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Pathogens and Politics: Current Research and New Questions

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Abstract

The emotion of disgust has been linked to more conservative social attitudes and to self-placement on the left–right political spectrum. This relationship seems to be robust and general: It has been observed by multiple labs, using diverse methods and measures, in a variety of countries and cultures. However, *why* disgust should be associated with social and political attitudes is still an open question. We first review the evidence for a link between disgust and political attitudes and then outline competing accounts of why there should be a relationship between the two in the first place.

Many emotions seem to serve a clear purpose – they help solve some of the most common problems encountered by our species. The emotion of fear, for instance, consists of a set of reactions that aid in keeping a person away from any number of threats to their survival, such as predators, heights, or angry enemies. These emotions aid survival not just by motivating appropriate behavioral reactions, but also by changing how individuals perceive and think about the world around them. In the last few decades, researchers have documented a number of ways in which various emotions affect an individual's attention, judgment, and even memory in ways that also serve to promote survival (e.g., DeSteno, Petty, Wegener, & Rucker, 2000; Lerner & Keltner, 2000, 2001; Lerner & Tiedens, 2006; Levine & Pizarro, 2004). The emotion of fear, for instance, gives rise to heightened sensitivity to risks in the environment – a shift in judgment that seems appropriate under conditions in which an individual has encountered a threat. Anger, on the other hand, has the opposite effect: Angry individuals view the world around them as less risky and are more likely to engage in actions in service of their anger (such as seeking revenge) despite the risk involved.

Like most other emotions, disgust also appears to motivate behaviors and cognitions that are consistent with what many see as its primary function – protecting individuals from exposure to pathogens or poisons. However, as many have pointed out, the emotion of disgust appears to have extended its scope of influence far beyond its original function of preventing disease. There are a growing number of findings showing that disgust seems to shape judgment in domains that, at first glance, appear unrelated to pathogen exposure, such as moral and political judgments. For instance, recent research has shown that individuals who are more easily disgusted tend to be politically conservative, and that inducing people to experience disgust tends to shift their judgments toward the conservative end of the political spectrum. On the face of it, it makes little sense that an emotion that likely evolved to protect us from ingesting or touching dangerous substances should exert an influence on something as complex as political views.

We have three aims in this paper. In the first section, we review the recent body of evidence linking disgust to political ideology. Here, we offer a summary of work on this topic that we

have recently discussed in greater detail elsewhere (Pizarro & Inbar, 2015). In the second section, we outline competing accounts for this relationship and to present a tentative defense of one account over the others.

Disgust as Disease Avoidance

Many researchers believe that the emotion of disgust is, in part, an adaptation to the threat of disease-causing pathogens (i.e., viruses and bacteria) and parasites (Curtis, de Barra, & Aunger, 2011; Oaten, Stevenson, & Case, 2009). Researchers have noted that many disgust elicitors are potential pathogen vectors–including body products and secretions (e.g., feces, urine, pus, blood); contaminated food (e.g., putrid meat); and signs of disease (sores, boils, or open wounds). Of course, there is also a great deal of flexibility and cultural variability in what is disgusting. Most Westerners are disgusted by the idea of consuming insects – which are a dietary staple in many hunter-gatherer cultures (Ruby, Rozin, & Chan, in press) – but not disgusted by pork, which Jews and Muslims the world over consider repulsive. However, despite this cultural variability, there is also substantial cross-cultural consistency in core disgust elicitors such as feces, putrefaction, and signs of disease (Rozin, Haidt, & McCauley, 2008).

Avoidance of core disgust elicitors also seems to emerge earlier than other types of disgust. Even 2- to 3-year-old children make disgust expressions at the smell of urine and feces and are reluctant to touch filthy socks (although less so than older children or adults; Stevenson, Oaten, Case, Repacholi, & Wagland, 2010). At the same time, many young children (1.5- to 2-year-olds) will consume imitation dog feces, whole dried fish, and dried grasshoppers, whereas older children refuse these foods (Rozin, Hammer, et al., 1986). This suggests that disgust at core elicitors and disgust-based food aversions follow different developmental tracks, with the former emerging relatively early (and responding relatively inflexibly to a small set of elicitors), and the latter emerging later (and responding much more flexibly to a broader range of culturally learned elicitors). Both may serve pathogen-avoidance functions, but pathogen threats posed by specific foods likely vary much more across cultures than do pathogen threats associated with core disgust elicitors.

