The Ick Factor:
Physiological Sensitivity to Disgust as a Predictor of Political Attitudes

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Abstract

Mounting evidence suggests political attitudes connect to broad, dispositional, perhaps biological temperaments. We add to these empirical results by reporting a correlation between certain political attitudes and physiological reactions to disgusting stimuli such as human excrement and worms being eaten. Specifically, we find that individuals whose skin conductance levels increase when viewing disgusting images are more likely to adopt "conservative" positions on homosexuality and perhaps a broader range of "sex and reproduction" issues, a result that serves as a useful illustration of the larger point that political attitudes cannot be separated from generic physiological traits.

How ingrained are political attitudes? Are they entirely situational or partly dispositional? Are political attitudes sui generis, culturally dependent, skin-deep, and detached from baseline temperaments, or are they universal, connected to bedrock biological forces, and derivative of an individual's overarching persona? Political scientists typically take the view that political attitudes are environmentally determined and therefore distinct from physiological predispositions. Though careful to define the political environment in broad terms, empirical researchers usually devote their efforts toward documenting the effects of variations in the environment (e.g., parental socialization, wars, religious indoctrination, and economic calamities) on political attitudes. If indeed attitudes are thought to derive even in small part from generic, perhaps physiological dispositions, this belief has seldom been empirically tested with results that are then reported in the discipline's journals. This is unfortunate since the assumption that the environment is the sole source of political attitudes guarantees disappointment. As long as only environmental independent variables are included in analyses, it is impossible to demonstrate that nothing but environmental variables matter, let alone to assess the importance of biological variables.

The good news is that outside of political science interest has grown rapidly in testing the possibility that political attitudes are connected to seemingly non-political personality traits and even to physiological dispositions. In a widely-noted study (Amodio et al. 2007), respondents reported whether they identified themselves as political liberals or political conservatives and then viewed a computer slideshow while their brains were being imaged (ERP). The show was arranged such that respondents were led to believe a particular slide would contain a certain alphabetical letter but then

the slide did not contain that letter. Analysis of variations in brain activation patterns subsequent to this unexpected event suggests that these patterns are different for self-identified liberals than for self-identified conservatives. The authors' interpretation is that individuals whose brain activation patterns indicate a stronger preference for order and predictability are more likely to self-identify as political conservatives, an ideology placing value on tradition and order.

Building off work indicating aggregate political attitudes are sometimes correlated with perceptions of threat in the environment (Huddy et al. 2005; Jost 2006; Carney et al. 2008), Oxley et al. (2008) assess political attitudes and then record individual-level physiological responses to threatening stimuli. They find that political attitudes supportive of a collection of socially protective policies (e.g., domestic surveillance, increased military spending, and restricted immigration) could be predicted for those individuals displaying heightened physiological responses (startle blink EMG and skin conductance) to loud, unexpected noises or to threatening visual images (such as a large spider on a person's face). These results indicate that political attitudes are connected to central nervous system response to threats, both activation of the sympathetic nervous system (skin conductance) and a much more rapid extensor-flexor reflex designed to protect vital organs (startle blink EMG response).

Research by Vigil (2009) also focuses on the potentially distinct orientations of liberals and conservatives to threats but does so from a different perspective. Using computer technology, photographs of human faces were given emotionally ambiguous expressions. Even though all respondents were shown the same images, political conservatives were significantly more likely than liberals to attribute threatening, angry

emotions to the faces. Though in this case the connection is perceptual/cognitive rather than physiological, the interpretation is similar: reactions to non-political stimuli have clear correlations with political orientations as reflected in self-professed ideology.

Additional intriguing work has been undertaken by Haidt and colleagues (e.g., Haidt and Graham 2007; see also Jost et al. 2003). As with Vigil's research, they do not test physiology, but they do show that politics is connected to broader orientations toward life—in this case, moral values. Haidt reports that liberals make moral judgments primarily on the basis of two moral dimensions: harm avoidance and a desire for fairness/ equity. Conservatives, on the other hand, as indicated by numerous large N surveys, display similar concerns for harm avoidance and fairness but also additional concerns for purity, in-group loyalty/protection, and authority. Here again, the evidence indicates that political attitudes are intimately connected to generic traits—in this case, to the particular moral dimensions that tend to structure life styles and choices.

Further indications that politics connects to broader temperaments can be found in two additional, reasonably-distinct literatures. The first involves personality traits. Subsequent to a massive research agenda, personality psychologists have identified five major personality dimensions: openness to new experiences, conscientiousness, extraversion, agreeableness, and neuroticism. With this established, a logical question becomes whether the holding of certain political ideologies correlates with particular personality traits. Research on this issue indicates that two of the Big Five dimensions consistently track with political ideology in a wide variety of samples drawn from several different countries. Those scoring high on conscientiousness tend to be political conservatives and those scoring high on openness to new experiences tend to be political

liberals (see Caprara, Barbaranelli, and Zimbardo 1999; Block and Block 2005; Caprara et al. 2006). The other three core personality traits—neuroticism, extraversion, and agreeableness—tend to display minimal or erratic relationships with political beliefs but the fact that two major elements of generic personality are predictive of political orientations, in combination with the well-documented fact that personality traits are heavily dispositional (see Bouchard and McGue 2003; McCrae and Costa 2003) is further indication that politics is related to broader and deeper traits.

