Political Orientations May Vary with Detection of the Odor of Androstenone

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Abstract

Androstenone is a non-androgenic steroid found in the sweat and saliva of many mammals, including humans. Though all homo sapiens produce androstonone naturally, the ability to detect it varies markedly from person to person, with some doing so readily but others failing to smell it at virtually any concentration. Since previous research suggests that even subthreshold levels of androstenone can affect selected cognitive functions and social behaviors, particularly those relevant to reproduction, hierarchy, and emotion, we test for a possible link between olfactory sensitivity to androstenone and various political orientations. The results suggest that androstenone detection is positively related to the holding of selected political orientations, particularly those associated with preserving social order. Given that previous research has established a connection between a specific genetic polymorphism in the OR7D4 gene and androstenone detection, we conclude with a preliminary test of the possibility that variants at this locus have an indirect effect on political orientations. Whether the topic of interest is food consumption, reproductive behavior, family interactions, or politics, life is about translating environmental inputs into behavioral outputs. Nervous systems consist of neurons that sense and send signals regarding environmental conditions to the central nervous system (CNS) which then prepares a response that is implemented via signals sent through motor neurons to muscles or organs that put the selected response into action. To put it directly, "afferent input provides information (of which the person may or may not be aware) for the CNS to use in directing activities" (Sherwood 2010, 185). Nervous systems are not all the same, however, and research is showing that variations in the physiological constitution of nervous systems correlate with differences in behavior (Insel and Young 2001). Due in part to variations in the way stimuli are sensed, some organisms simply experience and react to the world differently than others—and display correspondingly different behaviors.

This statement applies even to ostensibly higher order human behaviors such as political and moral judgments (Bargh et al. 2001; Amodio et al. 2007; Oxley et al. 2008; de Dreu et al. 2010; Kanai et al. 2011). As Vigil notes, differences in political orientations "may be partly rooted in how people process social stimuli" 2008: 9). Physiological sensing and processing varies markedly from person to person—and this variation appears to correlate with a range of social variables including political orientations. For example, individuals who see emotionally neutral faces as threatening (Vigil 2010) or who startle when they hear a loud and unexpected noise (Oxley et al. 2008) are more likely to harbor certain politically conservative orientations. A large proportion of sensory input does not pass through consciousness (Sherwood 2010, Chp.

6) so it is important to note that the effects of sensory variations do not require the individual to be aware that something has been sensed.

Olfaction is the most ancient and chemically direct of all the senses, registered in the emotional centers of the brain without elaborate filters and mechanisms (Gloor 1997). On the basis of little more than a protein serving as a receptor, detection of chemicals in the environment allowed primitive organisms to move toward or away from given chemicals. Neurophysiologist John Allman sees all behavior as building off a basic lustdisgust dimension in which organisms are either attracted to or repelled by regions of the environment (see, for example, Woodward and Allman 2007). From this vantage point, chemical sensing is the basic detection mechanism for the simplest forms of life and the foundation of all subsequent senses. Olfaction is primitive, it is powerful—and as organisms became more complex, it became socially relevant.

As testament to the evolutionary centrality of olfaction, "anatomically, the olfactory brain overlaps with the socioemotional brain" (Zhou and Chen 2009: 1118). Odors register directly in the olfactory bulb which is located amidst brain areas at the heart of emotion, memory, and sociality, including the amygdala, hypothalamus, and orbitofrontal cortex (Neville and Haberly 2004). Contrast the directness of this arrangement with that for vision, where signals must travel from the eye via the optic nerve all the way to the occipital lobe at the back of the brain before then being relayed to limbic regions. As a result, odors exert a strong influence on behavior—even unintended behavior. When research participants are presented with a strawberry but are simultaneously exposed to the odor of an orange, as they reach for the strawberry they spread their grip more widely than necessary. Conversely, participants spread their grip

too narrowly in preparation for grasping an orange if the prevailing odor is of strawberries (Castiello et al. 2006). Retail outlets manipulate ambient odors because research suggests consumer behavior is affected by them, at least in some situations (Fiore, Yah, and Yoh 2000; Morrin and Ratneshwar 2000), apparently even when the scent is not strong enough to register in conscious thought (Lundstrom and Olsson 2005).