Additional support for the pathogen-avoidance account of disgust comes from its characteristic facial expression (a wrinkled nose, squinting eyes, and raising of the upper lip), which has been shown to protect against the entry of pathogens into the mucus membranes of the face (Susskind et al., 2008). Likewise, the behaviors associated with strong disgust reactions (gag reflex, protrusion of the tongue) serve to expel potential contaminants from the mouth. Finally, disgust seems to motivate hygienic behaviors at the individual level and the enforcement of hygiene norms at the group level, thereby adding a further layer of defense against the spread of disease (Curtis et al., 2011).

There is one additional feature of disgust that makes it especially functional as a way to avoid disease. Unlike other emotions that have been described as "basic" (in that they are also universal and emerge early in life), disgust works primarily by the process of association. For a stimulus to become disgusting, it is sufficient that it come into close contact with something that is already disgusting (Rozin, Millman, & Nemeroff, 1986). In contrast, emotions such as fear and anger do not seem to work this way – individuals who come into close contact with a fearsome predator, for example, do not become fearsome themselves. Disgust's associative nature is part of what makes it such an effective defense against pathogens, as it mimics the mechanism by which disease actually spreads (and was doing so long before humans had developed a germ theory of disease). In short, there is good reason to believe that disgust serves to protect individuals from disease by motivating behaviors that might prevent exposure to contaminants or expel them post-exposure.

Disgust and Politics

If this account of the origin and primary function of disgust is correct, recent psychological research on the influence of disgust on *social* judgment seem puzzling. A wealth of evidence has accumulated showing that disgust seems to be associated with attitudes on a range of social and political issues (e.g., Brenner & Inbar, 2015; Hodson & Costello, 2007; Inbar, Pizarro, & Bloom, 2009; Inbar, Pizarro, Knobe, & Bloom, 2009; Terrizzi, Shook, & Ventis, 2010). Evidence for this relationship has come primarily from studies that have investigated (1) the social and political judgments of individuals who vary in their general, trait-level sensitivity to disgust and (2) the moral and political judgments of individuals who temporarily have been made to feel disgusted via an experimental induction, such as a foul odor or physically disgusting images. Results from both types of studies seem to converge on a similar conclusion – that disgust is associated with social and political attitudes that fall on the more conservative end of the political spectrum.

Dispositional sensitivity to disgust

A substantial body of research has linked the dispositional tendency to experience disgust with an individual's overall political orientation. Inbar, Pizarro, and Bloom (2009) first documented a relationship between disgust sensitivity and self-placement on the conservative/liberal political spectrum. Disgust sensitivity was assessed using the Disgust Scale (Haidt, McCauley, & Rozin, 1994), a widely used self-report measure that asks respondents to rate how disgusting they would find specific situations (e.g., "You take a sip of soda, and then realize that you drank from the glass that an acquaintance of yours had been drinking from"), and their agreement with disgust-relevant statements (e.g., "Even if I was hungry, I would not drink a bowl of my favorite soup if it had been stirred by a used but thoroughly washed fly-swatter"). Inbar et al. found that individuals who reported being more easily disgusted were more likely to report being politically conservative. (This finding could, of course, be described equally accurately as liberals being relatively low in disgust sensitivity.) The results from this initial demonstration were consistent across three different samples (two undergraduate samples and one sample of adults recruited online) and were robust to controls for a number of demographic variables (including gender and religious affiliation).