The second stream of research involves the possible genetic basis of political attitudes. For several decades behavioral geneticists have reported that political attitudes are in no small part heritable (Martin et al. 1986, Eaves et al. 1999). This conclusion is primarily based on classic twin studies that do not provide any indication of the specific genetic alleles that might predispose individuals toward certain political attitudes, though more recent research has taken up precisely this task either with allelic association studies (see Settle et al. 2008) or genome-wide scans (Hatemi et al. 2008). For our purposes, the important point is that political attitudes may connect not just to physiological but also to genetic variations, thus further supporting speculation that politics is not just skin-deep.

Encouragingly, while most of the research on both personality/political attitudes and genetics/political attitudes traditionally has been done by non-political scientists, in recent years this situation has changed (on personality and political attitudes, see Whitaker and Fulwider 2007; Mondak and Halperin 2008; Mondak et al. 2009; Gerber et al. 2009; on genetics and political attitudes, see Alford, Funk, and Hibbing, 2005; Carmen 2007; Settle et al., 2008; and Hatemi et al. 2009).

The Physiology of Sensitivity to Disgust

Our intention in this paper is to further knowledge of the correlation between political attitudes and broader, perhaps physiological dispositions. Our particular focus is a physiological trait that certainly extends well beyond the variables typically offered as correlates of political attitudes. Specifically, we provide the first test of the possibility that individual variation in physiological sensitivity to disgust is predictive of political attitudes. Disgust is widely assumed to be evolutionarily useful as a mechanism for encouraging distance and detachment from pathogens and other dangers but it is also increasingly recognized as an emotion that is relevant to social judgments and morality (Rozin et al. 2000; Borg et al 2008). Specifically, as mentioned previously, Haidt and Graham (2007) summarize substantial evidence that conservatives are more likely than liberals to base moral judgments on purity issues. Given that disgust is generally provoked by the perception that something is "impure," it may be that, compared to liberals, political conservatives will be more physiologically sensitive to disgusting stimuli.

Generic ideological labels such as liberal and conservative, however, are potentially misleading. Little reason exists to expect a single disposition to influence the entire, somewhat arbitrary range of issues subsumed by these phrases. In this case, substantially greater theoretical basis exists for expecting physiological disgust reactions to be relevant to issues particularly pertinent to purity, such as issues of sexuality. And of the issues connected to sexuality, those relating to homosexuality seem the most likely to correlate with physiological reactions to disgust. Discussions among individuals with varying attitudes toward homosexuality frequently reveal the centrality of what is

commonly referred to as the "ick" factor, the tendency of some to display visceral discomfort with the thought of the physical act of homosexual sex. Therefore, we hypothesize that physiological disgust sensitivity will be positively and strongly related not to general conservatism but rather to conservative positions on certain political attitudes, such as those pertaining to sexuality and in particular homosexuality (similar logic is offered in Inbar et al. 2009). Put differently, we see less of a compelling theoretical basis for expecting variations in physiological disgust sensitivity to be related to attitudes toward free trade, the Patriot Act, and small government.

Previous non-physiological research provides empirical support for this line of thought. In the most recent and directly related research, Inbar et al. (2009) test whether level of agreement with standard, survey-self-report disgust sensitivity items such as "even if I was hungry I would not drink a bowl of my favorite soup it if had been stirred by a used but thoroughly washed fly swatter" correlates with political ideologies. Using two different samples, they find that self-reported conservatives score significantly higher on an abbreviated disgust sensitivity battery. In a follow-up study restricted to undergraduate students and reported in the same article, disgust sensitivity is not much related to declared positions on ten selected issues except that those students scoring higher on self-reported disgust sensitivity tend to oppose abortion rights and gay marriage, the two issues arguably most related to disgust.

Missing from previous research on political orientations is a direct measure of disgust as a visceral, biological response. As with any survey item, self-reports of felt emotion are subject to a variety of response biases. With regard to the emotion of most interest to this project, can we be sure that individuals who claim to be disgusted by a

given stimulus do in fact have measurably larger physiological reactions? Self-reports are undoubtedly valuable and an important part of the story but given the known tendency of individuals to provide socially acceptable answers (Asch, 1951; Granberg and Holmberg 1991), it seems likely that at least some individuals will offer survey responses that are not in complete alignment with their actual physiological response. For example, in hopes of projecting a tough and impervious image, some participants might downplay their sensitivity to disgust just as, in hopes of appearing attuned, discerning, and pure, others might overstate their disgust sensitivity. While previous research is valuable in finding support for a relationship between political attitudes and ***reported*** sensitivity to disgust, we are able to determine whether this relationship extends deeper to ***physiological*** sensitivity to disgust and, as an interesting sidelight, we are also able to analyze the possible relationship between self-reported and biological disgust sensitivity.

Measurement and Research Design

Political attitudes were measured by ascertaining reactions to16 brief issue-prompt items presented in the well-known Wilson-Patterson format (Wilson and Patterson 1968) in which respondents indicate agreement or disagreement (they can also equivocate). The specific prompts employed can be found in Table 1 and cover a range of topics including taxes, defense, and social issues. Given the potential disparity between self-reported disgust sensitivity and physiologically-indicated disgust sensitivity, we obtained measurements of both from a single sample of individuals.