The Odor of Politics?

Recent research identifies three primary functions of disgust: pathogen avoidance, mate choice, and social interaction, sometimes labeled microbes, mating, and morality (Tybur, Lieberman, and Griskevicius 2009; Tybur et al. 2010; Neuberg, Kenrick, and Schaller 2011). We believe this organizational scheme applies equally well to olfaction—perhaps not surprisingly given the central role olfaction plays in disgust. As mentioned, the precursor to olfaction originated as a mechanism for identifying substances that single-celled organisms should approach or avoid. When more complex organisms began acquiring nutrients through ingestion rather than absorption, olfaction became a crucial indicator of what to ingest and, more importantly, what not to ingest. Thus, the first of three primary uses of the olfactory system is pathogen avoidance.

The second is mating. When certain animals began reproducing sexually rather than asexually, olfaction became an integral part of the process and continues to play that role even in humans (Jacob et al. 2002; Pause 2004; Lundstrom and Olsson 2005; Saxton et al. 2008; for a good review, see Sargeant 2010), heightening the attractiveness of some prospective sexual partners while greatly reducing the attractiveness of others. The "personal fragrance" industry now has annual retail sales well over \$10 billion per year and, judging by the content of the advertising, is closely related to romance and sex.

The third fundamental role of olfaction is the one that concerns us here and it pertains to sociality, broadly defined. From the beginning of social life, olfaction has been employed to identify offspring, close kin, and out-group members. Within a group, it is also valuable in identifying dominance hierarchies, conspecifics to avoid and befriend, and one's own place within the group (Kline, Schwart, and Dikman 2007; Hummer and McClintock 2009; Zhou and Chen 2009; Tobin et al. 2010). In short, the chemosignals that are crucial to olfaction serve as a vital means of social communication, especially as it relates to reproductive, territoriality, and inter-group as well as intra-group behavior (Stockhorst and Pietrowsky 2004, 5). When new challenges arise, nature typically modifies existing systems rather than starting from scratch so when social life began, olfaction was used to identify offspring and to provide other socially valuable information. With the growing complexity of social life, its role expanded to small scale dominance hierarchies and later, we submit, to mass scale social life—that is, to politics.

Support for this conception is found in the physiology of olfaction. In mammals, olfaction depends on approximately 1,000 different receptors, each designed to detect the presence of a specific ambient, odor-causing chemical (Mombaerts 1999). Any given receptor is capable of identifying only a single chemical, though many odors contain more than one chemical and so activate a portfolio of olfactory receptors. The variety of receptor combinations allows organisms to identify a multitude of distinct odors, estimated to be 10,000 for homo sapiens (Sherwood 2010: 232). As might be expected, many olfactory receptors correspond to the chemicals emitted by foodstuffs; however, numerous other receptors are targeted not toward food odors but rather toward odors associated with reproduction and sociality. For example, the peptides oxytocin and

vasopressin, long known to have marked social implications (Insel and Young 2001; Tobin et al. 2010; Kosfeld et al. 2005), are detected by receptors in the olfactory system and blocking these receptors in rats has been demonstrated to impair social recognition abilities and associated behaviors (Tobin et al. 2010).

