgust recognition deficit in Obsessive–Compulsive Disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, 35, 183–192.
- Phillips, M. L., Marks, M., Senior, C., Lythgoe, D., O’Dwyer, A.–M., Meehan, O., Williams, S. C. R., Brammer, M. J., Bullmore, E. T., & McGuire, P. K. (2000). A differential neural response in Obsessive–Compulsive Disorder patients with washing compared with checking symptoms to disgust. *Psychological Medicine*, 30, 1037–1050.
- Phillips, M. L., Senior, C., Fahy, T., & David, A. S. (1998). Disgust: The forgotten emotion of psychiatry. *British Journal of Psychiatry*, 173, 373–375.
- Plutchik, R. (1980). *Emotion: A psychoevolutionary synthesis*. New York: Harper & Row.
- Plutchik, R. (2001). The nature of emotions. *American Scientist*, 89, 344–350.
- Power, M., & Dalgleish, T. (1997). *Cognition and emotion: From order to disorder*. East Sussex, UK: Psychology Press, Erlbaum.
- Rachman, S. (1990). *Fear and courage* (2nd ed.). New York: W. H. Freeman Company.
- Rachman, S., & Shafran, R. (1998). Cognitive and behavioral features of Obsessive–Compulsive Disorder. In R. P. Swinson & M. M. Antony et al. (Eds.), *Obsessive–Compulsive Disorder: Theory, research, and treatment*. New York: Guilford Press.
- Riskind, J. H., Abreu, K., Strauss, M., & Holt, R. (1997). Looming vulnerability to spreading contamination in subclinical OCD. *Behaviour Research and Therapy*, 35, 405–414.
- Roseman, I. J., Wiest, C., & Swartz, T. S. (1994). Phenomenology, behaviors, and goals differentiate discrete emotions. *Journal of Personality and Social Psychology*, 67, 206–221.
- Rowan, A. (1994). Homophobia: A new diagnosis for DSM–V? *Behavior Therapist*, 17, 183–184.
- Royzman, E. B., & Sabini, J. (2001). Something it takes to be an emotion: The interesting case of disgust. *Journal for the Theory of Social Behavior*, 31, 29–59.
- Rozin, P. (1997). Moralization. In A. Brandt & P. Rozin (Eds.), *Morality and health* (pp. 379–401). New York: Routledge.
- Rozin, P. (1999). Food is fundamental, fun, frightening, and far–reaching. *Social Research*, 66, 9–30.
- Rozin, P., & Fallon, A. E. (1987). A perspective on disgust. *Psychological Review*, 94, 32–41.
- Rozin, P., Fallon, A. E., & Mandell, R. (1984). Family resemblances in attitudes to food. *Developmental Psychology*, 20, 309–314.
- Rozin, P., Haidt, J., & McCauley, C. R. (1999). Disgust: The body and soul emotion. In T. Dalgleish & M. J. Power (Eds.), *Handbook of emotion and cognition*. New York: John Wiley and Sons.
- Rozin, P., Haidt, J., & McCauley, C. R. (2000). Disgust. In M. Lewis & J. M. Haviland (Eds.), *Handbook of emotions*. New York: The Guilford Press.
- Rozin, P., Haidt, J., McCauley, C., Dunlop, L., & Ashmore, M. (1999). Individual differences in disgust sensitivity: Comparisons and evaluations of paper–and–pencil versus behavioral measures. *Journal of Research in Personality*, 33, 330–351.
- Rozin, P., Hammer, L., Oster, H., Horowitz, T., & Marmora, V. (1986). The child’s conception of food: Differentiation of categories of rejected substances in the 16 months to 5 year age range. *Appetite*, 7, 141–151.
- Rozin, P., Lowery, L., & Ebert, R. (1994). Varieties of disgust faces and the structure of disgust. *Journal of Personality and Social Psychology*, 66, 870–881.

- Rozin, P., Lowery, L., Imada, S., & Haidt, J. (1999). The CAD triad hypothesis: A mapping between three moral emotions (contempt, anger, disgust) and three moral codes (community, autonomy, divinity). *Journal of Personality and Social Psychology, 76*, 574–586.
- Rozin, P., Markwith, M., & McCauley, C. R. (1994). The nature of aversion to indirect contact with other persons: AIDS aversion as a composite of aversion to strangers, infection, moral taint and misfortune. *Journal of Abnormal Psychology, 103*, 495–504.
- Rozin, P., Markwith, M., & Stoess, C. (1997). Moralization and becoming a vegetarian: The transformation of preferences into values and the recruitment of disgust. *Psychological Science, 8*, 67–73.
- Rozin, P., Millman, L., & Nemeroff, C. (1986). Operation of the laws of sympathetic magic in disgust and other domains. *Journal of Personality and Social Psychology, 50*, 703–712.
- Rozin, P., & Nemeroff, C. (1990). The laws of sympathetic magic: A psychological analysis of similarity and contagion. In J. W. Stigler, R.A. Shweder, & G. Herdt (Eds.), *Cultural psychology: Essays on comparative human development*. New York: Cambridge University Press.
- Rozin, P., & Singh, L. (1999). The moralization of cigarette smoking in America. *Journal of Consumer Behavior, 8*, 321–337.
- Rozin, P., Taylor, C., Ross, L., Bennett, G., & Hejmadi, A. (2005). General and specific abilities to recognize negative emotions, especially disgust, as portrayed in the face and the body. *Cognition and Emotion, 19*, 397–412.