To measure self-report, we employed the standard disgust sensitivity survey battery, DS-R (Disgust Sensitivity-Revised). The DS-R is an improved and shortened

version of a previous battery. It consists of 27 items, though two of these are "catch" items that are not factored into the final calculus. Factor analysis identifies three central elements: core disgust, animal reminder disgust, and contamination disgust. Items for these three factors scale well (alphas in excess of .70) and a full discussion of this widely-used battery can be found at the Disgust Scale Homepage maintained by Jonathan Haidt (http://people.virginia.edu/~jdh6n/disgustscale.html). All items have five possible responses. For 14 of the items, these responses range from "strongly agree" to "strongly disagree" and for the remaining items responses range from "not disgusting at all" to "extremely disgusting" (see Appendix 1 for the full battery).

To measure physiological response to disgust, we relied upon one of the most common indicators of physiological activity: skin conductance. When an arousing stimulus registers, particularly an aversive one, signals are sent from the cortex to the thalamus and eventually to the brain stem. The result is elevated noradrenergic activity in the locus ceruleus (Thase and Howland 1995) which, working through both the amygdala and the hypothalamic-pituitary-adrenal axis, stimulates the release of epinephrine (Lemche et al. 2005). The result is commonly known as activation of the sympathetic division of the autonomic division of the sympathetic nervous system (SNS). This activation involves a remarkably broad cascade of events, from shutting down the digestive system to heightening energy and awareness. One element of SNS response involves opening the eccrine glands that are interspersed amongst various layers of skin. Presumably, the moisture secreted from these glands is designed to keep the body from overheating during arousal. Since electricity is known to move more rapidly through moisture, detection of the activation of this element of the SNS is possible by recording

the rapidity with which standardized electrical signals move across the skin. The faster the movement of electricity, the more active the SNS. To make this recording, sensors are place on the tips of the index and medial fingers and attached to a bioamplifying unit that makes it possible to measure the pace of electrical movements across a standardized surface area of those two fingers. Further technical details involved in measuring skin conductance are available in Miller and Long, 2007, but the important point here is that psychophysiologists have established that skin conductance "provides relatively direct and undiluted representation of sympathetic activity" and that it therefore links closely "with the psychological concepts of emotion, arousal, and attention" (Dawson, Shell, and Filion 2007).

In order to stimulate possible disgust reactions, participants were shown five individual disgusting still images scattered throughout the sequential showing of a large number of individual images. Each image appeared on a computer screen for 15 seconds and was separated from the succeeding image by an inter-stimulus interval (ISI) of 10 seconds. Subsequent factor analysis indicated that responses to three of the five disgusting stimuli loaded heavily on the same factor, so our central measure of physiological disgust sensitivity is based on readings obtained during viewing of these three identified disgusting images: an emaciated body, human excrement, and a person eating a mouthful of worms. Because baseline skin conductance levels differ widely from individual to individual as a function of variations in thickness of skin and numerous other factors, an effective and commonly-employed strategy to control for this variation is to use first differences. Thus, consistent with established practice (see Miller and Long 2007), our key measure is not the absolute skin conductance levels during

viewing of the identified image but rather the ***change*** in skin conductance levels from that registered during the previous ISI to that registered during viewing of the (disgusting) stimulus in question. The average change in skin conductance precipitated by viewing of the three disgusting stimuli is our measure of physiological disgust sensitivity.

The sample employed in this project was obtained in the following manner. A survey research organization was retained to conduct a random telephone survey of the Lincoln, Nebraska area (population approximately 200,000). In the summer of 2007, 200 individuals were asked to come to a lab in the city to complete two Implicit Association Tests (IATs) and a lengthy survey of their political views. The following summer a subset of 50 of these individuals was invited back to the lab to complete additional survey items (including the disgust sensitivity battery) but more importantly to be attached to physiological equipment that makes possible the recording of skin conductance levels. Each session lasted approximately an hour, including the time required to secure informed consent and to debrief the participants. The 50 individuals who completed the physiological tests covered a range of levels of interest in politics as well as political beliefs, although individuals with the most extreme beliefs (on both the right and the left) were excluded. Participants were promised $50 for their first visit to the lab and $45 for their second. Usable data on skin conductance was obtained for 48 of the 50 two-time participants.

Disgust Sensitivity and Political Attitudes

Our main contribution in this paper is to offer a first test of the connection between individual political attitudes (and various combinations of those attitudes) and

physiological disgust sensitivity. Bivariate correlations are presented in the first column of Table 1 and in the second column are the partial correlations when age and gender—two variables frequently associated with both physiology and political beliefs—are controlled (partial correlations make it possible to control for other effects without imposing a causal order on the relationship). Attitudes on 16 issues are addressed and these issues can be placed in four loose categories since four deal with economic issues; four with out-group issues; four with internal but non-sexual issues; and four with sex-related issues.

(Table 1 about here)

The findings are quite clear. Across most of the individual political items, the coefficients are small, statistically insignificant, and as likely to be negative as positive (positive correlations indicate that higher physiological reactions to disgust are associated with a "conservative" stance on that particular issue or cluster of issues). The index for overall conservatism on all 16 issues is likewise not significant. The glaring exceptions to this string of statistically insignificant relationships, just as we hypothesized, are issues related to sex and reproduction, though even here it is clear that the strength of the relationship is coming from a single item: gay marriage. All four sex/reproduction items are positive and though as a group the sex items are significant ($p < .05$), gay marriage is the only individual item that is significant at the .05 level (pre-marital sex is significant at the more permissive .10 level). Larger skin conductance increases when viewing disgusting images appear not to be predictive of conservatism generally but are quite strongly predictive of conservative stances on gay marriage. Individuals displaying the strongest physiological reactions to, for example, emaciated bodies and a person eating

worms are the same ones who tend to oppose gay marriage. This pattern applies both for the bivariate correlations and when controlling for gender and age.