The relationship between political orientation and self-reported disgust sensitivity was replicated by Terrizzi et al. (2010), and was conceptually replicated by researchers using physiological measures of disgust reactivity (Smith, Oxley, Hibbing, Alford, & Hibbing, 2011). Specifically, Smith and colleagues found that participants' skin conductance responses when viewing disgusting images were positively correlated with particular conservative political attitudes (such as opposition to gay marriage). However, Smith and colleagues did not find a statistically significant relationship between physiological measures of disgust and self-reported overall political orientation. Moreover, while they demonstrated a relationship between scores on the Disgust Scale and certain conservative political attitudes, they did not replicate the overall effect on global left/right political orientation (although the authors themselves suggest that their failure to find a significant effect may be a result of their small sample size, which was just under 50 participants). Tybur, Merriman, Caldwell, McDonald, and Navarrete (2010) also reported a failure to replicate the relationship between disgust sensitivity and global political orientation in a US college sample using an updated version of the Disgust Scale (the DS-R; Olatunji et al., 2007) as well as a new measure of disgust sensitivity, the Three-Domain Disgust Scale (TDDS; Tybur, Lieberman, & Griskevicius, 2009).

These concerns led Inbar, Pizarro, Iyer, and Haidt (2012) to attempt to replicate the basic relationship between disgust sensitivity and political orientation in a sample of 25,000 US

respondents and more than 5,000 international respondents. All participants in these studies completed the DS-R, a revised and psychometrically improved version of the Disgust Scale (Olatunji et al., 2007). Many participants also completed measures of individual differences that might account for the observed relationship between disgust sensitivity and political orientation but had not been measured in previous studies (e.g., religiosity, neuroticism, and openness to experience). Inbar et al. replicated the relationship between disgust sensitivity and political orientation and showed that this relationship held even when including the additional control variables in the model. In addition, disgust sensitivity was a significant predictor of voting in the 2008 US presidential election. Higher individual-level disgust sensitivity positively predicted intentions to vote for John McCain (the more conservative candidate) over Barack Obama, and average levels of disgust sensitivity in a state predicted Obama's margin of victory over McCain. Finally, the authors replicated the same basic relationship between disgust sensitivity and political orientation in an international sample of respondents from 121 countries in ten broad geographical regions. (In order to avoid confusion about terminology, participants in the international sample were told that the term "liberal" referred to the left, progressives, and in some countries, socialists, and that "conservative" referred to the right, traditionalists, and in some countries Christian Democrats).

Moderation by attitude domain and type of disgust. The large samples in these studies allowed for a more precise estimate of the size of the relationship between disgust sensitivity (as assessed by the DS-R) and political ideology, as well as moderators of the effect size. In the US sample, the correlation between disgust sensitivity and self-reported overall ideology was $r = .17$ [95% CI: .16, .18]; effect sizes in the international sample were somewhat larger (*r*s of .22–.33). In the US sample, the largest relationships were between the contamination disgust subscale of the DS-R (which assesses disgust at interpersonal contagion threats such as drinking from someone else's soda or eating at a restaurant where the cook has a cold), social conservatism ($r = .30$), and overall conservatism ($r = .27$).[1] These effect size estimates are also generally consistent with a meta-analysis examining the relationship between diverse measures of pathogen sensitivity – including the DS/DS-R, the TDDS, and perceived vulnerability to disease (PVD; Duncan, Schaller, & Park, 2009) – and social conservatism in particular. Depending on the meta-analytic model used, effect size estimates ranged from $r = .23$ to $r = .31$ (Terrizzi, Shook, & McDaniel, 2013).

These more precise effect size estimates help explain the failures to replicate the relationship between disgust sensitivity and political ideology. Using $r = .25$ (the midpoint of $r = .17$–$.33$) as the estimate of the population effect size, a total N of 120 would be required for power = .8 (i.e., an 80% chance of detecting the relationship). A study with $N = 50$, as in Smith et al. (2011) study, would have only a 43% chance of detecting it.