- Sawchuk, C. N., Lohr, J. M., Tolin, D. F., Lee, T. C., & Kleinknecht, R. A. (2000). Disgust sensitivity and contamination fears in spider and blood–injection–injury phobias. *Behaviour Research and Therapy, 38*, 753–762.
- Sawchuk, C. N., Lohr, J. M., Westendorf, D. A., Meunier, S. A., & Tolin, D. F. (2002). Emotional responding to fearful and disgusting stimuli in specific phobia. *Behaviour Research and Therapy, 40*, 1031–1046.
- Schienle, A., Schafer, A., Stark, R., Walter, B., Franz, M., & Vaitl, D. (2003). Disgust sensitivity in psychiatric disorders: A questionnaire study. *Journal of Nervous and Mental Disease, 191*, 831–834.
- Schienle, A., Stark, R., & Vaitl, D. (2001). Evaluative conditioning: A possible explanation for the acquisition of disgust responses? *Learning and Motivation, 32*, 65–83.
- Shapira, N. A., Liu, Y., He, A. G., Bradley, M. M., Lessig, M. C., James, G. A., Stein, D. J., Lang, P. J., & Goodman, W. K. (2003). Brain activation by disgust-inducing pictures in Obsessive–Compulsive Disorder. *Biological Psychiatry, 54*, 751–756.
- Siegal, M. S., & Share, D. L. (1990). Contamination sensitivity in young children. *Developmental Psychology, 26*, 455–458.
- Sledge, W. H. (1978). Antecedent psychological factors in the onset of vasovagal syncope. *Psychosomatic Medicine, 40*, 568–579.
- Smits, J. A., Telch, M. J., & Randall, P. K. (2002). An examination of the decline in fear and disgust during exposure-based treatment. *Behaviour Research and Therapy, 40*, 1243–1253.
- Sprengelmeyer, R., Young, A. W., Pundt, I. et al. (1997). Disgust implicated in Obsessive–Compulsive Disorder. *Proceedings of the Royal Society: Biological Sciences, B264*, 1767–1773.
- Stein, R. I., & Nemeroff, C. J. (1995). Moral overtones of food: Judgments of others based on what they eat. *Personality and Social Psychology Bulletin, 21*, 480–490.
- Teachman, B. A., & Woody, S. R. (2003). Automatic processing in spider phobia: Implicit fear associations over the course of treatment. *Journal of Abnormal Psychology, 112*, 100–109.

- Thorpe, S. J., Patel, S. P., & Simonds, L. M. (2003). The relationship between disgust sensitivity, anxiety, and obsessions. *Behaviour Research and Therapy, 41*, 1397–1409.
- Thorpe, S. J., & Salkovskis, P. M. (1998). Studies on the role of disgust in the acquisition and maintenance of specific phobias. *Behaviour Research and Therapy, 36*, 877–893.
- Tolin, D. F., Lohr, J. M., Sawchuk, C. N., & Lee, T. C. (1997). Disgust and disgust sensitivity in blood–injection–injury and spider phobia. *Behaviour Research and Therapy, 10*, 949–953.
- Tolin, D.F., Sawchuk, C.N., & Lee, T.C. (1999). The role of disgust in blood–injection–injury phobia. *The Behavior Therapist, 22*, 96–99.
- Tolin, D. F., Worhunsky, P., & Nicholas, M. (2004). Sympathetic magic in contamination-related OCD. *Journal of Behavior Therapy and Experimental Psychiatry, 35*, 193–205.
- Tomkins, S. S. (1963). *Affect, imagery, consciousness: Vol. II. The negative affects*. New York: Springer.
- Troop, N.A., Murphy, F., Bramon, E., & Treasure, J.L. (2000). Disgust sensitivity in eating disorders: a preliminary investigation. *International Journal of Eating Disorders, 27*, 446–451.
- Troop, N. A., Treasure, J. L., & Serpell, L. (2002). A further exploration of disgust in eating disorders. *European Eating Disorders Review, 10*, 218–226.
- Tsao, S. D., & McKay, D. (2004). Behavioral avoidance tests and disgust in contamination fears: Distinctions from trait anxiety. *Behaviour Research and Therapy*.
- Tuschen–Caffier, B., Vogeles, C., Bracht, S., & Hilbert, A. (2003). Psychological responses to body shape exposure in patients with bulimia nervosa. *Behaviour Research and Therapy, 41*, 573–586.
- Vrana, S.R. (1993). The psychophysiology of disgust: Differentiating negative emotional contexts with facial EMG. *Psychophysiology, 30*, 279–286.
- Ware, J., Jain, K., Burgess, I., & Davey, G. C. L. (1994). Disease–avoidance model: Factor analysis of common animal fears. *Behaviour Research and Therapy, 32*, 57–63.
- Woody, S. R., McLean, C., & Klassen, T. (2005). Disgust as a motivator of avoidance of spiders. *Journal of Anxiety Disorders, 19*, 461–475.
- Woody, S. R., & Teachman, B. A. (2000). Intersection of disgust and fear: Normative and pathological views. *Clinical Psychology: Science and Practice, 7*, 291–311.
- Woody, S. R., & Tolin, D. F. (2002). The relationship between disgust sensitivity and avoidant behavior: Studies of clinical and nonclinical samples. *Journal of Anxiety Disorders, 16*, 543–559.
- Zajonc, R.B. & McIntosh, D.N. (1992). Emotions research: Some promising questions and some questionable promises. *Psychological Science, 3*, 70–74.