As mentioned previously, our research design yields two fundamentally different measures of disgust sensitivity. The first is physiological disgust sensitivity as measured by changes in skin conductance occasioned by the viewing of disgusting still images. The second is respondents' self-report of disgust sensitivity as measured by the revised 25-item disgust sensitivity index (DS-R). We replicated the procedures leading to Table 1 except that self-reported disgust sensitivity was substituted for the physiological measure of disgust sensitivity. The results are presented in Table 2.

(Table 2 about here)

As in Table 1, the first column reports the bivariate correlation of disgust sensitivity and political attitudes while the second column presents this correlation when the effects of gender and age are controlled. In the bivariate formulation, the results using self-reported disgust sensitivity vary widely from issue to issue. A few coefficients even achieve statistical significance in the unexpected direction (e.g., greater reported disgust sensitivity correlates with liberal positions on foreign aid, small government, and gun control) but the only positive and significant coefficients in column 1 are again those for sex/reproduction (two of the individual items and the four-item sub-index). Not surprisingly, when the controls are added (column 2), the unexpected relationships become insignificant and only the index of sex/reproduction items is significant at the .05 level. Overall, though the results for the self-reported measure of disgust sensitivity are weaker and, surprisingly, do not produce a significant relationship with gay marriage, the message is consistent with the physiological results in showing that the primary political

attitudes affected by disgust sensitivity are those pertaining to sex/reproduction (similar to the results on self-report presented by Inbar et al. 2009).

Do People Who Claim to be Disgust Sensitive also Display Physiological Disgust Sensitivity?

The roughly parallel results for physiological and for self-reported disgust sensitivity naturally lead to suspicions that the two measures correlate strongly with each other. Surprisingly, however, despite the fact that both measures are related to political attitudes involving sexuality, self-reported disgust sensitivity is unrelated to physiological disgust sensitivity (as measured by skin conductance changes caused by the viewing of disgusting stimuli). The simple bivariate correlation of the two is substantively small, inverse ($r = -.15$), and statistically insignificant ($p = .32$). One possible reason for the absence of a bivariate relationship is the potentially confounding effect of gender. It may be that differences (physiological and otherwise) between males and females need to be controlled in order for a relationship between physiological and self-reported disgust sensitivity to appear.

Interestingly, while the data suggest important differences between males and females, these differences are not physiological and they do not seem to be the reason for the absence of a correlation. As indicated in Figure 1, where the range of both physiological and self-reported disgust sensitivity has been standardized to run from 0 to 1 in order to facilitate comparisons, mean gender differences occur for self-reported disgust sensitivity ($p < .01$) but not for physiological disgust sensitivity ($p = .82$). Perhaps females claim to be more disgust sensitive because, due to societal norms, they often feel pressure to be disgust sensitive whereas males often feel pressure to be disgust insensitive. Though this interpretation is only speculation, we can state with some

certainty that, when the focus of attention is on physiology, the difference between males and females is substantively minute and statistically insignificant. When the focus is on self-report, however, males claim to be substantially and significantly less sensitive to disgust than females. Previous scholarship (and, undoubtedly, folk wisdom) holding that "women are more disgust sensitive than men," (Inbar, Pizarro, and Bloom 2009) is more accurately summarized as women ***report*** being more disgust sensitive than men.

(Figure 1 about here)

These gender differences in self-report are substantial, however they do not account for the lack of overall correlation between reported disgust sensitivity and physiological disgust sensitivity. A partial correlation of reported and physiological disgust sensitivity controlling for the effects of gender still does not produce a statistically significant relationship ($r = -.18$; $p = .23$) and exactly the same numbers result when both gender and age (another variable that could rightly be thought to affect physiological readings) are included as control variables ($r = -.18$; $p = .23$). In sum, individuals who believe themselves to be particularly disgust sensitive or particularly disgust insensitive are unlikely to be reporting sentiments that in point of fact relate to their physiological responses to disgust. People are not particularly adept at reporting their emotional states and the gender differences in self-report but not in physiology encourage the conclusion that societal pressures could be more crucial in shaping self-reports than physiological responses.

The complete lack of correlation between self-reported and physiological disgust sensitivity suggests it may be wise to control for the effects of one in estimating the role of the other. This we do in Table 3 where the first column reports the relationship

between physiological disgust sensitivity and political attitudes when gender, age, and self-reported disgust sensitivity are controlled, and the second column reports the relationship between self-reported disgust sensitivity and political attitudes when gender, age, and physiological disgust sensitivity are controlled. Interestingly, the results are quite similar for each measure. Disgust sensitivity is poorly related to attitudes on most political attitudes but has a substantial and statistically significant effect precisely where we would most expect it: on attitudes toward gay marriage. Self-reported and physiological disgust sensitivity are not related to each other but they are both independently related to attitudes toward gay marriage as well as the sub-index of sex issues. This sub-index is clearly anchored by the gay marriage relationship but it should be noted that when the gay marriage item is removed from it (analysis not shown), thereby creating a three-item sub-index of sex items, the partial correlation coefficients are sizable (.40 for physiologicial disgust sensitivity and .38 for self-reported disgust sensitivity) and significant at the .05 level. That physiological disgust sensitivity remains strong even when controlling for reported disgust sensitivity is notable.