Effects of induced disgust or pathogen threat on social attitudes

Along with the research linking dispositional disgust sensitivity and political ideology, there are also several studies inducing disgust and measuring social attitudes. In one study (Dasgupta, Desteno, Williams, & Hunsinger, 2009; $N = 130$), researchers showed some participants disgusting images (e.g., a cockroach on a piece of food) and others neutral images. Those who had seen the disgusting images subsequently implicitly evaluated gay people more negatively on the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). Likewise,

[1] Although one item from this subscale arguably taps sexual conservatism ("As part of a sex education class, you are required to inflate a new unlubricated condom, using your mouth"), the remaining subscale items also showed correlations with ideology substantially larger than those of the other DS-R items; see Inbar, Pizarro, Iyer, and Haidt (2012).

participants who were exposed to a noxious odor during the study explicitly rated gay men less positively relative to straight men (Inbar, Pizarro, & Bloom, 2012; $N = 61$). Researchers have found shifts in attitudes when inducing pathogen threat in other ways. Participants who viewed a slideshow highlighting disease and pathogen threats, for example, were more negative toward unfamiliar (e.g., Mongolian) immigrant groups (Faulkner, Schaller, Park, & Duncan, 2004; $N = 45$). Although these studies obtained generally consistent results, samples were not large given that all designs were between subjects (Dasgupta et al., $N = 130$; Inbar et al., $N = 61$; Faulkner et al., $N = 45$), and thus, the findings should be interpreted cautiously.

Explaining the Relationship Between Disgust and Politics

Given a relationship between disgust and political ideology, the natural next question is why this relationship should exist. The most widely accepted explanation is that disgust is one manifestation of a general disease-avoidance system, which motivates a range of social attitudes and behaviors that serve to reduce the risk of exposure to disease. These attitudes and behaviors constitute one part of what is often referred to as the "behavioral immune system" (BIS; Faulkner et al., 2004; Murray & Schaller, 2016; Park, Faulkner, & Schaller, 2003; Schaller & Duncan, 2007; Schaller & Park, 2011). The BIS is thought to include social and political attitudes such as in-group favoritism and hostility toward out-groups (Navarrete, Fessler, & Eng, 2007), adherence to cultural traditions (Murray, Trudeau, & Schaller, 2011), and sexual conservatism (Tybur, Inbar, Molho, & Güler, 2015). All of these attitudes are also associated with a more socially conservative political ideology, suggesting that political ideology may result in part from adaptations to pathogen threats.

More conservative attitudes in each of these domains are proposed to mitigate various risks of pathogen exposure. Interactions with out-group members might pose a greater pathogen threat than interactions with in-group members if out-groups carry pathogens from different ecologies (see Thornhill & Fincher, 2014, for an overview). Given that in-group favoritism is a hallmark of ideological conservatism (Duckitt & Sibley, 2010), researchers have proposed that variation in social conservatism partly results from variation in effort to neutralize the putative pathogen threats posed by intergroup interactions (Terrizzi et al., 2013). Likewise, cultural evolution might favor traditions and rituals (e.g., in terms of hygiene or food preparation) that function to neutralize ecology-specific pathogens (Billing & Sherman, 1998), and adherence to tradition might thus partially serve pathogen-neutralizing functions (Murray et al., 2011). Finally, sexual permissiveness entails obvious disease risks. Each new sexual partner presents a risk of exposure to novel pathogens, which might be transmitted by sex per se, or simply by close physical contact.

This account of a broad relationship between disease avoidance and political attitudes is supported by research showing that individuals who are chronically high in perceived vulnerability to disease are more conservative on a variety of measures tapping social conservatism (Terrizzi et al., 2013), such as right-wing authoritarianism (Altemeyer, 1998), social dominance orientation (Pratto, Sidanius, Stallworth, & Malle, 1994), and vertical collectivism (Singelis, Triandis, Bhawuk, & Gelfand, 1995). At the cultural level, there is evidence that cultures from geographical regions that were historically high in parasite and pathogen prevalence tend to be more conservative. Across 71 world regions, the historic prevalence of pathogens is associated with more restricted (i.e., conservative) sexual attitudes, and lower overall openness to experience (Schaller & Murray, 2008). Similarly, when looking across various countries and differences between states in the US, current disease prevalence is associated with greater religiosity and stronger family ties (Fincher & Thornhill, 2012).