Even so, olfaction traditionally has not been taken seriously as a correlate of political orientations and behavior, perhaps because of the erroneous assumption that political judgments arise solely from conscious sensory input-a notion that recent research is beginning to correct (e.g., Lodge and Taber 2005). For the most part, to date, the impetus for analyzing olfaction comes from the aforementioned broader interest in the connection of disgust to political views. Haidt and colleagues document that the judgments of political conservatives tend to be influenced more by "purity" concerns than those of liberals (Haidt and Graham 2007) and work by Inbar, Pizarro, and Bloom (2009) shows a correlation between self-reported disgust sensitivity and political stances, particularly those pertaining to sexual attitudes such as toward gay marriage. Smith et al. 2011 find that physiological responses to disgusting images, independently from selfreports, correlate with political attitudes toward gay marriage. Given that olfaction can lead to feelings of disgust, it is not surprising that this line of thinking extends to the realm of odors. In one experiment an ambient "fart" odor caused participants to be more negative toward gay men than was the case for a control group not subjected to the odor (Liberman and Pizarro 2010). This result is consistent with others (see Schnall et al. 2008) showing that people in malodorous, dirty surroundings tend to make harsher moral judgments than those in neutral surroundings.

As such, previous research gives tantalizing evidence that the primitive "pathogen avoidant" role of olfaction trickles over into moral and political judgments but our interest is in whether it is also the case that the aspect of olfaction that evolved specifically for social and political life is related to political orientations. In some respects, this is the more obvious approach but in another sense it is less obvious because socially relevant smells tend to be much less likely to enter conscious awareness. Many pathogen-relevant disgusting smells are immediately and unavoidably detectable and responses to them are often visible (perhaps a contorted expression, maybe even gagging or vomiting), but at most realistic levels, the odors of sexually and socially relevant chemicals do not enter conscious awareness and perhaps this fact has discouraged scholars from correlating political orientations and social odors. In any event, we can locate no previous research that has tested for this link.

Androstenone

The particular social chemical analyzed in this study is androstenone, a nonandrogenic steroid found in the sweat and saliva of many mammals, including humans (Hummer and McClintock 2009). Androstenone is a generic term typically applied to any of 16 chemical substances in the same family (Havlicek et al. 2010). Its centrality to humans is indicated by ERP studies indicating androstenone elicits much quicker cortical responses than a broad range of "control" odorants (Lundstrom et al. 2006).

A primary reason for scholarly interest in odor detection is that it varies so dramatically from person to person (Bremner et al. 2003). Menashe et al. call olfaction receptors "one of the most pronounced cases of functional population diversity in the human genome" (2003: 143). With regard to androstenone, even though all humans

produce it, numerous studies consistently report wide variation in both the intensity and valence with which androstenone is detected within the population. At concentrated dosages, some people do not smell androstenone at all. They are often referred to as androstenone anosmics and constitute somewhere between 10 and 40 percent of the population (Pause, Ferstl, and Fehm-Wolfsdorf 1998; Havlicek et al. 2010). Others report the odor of androstenone to be overwhelming while still others are somewhere in the middle, thereby making the distribution reasonably continuous. Among osmics, there is wide variation in whether androstenone is detected favorably or unfavorably. Some find the odor pleasing and compare it to sandalwood, incense, or vanilla; others dislike the odor and believe it to be similar to ammonia, sweat, or even urine (Jacob et al. 2006, 7; Knaapila et al. 2008; Havlicek et al. 2010).

One reason for the marked variation in androstenone detection appears to be genetic differences. Heritability studies suggest a strong genetic role (Wysocki and Beauchamp 1984; Knaapila et al. 2008) and a gene labeled OR7D4 is known to be related to detection of androstenone (and its running mate androstenione) but not to any other known odor (Keller et al. 2007). Whereas allelic association studies on most phenotypes, including diseases and physical features known to be heritable, typically report extremely modest and poorly replicated relationships with the phenotypes of interest (see Goldstein 2009) the relationship between OR7D4 and androstenone detection is relatively strong and has been replicated frequently (Keller et al. 2007). Thus, though androstenone detection is undoubtedly affected by environmental factors, including the frequency of exposure to the substance (Wang and Jacobs 2004), it is also partially based in genetics.