(Table 3 about here)

Conclusion

In future work, scholars would be well-advised to consider two facts. First, recent research (Rozin et al. 2000; Borg et al. 2008) indicates that distinct types of disgust exist and have unique neural markers (for example, disgust related to incest has different neural signatures than does disgust related to spoiled food). Thus, studies on the correlates of political attitudes might want to analyze not just reactions to disgust generally but reactions to specific types of disgust. Second, even though we did not find

strong evidence that variations in physiological disgust sensitivity predict overall conservatism, it may be worthwhile to pursue this possibility with larger samples and with more detailed political items. The theoretical basis for expecting physiological disgust sensitivity to be connected to broader conservative views is not as strong as it is for specific items like gay marriage but it is far from absent (see Haidt and Graham 2007) and the breadth of the effect may be a fruitful area for future inquiries.

Until this happens the following can be said. Knowing the degree to which an individual's skin conductance increases when presented with pictures of human excrement, a man eating worms, and an emaciated body is useful in predicting whether that particular individual supports or opposes gay marriage and possibly positions taken on other sexually-related issues. That involuntary, generic disgust reactions should be related to political attitudes is noteworthy and consistent with our earlier contention that politics in some cases runs biologically deep and is substantively integrated with what would seem to be non-political aspects of life.

It is important to note that our results are purely correlational and we cannot be certain that physiological responses to generic disgust precede political attitudes. An alternative possibility is that those with certain political attitudes will be led to develop particular patterns of responding to disgusting images and concepts. Until appropriate longitudinal data are available, an important part of sorting out the actual causal order of a correlational relationship is careful theorizing, and here we tend to agree with Inbar, Pizarro, and Bloom that it seems "unlikely that political attitudes would shift a person's general emotional dispositions, particularly when it comes to disgust, a basic emotion that emerges long before individuals form political attitudes" (2009). This alternative vision

of political attitudes coming first, with physiological responses to generic stimuli then being shaped by those political attitudes seems to accord more centrality to politics than is appropriate in light of most people's casual connections to the political arena.

Parents who are opposed to homosexuality may reward their children for reacting negatively to it just as parents who are supportive of homosexuality may reward their children for reacting positively, but is it reasonable to expect that the children then transfer this issue-specific reinforcement to generic, non-political stimuli? It is one thing for parents to encourage their children to believe that homosexuality is impure; it is quite another for the children who adopt this view to then develop heightened physiological reactions to, say, someone eating worms. Conditioning involuntary responses, such as those measured in this study, takes concerted and immediate reinforcement—reinforcement that is unlikely to be applied to generic disgust responses. Even if, for the sake of argument, we accept the contention that politics shapes general physiological responses, is the direction of the relationship found here consistent with this alternative explanation? Is there empirical evidence that parents with "conservative" attitudes toward homosexuality condition their children—knowingly or not—to be disgust sensitive in general? The opposite direction of socialization seems more consistent with traditional caricatures of child-rearing by conservatives (Lakoff, 2002). "Tommy, what's the matter with you? Why are you so calm when there is a man eating worms over there?" is less the stereotypical conservative parental message than "Grow up, Tommy; it is only a man eating worms!" Though we cannot close the case on any possibilities, it seems more likely that politics is shaped by deeper forces than it is that politics is itself the shaper of those forces.

However, should subsequent work indicate that political attitudes really are antecedent to general emotional responses, the facts that political attitudes infiltrate facets of life seemingly so far detached from its bailiwick and that political attitudes become physiologically instantiated in involuntary biological responses to generic stimuli are perhaps just as remarkable as the possibility that the genesis of political attitudes can be traced to physiological indications of disgust sensitivity. In other words, the importance of the finding reported here is that, whatever the causal order, political attitudes in some cases are biologically connected.

This realization, in turn, has potential implications for the tenor of political debate. Opponents of gay rights sometimes cannot understand why supporters are unbothered by the thought of homosexual relations just as supporters cannot understand why opponents find that same thought so distressing. Knowing that part of the reason for these fundamentally different reactions is individual-level variation in physiological sensitivities will not magically bring the two sides together, but recognition of the physical nature of these differences may argue for different debating strategies and expectations. We are not suggesting that participants in political disputes despair of ever converting their political opponents; only that it may be useful to recognize that efforts at persuasion take place against the backdrop of wide variation in individual-level physiological dispositions. Receptivity to a political argument varies from person to person in part because physiological machinery varies from person to person.

REFERENCES

Alford, J.R., Funk, C.L., & Hibbing, J.R. (2005). Are political orientations genetically transmitted? ***American Political Science Review,*** 99, 153-167

Amodio, D. M., Jost, J.T., Master, S.L., & Yee, C.M. (2007). Neurocognitive correlates of liberalism and conservatism. ***Nature Neuroscience***, 10, 1246-1247.

Asch, S. (1951). Effects of group pressure on modification and distortion of judgment. In H. Guetzkow (Ed.), ***Groups, leadership and men***. Pittsburgh: Carnegie Press.

Block, J., & Block, J.H. (2005). Nursery school personality and political orientation Two decades later***. Journal of Research in Personality***, 40, 734-749.

Borg, J.S., Lieberman, D., & Kiehl, K.A. (2008). Infection, incest, and inquiry: Investigating the neural correlates of disgust and morality. ***Journal of Cognitive Neuroscience*** 20: 1529-46.