An Alternative Account of the Relationship Between Disgust and Politics

A broad relationship between disgust and socially conservative political beliefs seems both theoretically plausible and empirically supported. However, some aspects of the broad account have also been questioned. For example, the "in-group favoritism" hypothesis rests on the empirical assumption that pathogens from different ecologies (i.e., those likely to be carried by out-group members) are especially dangerous. This assumption has been questioned by de Barra and Curtis (2012), who argue that "local adaptation" – where pathogens are most successful in the local group in which they have evolved – is generally the norm. Furthermore, much of the evidence for the broad account comes from culture-level comparisons (e.g., correlating culture-level pathogen threats with culture-level differences in attitudes or institutions; see, e.g., Fincher & Thornhill, 2012). Although these tests are informative, they also have a number of limitations, including the problem of inferring individual-level relationships between variables from cross-group data (see Pollet, Tybur, Frankenhuis, & Rickard, 2014), and the inappropriateness of inferential statistics when most or all members of the population (in this case, countries, US states, etc.) are sampled (see Pollet, 2013).

It is therefore worth considering whether the evidence might be consistent with an alternative account focusing on sexual conservatism in particular. According to this "sexual conservatism" account, individuals' adoption of more monogamous versus promiscuous sexual strategies may be shaped by environmental pathogen threat (Schaller & Murray, 2008). Each new sex partner presents a risk of pathogen exposure, both from intercourse itself and from close physical contact. If these pathogen costs outweigh the benefits of multiple sexual partners (which include more offspring for males and increased offspring genetic diversity or quality for females; see Buss & Schmitt, 1993), then sexual monogamy may be the optimal sexual strategy for some individuals (Loehle, 1995). Likewise, modeling simulations suggest that higher pathogen costs of sex can lead to increases in variability in monogamous versus promiscuous mating strategies across individuals, with some individuals favoring a pathogen-risky sexual strategy (i.e., non-monogamous) and others favoring a pathogen-risk-averse strategy (i.e., monogamous; Boots & Knell, 2002; Kokko, Ranta, Ruxton, & Lundberg, 2002).

Individuals following relatively monogamous versus non-monogamous mating strategies are differentially affected by social rules and norms regarding sexual behavior (Weeden, Cohen, & Kenrick, 2008; Weeden & Kurzban, 2013). Social norms condoning or encouraging sexual promiscuity disadvantage individuals who have invested heavily in a single pair bond – and thus have more to lose from infidelity, mate poaching, and withdrawal of partner support. These individuals would be expected to be more opposed to promiscuity per se as well as "non-traditional" activities that present opportunities for casual, extra-pair sex (e.g., drug use, parties, sexual exploration; Kurzban, Dukes, & Weeden, 2010). In other words, individuals following relatively monogamous mating strategies have a strategic interest in endorsing social norms proscribing sexual promiscuity. Such norms characterize many aspects of conservative ideology, particularly the social conservatism emphasized by pathogen avoidance accounts of ideology (Weeden & Kurzban, 2013).

The sexual conservatism account, then, posits that pathogen-avoidant individuals are drawn to a high investment, relatively monogamous sexual strategy, which avoids the pathogen costs associated with sexual promiscuity. Investment in this sexual strategy then motivates endorsement of a number of socially conservative norms that advantage individuals who have invested in monogamous pair bonds. Thus, the relationship between disgust and politics more broadly is the downstream consequence of a relationship between disgust and more conservative attitudes on sexual issues in particular. To be clear, the claim is not that there is no relationship between

disgust and other sociopolitical attitudes – just that this relationship is due to shared variance with sexual conservatism specifically.