In light of the importance of androstenone to social life, it is not surprising that, as Kline, Schwartz, and Dikman put it, "the relevance to human social and sexual behavior of ... androstenone has been the subject of considerable inquiry" (2007: 406). They go on to note that "androstenone appears to be relevant to social perception and cognition, although the exact nature of this relationship is not entirely clear" (2007: 406). Most studies have focused on the finding that subjecting people to the odor of androstenone alters social judgments. More specifically, this line of research finds that androstenone tends to affect the way people perceive others, but typically from the perspective of malefemale relations. After being exposed to androstenol (the alcohol version of androstenone), females usually evaluate males more favorably while males are likely to be unaffected (Cowley, Johnson, and Brooksbank 1977). One study finds that females are more likely to sit in a chair that has been treated with androstenone (Kirk-Smith and Booth 1980; see also Gustavson et al. 1987).

Only a few studies address androstenone's potential relevance to the broader (non-mating) aspects of social life. Filsinger et al. find that exposure to androstenone led men to rate other men as more passive (1984). Kline, Schwartz, and Dikman report that individuals more sensitive to the odor of androstenone tend to be less likely to give evidence of the personality trait known as defensiveness in which negative traits (such as anger) are assigned to others but are asserted not to apply to oneself (2007). And Hummer and McClintock (2009) document that androstadienone (a close relative of androstenone's) heightens sensitivity and attention to emotions. For example, for participants receiving androstadienone (instead of a control substance) on their lip, response time in a dot probe task was reduced if the dots appeared on the same side as an

emotional (rather than a neutral) face. As interesting as these studies might be, the relevance of variations in androstenone detection (as opposed to the artificially induced presence of androstenone) has been largely ignored as has the relevance of androstenone to the study of politics—dominance hierarchies, in-group/out-group relations, leadership, and a secure social order. We intend to take an initial step toward filling these gaps.

Given the absence of any previous research on the effects of androstenone detection on politically relevant variables as well as the occasionally inconsistent empirical results on the connection between androstenone detection and variables relevant to mating and reproduction (for reviews, see Schaal and Porter 1991; Havlicek et al. 2010), at this stage, a priori theoretical expectations must be viewed as little more than provisional. Despite androstenone's acknowledged "relevance to social life," we simply have little politically relevant empirical or theoretical work on which to build.

Still, the Hummer and McClintock results just summarized provide grounds for informed speculation, particularly when combined with recent work on cognitive and psychological differences across the political spectrum. For example, Inbar, Pizarro, and Bloom (2009) find that political conservatives are more likely to report feeling the emotion of disgust; Vigil (2010) finds that conservatives are more likely than liberals to attribute certain emotions (such as anger) to faces presented on a computer screen; and Oxley et al. (2008) find that conservatives are more likely than liberals to display an elevated startle reflex subsequent to an unexpected loud noise. Thus, multiple studies provide an indication that, relative to those whose views are associated with the political left, individuals inclined to the political right might be more responsive to emotionally laden stimuli such as human faces, threatening noises, or disgusting concepts. This being

the case, there may be grounds for speculating that those whose views are associated with the political right would also be more sensitive to the odor of androstenone, given that it seems to provide emotionally meaningful cues. Sensitivity to the emotional content of other people's odors, as well as to the emotional content of their faces, may be conducive to certain right-of-center political orientations.

A similar line of reasoning that leads to the same directional expectation is that, given its close relationship with testosterone (Gower and Ruparelia 1993: 168-9), a substance often associated with aggression, competition, and risk-taking (Booth et al. 2006; McDermott et al. 2007), those who readily detect androstenone in those around them might be more likely to seek comfort and protection in the arms of the secure, traditional social order that conservatives often hold out as the end goal of their policy stances. Thus, heightened sensitivity to odors such as androstenone may be consistent with favorable attitudes toward decisive leaders, protection from both in-group rule-breakers and out-group invasions, and a desire to promote traditional rather than avant-garde lifestyles.

In this vein, previous research would seem to provide some basis for hypothesizing that there will be a positive relationship between the intensity with which people report detecting a standardized concentration of androstenone and certain "conservative" political beliefs, particularly those thought to promote a stable and secure social order. At the same time, we readily concede that this analysis is exploratory. The absence of any previous work on the connection between political orientations and individual-level variation in the ability to detect the human odorant androstenone renders

this situation unavoidable. We are hopeful that our study will be able to provide a firmer theoretical basis for subsequent studies.