Bouchard, T.J., Jr., & McGue, M. (2003). Genetic and environmental influences on human psychological differences. ***Journal of Neurobiology***, 54, 4-45.

Caprara, G.V., Barbaranelli, C., & Zimbardo, P.G. (1999). Personality profiles and political parties. ***Political Psychology*** 20, 175-97.

Caprara. G.V., Schwartz, S., Capanna, C., Vecchione, M., & Barbaranelli, C. (2006). Personality and politics: Values, traits, and political choice. ***Political Psychology***, 27, 1-28.

Carmen, I.H. (2007). Genetic configurations of political phenomena. ***Annals of the American Academy of Political and Social Science*** 614, 34-55.

Carney, D.R., Jost, J.T., Gosling, S.D., & Potter, J. (2008). The secret lives of liberals and conservatives: Personality profiles, interaction styles, and the things they leave behind. ***Political Psychology***, 29, 807-840.

Dawson, M.E., Shell, A.M., & Filion, D.L. (2007). The electrodermal system. In J.T. Cacioppo, L.G. Tassinary, & G.G. Berntson (Eds.), ***Handbook of Psychophysiology*** (pp. 200-23). New York: Cambridge University Press.

Eaves, L.J., Heath, A.C., Martin, N.G., Maes, H., Neale, M., Kendler, K., Kirk, K., & Corey, L. (1999). Comparing the biological and cultural inheritance of personality and social attitudes in the Virginia 30,000 study of twins and their relatives. ***Twin Research***, 2, 62-80.

Gerber, A., Huber, G.A., Raso, C., & Ha, S. (2009). Personality and political behavior. Unpublished manuscript, Yale University.

Granberg, D., & Holmberg, S. (1991). Self-reported turnout and voter validation. ***American Journal of Political Science*** 35: 448-59.

Haidt, J. & Graham, J. (2007). When morality opposes justice: Conservatives have moral intuitions that liberals may not recognize. ***Social Justice Research,***. 20, 98-116.

Hatemi, P.K., Gillespie, N., Hibbing, J.R., Alford, J.R., & Martin, N.G. (2008). Looking for political genes: Genome-wide linkage on political attitudes. Paper presented at the annual meeting of the American Political Science Association, Boston, Mass., August-September 2008.

Hatemi, P.K., Alford, J.R., Hibbing, J.R., Keller, M., Martin, N.G., Medland, S., & Eaves, L.J. (2008). Not by twins alone: Using the extended family design to investigate the genetic basis of political attitudes. Paper presented at the annual meeting of the American Political Science Association, August-September 2008, Chicago, Ill.

Huddy, L., Feldman, S., Taber, C.S., & Lahav, G. (2005). Threat, anxiety, and support of anti-terrorism policies. ***American Journal of Political Science,***.49, 610-625.

Inbar, Y., Pizarro, D.A., & Bloom, P. (2009). Conservatives are more easily disgusted than liberals. ***Cognition and Emotion***, in press.

Jost, J.T. (2006). The end of the end of ideology. ***American Psychologist,*** 61, 651-670.

Jost, J.T., Glaser, J., Kruglanski, A.W., & Sulloway, F. (2003). Political conservatism as motivated social cognition. ***Psychological Bulletin,*** 129 339-375.

Lakoff, G. (2002). ***Moral politics: How liberals and conservatives think***. Chicago: University of Chicago Press.

Lemche, E., Giampietro, V.P., Surgaladze, S.S., Amaro, E.J., Andrew, C.M., Williams, S.C.R., Brammer, M.J., Lawrence, N., Maier, M.A., Russell, T.A., Simmons, A., Ecker, C., Joraschky, P., & Phillips, M.L. (2005). Human attachment security is mediated by the amydgala: Evidence from combined fMRI and psychophysiological measures. ***Human Brain Mapping*** 27: 623-35.

Martin, N.G., Eaves, L.J., Heath, A.C., Jardine, R., Feingold, L., & Eyesenck, H.J. (1986). Transmission of social attitudes. ***Proceedings of the National Academy of Sciences,*** 15, 4364-4368.

McCrae, R.R., & Costa, P.T., Jr. (2003). ***Personality in adulthood: A five factor theory perspective***. New York: Guilford Press.

Miller, A., & Long, J. (2007). Psychophysiology principles, pointers, and pitfalls. In L.A. Schmidt & S.J. Seglowitz (Eds.), ***Developmental Psychophysiology*** (pp. 367-423). New York: Cambridge University Press.

Mondak, J.J., & Halperin, K.D. (2008). A framework for the study of personality and political behavior. ***British Journal of Political Science***, 38, 335-362.

Mondak, J.J., Hibbing, M.V., Canache, D., Anderson, M.R., & Seligson, M.A. (2009). Personality and civic engagement: Exploring the foundations of political behavior. Unpublished manuscript, University of Illinois, Urbana-Champaign.

Oxley, D.R., Smith, K.B., Alford, J.R., Hibbing, M.V., Miller, J.L., Scalora, M., Hatemi, P.K., &

Hibbing, J.R. (20008). Political attitudes vary with physiological traits. ***Science***, 321, 1667-1670.

Rozin, P., Haidt, J., & McCauley, C.R. (2000). Disgust. In M. Lewis & J. Haviland (Eds.), ***Handbook of Emotions, Second Edition*** (pp. 637-653). New York: Guilford Press.