There is, in fact, empirical evidence that disgust is especially strongly related to sexual conservatism. One recent study found that, out of attitudes toward 14 groups, the DS-R related most strongly to attitudes toward groups that were seen as violating or promoting traditional sexual rules (Crawford, Inbar, & Maloney, 2014). Using a physiological measure (skin conductance), Smith et al. (2011) found that arousal in reaction disgusting (but non-sexual) images was a significant predictor of attitudes toward gay marriage, and that this arousal was a reliable predictor of conservative sexuality when looking across all items in the sexual/reproductive domain (including attitudes toward pornography, premarital sex, and abortion). In addition, these items were the only political attitudes of the set that were significantly related to either the physiological measures of disgust or scores on the disgust sensitivity questionnaire. Attitudes toward a number of other hot-button political issues (such as tax cuts, welfare, foreign policy) demonstrated no reliable relationships with either measure of disgust. Likewise, in the initial demonstration of the link between disgust sensitivity and political conservatism, Inbar, Pizarro, and Bloom (2009) found that the relationship between conservatism and disgust sensitivity was statistically mediated by differences on two specific attitudes that divided liberals and conservatives: attitudes toward gay marriage and attitudes toward abortion (disgust sensitivity was not related to other political attitudes such as those about welfare, gun control, or immigration). Controlling for attitudes on these two issues eliminated the relationship between disgust sensitivity and overall political orientation. Finally, manipulating disgust in the laboratory with a foul odor had a significant influence on the evaluation of gay men on a feeling thermometer but had no effect on judgments of other social groups, including African Americans, immigrants, or the elderly (Inbar, Pizarro, & Bloom, 2012).

Tybur et al. (2015) recently investigated the possibility that the relationship between disgust and (non-sexual) conservatism could reflect a shared relationship with sexual attitudes. In three studies employing a variety of measures of disgust and sexual conservatism, the authors used structural equation modeling (SEM) to investigate the relationship between disgust, sexual attitudes, and self-reported conservatism. Regardless of the specific measures, Tybur and colleagues found that the relationship between disgust and overall self-rated conservatism was fully mediated by attitudes toward sex.

Especially given the numerous relationships between disease avoidance and political attitudes that have been found by other researchers using different measures and levels of analysis, it is obviously too soon to close the book on a broad account. Even if general self-reported conservatism is not directly related to pathogen avoidance, attitudes on some specific issues might be. For example, attitudes toward immigration might relate to pathogen avoidance independent of sexual conservatism, perhaps especially in parts of the world where immigration is especially politically controversial (see, e.g., Brenner & Inbar, 2015). However, Tybur et al.'s (2015) findings do suggest that at least in the US, the relationship between disgust and *general* social conservatism may result from sexual attitudes in particular, rather than the pathogen-mitigating functions of a wide array of conservative beliefs.

Conclusion

The very same mechanisms that cause us to feel disgust for putrid meat, blood, pus, and vomit also seem to underlie a wide variety of political beliefs. A relationship between disgust and politically conservative attitudes and behavior has been established using diverse methods. Researchers have assessed disgust using self-reports of disgust sensitivity on multiple scales as well

as physiological reactivity to disgusting stimuli, and have induced disgust using unpleasant odors and disgusting images. They have assessed politics using self-reports of political ideology; attitudes toward specific groups and issues; widely used measures of ideology such as social dominance orientation (Pratto et al., 1994) and right-wing authoritarianism (Altemeyer, 1998); voting intentions; and actual voting. Thus, the basic relationship between disgust and politics seems robust and general. However, the reason that such a relationship should exist in the first place is still an open question. There is a good deal of research linking disgust to a broad swath of social and political attitudes – such as sexual conservatism, adherence to cultural traditions, and hostility toward foreigners. Nevertheless, new research raises the possibility that the more general relationship between disgust and politics is a consequence of sexually conservative attitudes in particular. We believe researchers should now focus on distinguishing between competing accounts of why the relationship between disgust and politics should exist in the first place.

Short Biographies

Yoel Inbar is an assistant professor of psychology at the University of Toronto, Canada. His research concerns the interplay between two general mental processes that influence judgment: rational, deliberate analysis; and intuitive, emotional reactions. He is interested in the interaction between these two kinds of thinking in people's beliefs, preferences, and choices.

David Pizarro is an associate professor in the Department of Psychology at Cornell University in Ithaca, NY. His primary research interest is in how and why humans make moral judgments, such as what makes us think certain actions are wrong, or that some people deserve blame. In addition, he studies how emotions influence a wide variety of judgments.

Note

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