Methods

The data used in this analysis were collected as part of a larger study conducted in the summer of 2010. A professional survey organization sent informational letters (to promote response rate) to a random sample of adults in the area surrounding a mediumsized Midwestern city, then followed up by phone, recruiting a sample of 340 individuals to come to a lab on a nearby college campus in exchange for \$50. Though the sample was drawn randomly, we make no claims that those eventually participating constitute a random sample. The restriction to a small part of the country and the requirement that participants travel to the lab undoubtedly introduce biases, but a national random sample is not necessary to explore the possible connection between political orientations and variations in androstenone detection. Still, we are pleased to note that the group eventually participating is not a student sample and matches nicely with demographic figures on the overall adult population in the United States though, primarily as a result of the population from which the sample was drawn, it is somewhat higher on education and income and substantially lower on percent nonwhite: The mean participant was 45 years old, had some college education and earned \$60,000 annually. The sample was 55% female and 95% white. Also reflecting the population from which it was drawn, more participants self-identified as conservatives than as liberals, with many others identifying as moderates, but the important fact is that substantial variation in political orientations was present.

Participants first completed a lengthy computer-based survey on their political beliefs, personal tastes and preferences, personality traits, and demographic characteristics. Then, after all participants completed a separate experimental task in an adjacent lab, they were escorted to a well-ventilated room where they began a second computer-based survey protocol. Participants first answered the set of olfactory screening items used by Keller et al. (2007) that catalogue any characteristics or experiences that may interfere with the ability to detect odors overall (general osmia); for example, seasonal allergies, current respiratory infection, chronic alcoholism, endoscopic surgery, and current use of hormonal birth control. These questions were used as a strict filter. Any individual who indicated that one or more of these conditions applied to them was excluded from subsequent analyses, resulting in an eventual sample of 136. Thus, these filters for factors known to degrade general osmia substantially reduce the number of available cases, with seasonal allergies being the main culprit. Despite this reduction in degrees of freedom, we proceed in the fashion encouraged by previous research (Keller et al. 2007). For what it is worth, the characteristics of the individuals in the reduced sample are quite similar to those for the complete sample: 51.4% male, some college, annual income of just under \$60,000, 91.2% white, and mostly conservative (39.4%) and moderate (34.3%), they just have not had any experiences likely to diminish general osmia. Since results could easily be different with other "filtering" rules, further research on the most appropriate practices would be valuable.

Four amber-colored 40 ml bottles marked only with a number from one and four were set up on the table next to the computer in the room. Directions on the computer screen instructed the participants to pick up each bottle, beginning with the one labeled

"1", unscrew the cap, place the bottle under their nose, and inhale gently. After recapping the bottle, they were asked to rate on scales of 1 to 10, first, the strength or intensity of the odor (with 1 being "smelled no odor" and 10 being "smelled a strong odor") and then the favorability or valence of the odor (with 1 being "unpleasant odor" and 10 being "pleasant odor"). This same process was then repeated for bottles two, three, and four.

The substances in bottles were presented in the same order for all participants. Bottle #1 contained 5 ml of a solution of androstenone (5 α -androst-16-en-3-one) with solvent propylene glycol at a dilution of 1:1000. Though androstenone has 16 distinct derivatives, scholarly studies of androstenone typically employ one of two: Δ 4,16-androstadien-3-one (also known as androstadienone) or 5 α -androst-16-en-3-one. They are closely related and we employ the latter here in order to keep our work consistent with that of Keller et al. 2007 and Knaapila et al. 2008.