Settle, J.E., Dawes, C.T., Christakis, N.A., & Fowler, J.H. (2008). Friendships moderate an association between the DRD4 gene and political ideology. Unpublished manuscript, University of California-San Diego.

Thase, M.E., and Howland, R.H. (1995). Biological processes in depression. In E.E. Beckham & W.R. Leber (Eds.), ***Handbook of Depression*** (pp. 213-279). New York: Guilford Press.

Vigil, J.M. (2009). Facial expression processing varies with political affiliation. Unpublished manuscript, University of North Florida.

Whitaker, E., & Fulwider, J. (2007). Exploring links between personality and political orientation. Paper presented at the annual meeting of the International Society for Political Psychology, July 2007, Portland, Ore.

Wilson, G.D., & Patterson, J.R. (1968). A new measure of conservatism. ***British Journal of Social and Clinical Psychology,*** 8, 264-269.

APPENDIX 1: DISGUST SCALE-REVISED (FROM HAIDT)

1**Please indicate how much you agree with each of the following statements, or how true it is about you. Please write a number (0-4) to indicate your answer:**

0 = Strongly disagree (very untrue about me)
1 = Mildly disagree (somewhat untrue about me)
2 = Neither agree nor disagree
3 = Mildly agree (somewhat true about me)
4 = Strongly agree (very true about me)

____1. I might be willing to try eating monkey meat, under some circumstances.
____2. It would bother me to be in a science class, and to see a human hand preserved in a jar.
____3. It bothers me to hear someone clear a throat full of mucous.
____4. I never let any part of my body touch the toilet seat in public restrooms.
____5. I would go out of my way to avoid walking through a graveyard.
____6. Seeing a cockroach in someone else's house doesn't bother me.
____7. It would bother me tremendously to touch a dead body.
____8. If I see someone vomit, it makes me sick to my stomach.
____9. I probably would not go to my favorite restaurant if I found out that the cook had a cold.
____10. It would not upset me at all to watch a person with a glass eye take the eye out of the socket.
____11. It would bother me to see a rat run across my path in a park.
____12. I would rather eat a piece of fruit than a piece of paper
____13. 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 flyswatter.
____14. It would bother me to sleep in a nice hotel room if I knew that a man had died of a

heart attack in that room the night before.

How disgusting would you find each of the following experiences? Please write a number (0-4) to indicate your answer:

0 = Not disgusting at all
1 = Slightly disgusting
2 = Moderately disgusting
3 = Very disgusting
4 = Extremely disgusting

____15. You see maggots on a piece of meat in an outdoor garbage pail.
____16. You see a person eating an apple with a knife and fork
____17. While you are walking through a tunnel under a railroad track, you smell urine.
____18. You take a sip of soda, and then realize that you drank from the glass that an acquaintance of yours had been drinking from.
____19. Your friend's pet cat dies, and you have to pick up the dead body with your bare hands.
____20. You see someone put ketchup on vanilla ice cream, and eat it.
____21. You see a man with his intestines exposed after an accident.
____22. You discover that a friend of yours changes underwear only once a week.
____23. A friend offers you a piece of chocolate shaped like dog-doo.
____24. You accidentally touch the ashes of a person who has been cremated.
____25. You are about to drink a glass of milk when you smell that it is spoiled.
____26. As part of a sex education class, you are required to inflate a new unlubricated condom, using your mouth.
____27. You are walking barefoot on concrete, and you step on an earthworm.

To calculate your score: First, put an X through your responses to items 12 and 16 (these items don't count). Then "reverse" your score on items 1, 6, and 10 by subtracting what you wrote from the number 4, and write those numbers in the margin. Finally, add up your responses to all 25 items (using your "reversed" scores on 1, 6, and 10). The total will be a number between 0-100.