Bottle #2 contained only propylene glycol (5ml) as a check to ensure that the solvent itself did not have a detectable odor (a practice also advised by Keller et al. 2007). Bottle #3 contained 5 ml of a solution of citronella oil (Chinese 85/35%) diluted at 1:10,000 in paraffin oil. Citronella was used because it is an odor that is easy to detect and has no known specific anosmia (Knaapila et al. 2008). Bottle #4 contained the same androstenone solution as Bottle #1. In contrast to most odors, sensitivity to androstenone tends to heighten over the course of multiple exposures (Keller et al. 2007), a pattern consistent with the experiences of those who worked with androstenone in the lab over the course of several hours. In this paper, only responses based on Bottle #1 are employed but in the future we will analyze the results for Bottle #4 and also for the change between reported detection for Bottles #1 and #4. We can say now that the

correlation between sensitivity in the first and second androstenone trials was quite high (r = .62; p < .001). Thus, the central variable of interest in this analysis is the intensity with which each respondent reported detecting androstenone in the initial trial (intensity).

The broad political construct in our analysis is the ideological contour of political orientations, measured in several different ways. One is an exclusively political variation of the Wilson-Patterson Index (Wilson and Patterson, 1968) which asks participants how strongly they agree or disagree (on a five-point scale) with a set of 28 individual political items including gay marriage, protecting gun rights, and increasing military spending (full listing in the Appendix). Responses to each item were coded such that higher scores correspond to a conservative position and then summed to obtain an overall measure of issue-based political conservatism. Another measure is drawn from a set of items asking participants to report their preferences on 15 items addressing what they prefer society to be. Though similar to the Wilson-Patterson, this battery of items taps broader preferences for the organization of society, as indicated by the extent to which they agree or disagree with statements like "government should not interfere with the fact that some people will be naturally more successful than others" (full listing in the Appendix). Responses were coded so that higher scores for each of these items indicate more conservative preferences and scores were summed to obtain an additive "Society Works Best" (SWB) scale. Finally, a distinct battery of five items asked respondents about their preferences for social order; for example, do they want leaders to be firm and decisive, rulebreakers to be harshly punished, and public policies to stress protection (full listing in the Appendix). Again, responses were coded so that higher scores for each of these items indicate more conservative preferences and individual scores were summed to obtain an

additive index. As might be expected, these three batteries are highly intercorrelated (r for SWB-WP = .75; r for SWB-Social Order = .65; r for WP-Social Order = .66) suggesting that, though they pick up unique features, they tap into the same general construct.

Age, gender, income, education, and religiosity were also recorded in the surveys taken by the participants and are included as control variables in the following analyses. All of these variables are self-explanatory except for religiosity which as measured by how often subjects attended religious services (1=never/rarely, 4=more than once a week). Finally, since previous work notes wide variation in the favorability with which individuals report detecting androstenone, we include the "valence" variable as an additional control.

Results

We proceed by analyzing political orientations in the context of a broader array of life preferences and tendencies. Specifically, we test for a connection between variations in androstenone detection and several personality, psychological, and political batteries. In addition to the three measures of political ideological tendencies described above, the survey available to us also tapped cognitive and personality patterns, including the Big 5 personality inventory (conscientiousness, emotional stability, openness, agreeableness, and extroversion), the BIS/BAS (behavioral inhibition and activation, respectively) scales, preference for literalism, and tendencies to be both disgust and threat sensitive. We have no strong expectations for the nature of the relationship between androstenone detection and these concepts but we do expect positive relationships for all three of our political batteries and sensitivity to androstenone, which would indicate that those with

politically conservative positions tend to be more sensitive to androstenone. The results for all of these batteries (both bivariate correlations and partial correlations after including the controls listed above) are presented in Table 1.

(Table 1 about here)

The best indicator of the presence of an independent relationship is provided when standard control variables are partialed out (the second column). Interestingly, when this is done it is clear that, as we hypothesized, variations in androstenone detection seem to correlate the most strongly with the three political items. Variation in detection of androstenone from person to person is largely unrelated to any of the Big 5 personality variables or to most of the available psychological batteries. The literalism, disgust, and threat batteries give some indication of a positive relationship with sensitivity to androstenone but these relationships evaporate when controls are applied.

Turning to the political batteries, we see a much different story. As expected, whether the focus is on the broad "society works best" battery, the "preferences for social order" battery," or the issues-based Wilson-Patterson battery after standard controls are applied, a strong positively-signed relationship appears between intensity of androstenone detection and "conservative" political orientations. Individuals espousing "liberal" political views (in the American sense of the term) tend to be less sensitive to the odor of androstenone.

Since broad ideological categories cover a tremendous amount of ground, we attempted to get a better indication of the particular issues that tend to be most closely connected to androstenone detection. More specifically, using the Wilson-Patterson style items, we identified the three issues pertaining to sex and reproduction (gay marriage,

pre-marital sex, and abortion rights) and made an index of these. Though the relationship of androstenone detection and this index was positive, it did not achieve statistical significance even at the .10 level in either the bivariate or controlled analysis. Similarly, we identified the three items that most pertained to economic policies (government regulation of business, small government, and lower taxes) and made an additive index of these. Once again, though positive, the relationship between economic issues and androstenone detection was not statistically significant. The strength of the connection between variations in androstenone detection and political views does not seem to be economic or sexual morality items.

This fact, combined with the strong relationship between androstenone detection and our smaller battery tapping "preferences for social order" (the coefficient for this battery is the largest of any of the variables and the only one that is statistically significant in both the bivariate and controlled analyses), is consistent with our earlier theoretical speculation that androstenone detection would be most apparent on issues pertaining to securing the social order. Perhaps it is the case that individuals who readily, if unwittingly, detect androstenone when around other individuals are accordingly more sensitive to the potential for social aggression and therefore more supportive of policies that would protect against dangers facing the social order. To the extent androstenone is the odor of aggression and possibly social threat, people more sensitive to it could be more likely to have the perception that the world is a dangerous place and therefore to support special efforts to protect the social order. Once again, we emphasize that we present this account merely as one interpretation that is consistent with the results. At this early stage of research on variation in sensitivity to subthreshold social cues

delivered by those around us, we welcome alternative theoretical accounts that are consistent with these empirical results.

In sum, in our sample at least, variations in androstenone detection appear to be relevant to variations in political orientations. This connection is not present across the full range of political issues but seems to be strongest in precisely the areas theory would lead us to expect—preferences for policies that are intended to protect the social order. Economic and sexual morality issues appear to be less connected to sensitivity to the odor of androstenone. The absence of a relationship to sex items is particularly interesting given that other research demonstrates sensitivity to pathogen-relevant disgust is indeed related to issue stances on sexual matters. Thus, sensitivity to the human odorant androstenone appears to manifest itself politically in quite a different fashion than sensitivity to pathogen-indicating odors (e.g., human excrement, vomit, spoiled food). Certain individuals are sensitive to the odor of androstenone and they also tend to be the people who are eager to squelch threats to the social order. The apparent relevance of variations in androstenone detection to political orientations leads to questions regarding the source of these variations.

The Molecular Genetics of Androstenone Detection

Though variations in androstenone detection undoubtedly can be traced to numerous sources, previous research does indicate a clear role for genetics and has zeroed in on a gene known as OR7D4. This fact raises the possibility that allelic variation in OR7D4 could be related to selected political orientations indirectly through its effect on the ability to detect androstenone. We have just shown that androstenone detection is related to political orientations and previous research has shown that allelic

variation in OR7D4 is related to androstenone detection. The question becomes whether or not these two links fit together to serve as a bridge from genetic variations to political orientations. If so, it would be a noteworthy result. Previous efforts to link allelic variation with political views have been few (Settle et al. 2010; Hatemi et al. 2011) and often focus on the usual suspects of neurotransmitter-relevant genes such as DRD4 and 5-HTT, genes that appear to be relevant to a wide variety of personality traits, perhaps including politics, but only then if allelic variations are interacted with any of a range of environmental variables such as the number of friends a person has (Settle et al. 2010). As fascinating as these previous results may be, the connection we are proposing is quite different in that it does not involve neurotransmitters but rather something as basic as whether or not chemicals are readily detected by the olfactory system. Moreover, we are not proposing an interaction of genetics and the environment. These interactions are sometimes viewed with suspicion because the large number of possible combinations increases the odds that some relationship will appear to be significant just by chance. (Bonferroni corrections adjust for the number of hypotheses tested and frequently reduce single interactions to statistical insignificance.) Rather, we propose and test for a single non-interactive indirect effect in which variation at a specific locus is suspected of affecting androstenone detection which affects political orientations.