Figure 1: Disgust Sensitivity Measures and Gender

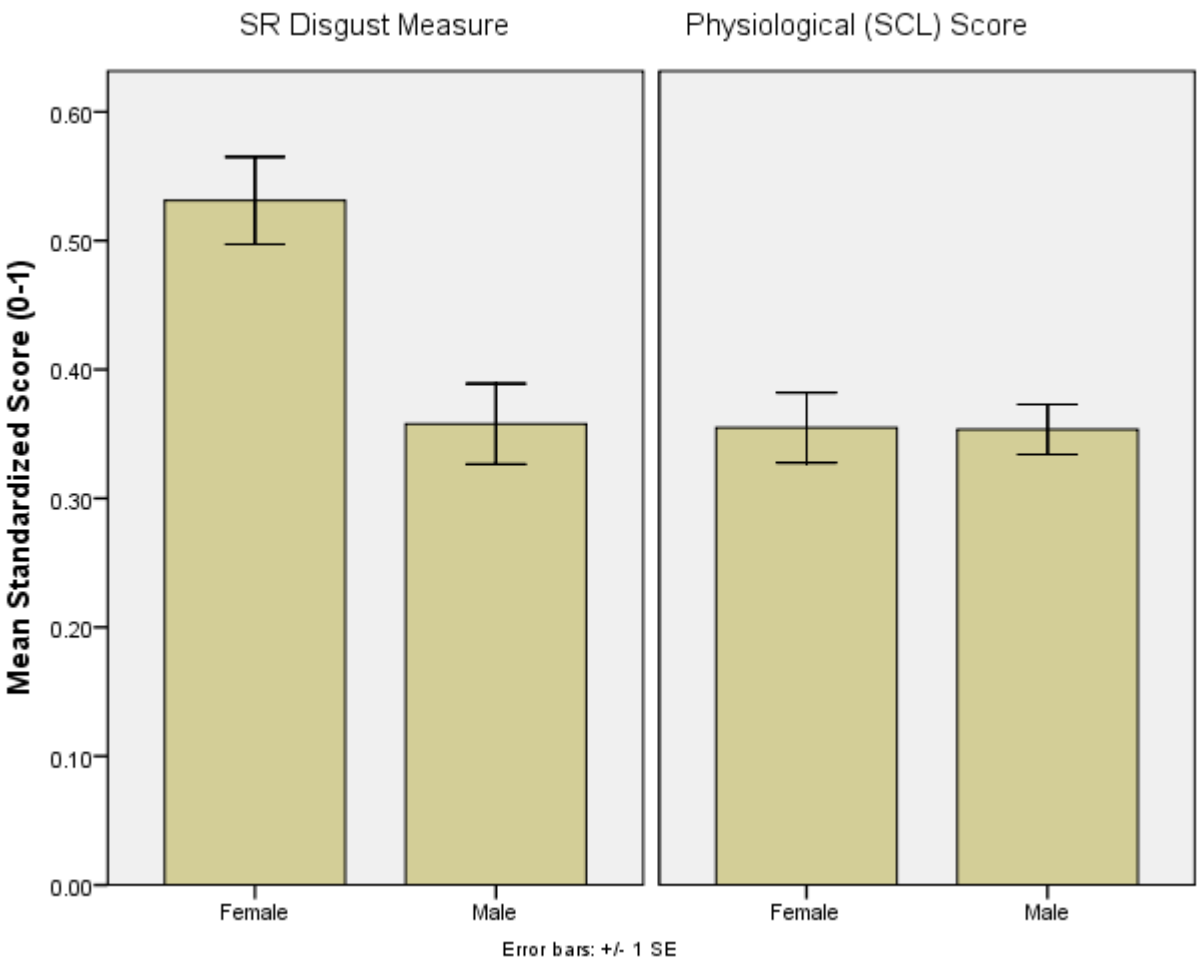

Table 1: Political Attitudes and Physiological Reactions to Disgusting Stimuli

	Physiological. Disgust Sensitivity	Partial Physiological Sensitivity (controlling for gender and age)
Welfare Spending	.16	.14
Tax Cuts	.01	-.02
Free Trade	.12	.10
Small Government	-.10	-.15
4 Economics Items	.10	.05
Illegal Immigrants	-.04	-.02
Military Spending	-.17	-.14
Foreign Aid	-.00	-.07
Iraq War	.14	.17
4 Out-Group Items	-.03	-.01
School Prayer	-.00	.06
Gun Control	.11	.05
Death Penalty	-.15	-.21
Biblical Truth	.11	.07
4 Int. Nonsex Items	.03	-.02
Pornography	.15	.14
Abortion Rights	.13	.16
Premarital Sex	.25*	.18
Gay Marriage	.42**	.39**
4 Sex Items	.35**	.32**
Index of all 16 items	.18	.14

Pearsons r reported
** $p < .05$, * $p < .10$

Table 2: Political Attitudes and Self-Reported Disgust Sensitivity

	Self-Reported Disgust Sensitivity	Self-Reported Disgust Sensitivity (controlling for gender and age)
Welfare Spending	-.23	-.19
Tax Cuts	.09	.14
Free Trade	-.16	-.08
Small Government	-.30**	-.20
4 Economics Items	-.28	-.17
Illegal Immigrants	-.02	-.03
Military Spending	.17	.12
Foreign Aid	-.31**	-.21
Iraq War	-.18	-.17
4 Out-Group Items	-.15	-.12
School Prayer	.05	-.05
Gun Control	-.32**	-.24
Death Penalty	.03	.06
Biblical Truth	.23	.14
4 Int. Nonsex Items	-.03	-.06
Pornography	.29**	.13
Abortion Rights	.26*	.25*
Premarital Sex	.29**	.23
Gay Marriage	.17	.21
4 Sex Items	.36**	.30**
Index of all 16 items	.01	.02

Pearsons r reported
** $p < .05$, * $p < .10$

Table 3: Political Attitudes and Disgust Sensitivity (Controlling for the "Other" Measure of Disgust Sensitivity

	Physiological Disgust Sensitivity (controlling for gender, age, and self-reported disgust sensitivity	Self-Reported Disgust Sensitivity Score (controlling for Gender, age, and physiological disgust sensitivity)
Welfare Spending	.10	-.17
Tax Cuts	.00	.11
Free Trade	.10	-.06
Small Government	-.19	-.23
4 Economics Items	.02	-.16
Illegal Immigrants	-.02	-.03
Military Spending	-.11	.10
Foreign Aid	-.12	-.23
Iraq War	.14	-.15
4 Out-Group Items	-.04	-.13
School Prayer	.05	-.04
Gun Control	.00	-.24
Death Penalty	-.20	.02
Biblical Truth	.10	.15
4 Int. Nonsex Items	-.03	.03
Pornography	.16	.16
Abortion Rights	.21	.28*
Premarital Sex	.24	.27*
Gay Marriage	.44**	.32**
4 Sex Items	.40**	.38**
Index of all 16 items	.14	.04

Pearsons r reported
** $p < .05$, * $p < .10$