OR7D4 is on the long arm of chromosome 19 in a cluster of seven intact odorant receptor genes and it has been shown to be unusually responsive to androstenone but not responsive to any other chemical (Keller et al. 2007). OR7D4 is a polymorphic gene and the key variants with regard to androstenone detection come in the form of two single nucleotide polymorphisms (SNPs) that are in complete linkage disequilibrium (this

means that a particular allele in one locus always goes with a particular allele at the other locus, so testing for the effects of variation in one automatically tests for the effects of the other). RT is the most common version of OR7D4 and the letters refer to two of the amino acids this particular nucleotide sequence produces (R = arginine and T =threonine), though this version is also sometimes referred to as G after the nucleotide (guanine) that is present in a particular version of one of the two SNPs (rs61729907). WM is less common and instead of arginine and threonine has tryptophan (W) and methionine (M) in its polypeptide chain. It has the nucleotide A (adenine) instead of G at the key locus. WM has been found to be far less sensitive to androstenone both in vitro and in vivo (Keller et al. 2007). In fact, one study reports that, compared with those individuals homozygous for the "G" (RT) allele, those with at least one "A" (WM) allele (remember, humans are diploid organisms so we all have two versions of OR7D4) are four times as likely to rate a high concentration of androstenone as having an "extremely weak" odor (Keller et al. 2007).

We would like to know whether political orientations vary with these SNPs in OR7D4 and we are in a position to provide a tentative answer because each of the respondents in our study was asked to supply a saliva sample from which the DNA could be extracted in preparation for genotyping at a variety of sites, including rs61729907. Thus, we are fortunate to have political information, androstenone detection abilities, and genetic information for the same individuals. Unfortunately, as we have seen, after the necessary olfactory filters are applied, we are left with an extremely small N by the standards of genetic analysis. Moreover, allelic association results at common polymorphisms tend to replicate at a disappointingly low rate for virtually all phenotypes,

including diseases, physical characteristics, and complex social traits such as political beliefs. As a result, the findings we present on a sample of approximately 100 individuals for whom complete information is present on all relevant variables should be viewed as nothing more than a pilot study that, if the results are favorable, might serve as encouragement for a full-blown effort to specify more accurately the relationships between OR7D4 variations and traits such as political orientations.

Previous population studies indicate that 83 percent of all alleles at this site are the "G" (RT) version and our data set replicates this result almost perfectly (84 percent). Assuming normal meiotic cell division, most individuals will be GG (70.5%) with virtually all the rest being GA (27%) and just a few AA (2.5%) and these expectations are close to those present in our sample: 69 percent, 29 percent, and 1.5 percent, respectively. The next question is whether allelic variation at rs61729907 correlates with the intensity with which participants report detecting androstenone, as previous research would lead us to expect. The answer is yes as the correlation between variations in the pertinent OR7D4 genotype and the strength with which participants reported detecting androstenone is -.20 (p < .05). We have already seen that androstenone detection is related to political orientations so the issue now becomes the manner in which these relationships fit together in a larger model. To provide this information, we constructed a path diagram in which the links from OR7D4 to androstenone detection and from androstenone detection to preference for social order (the political measure that is both theoretically and empirically the most central to our project) form the core but we also regressed androstenone detection and then preference for social order against the same

control variables used in column 2 of Table 1. In Figure 1 we report only those coefficients that achieved statistical significance at the .05 level.

(Figure 1 about here)

Only a few of the control variables are statistically significant. Previous research has detected that females tend to be more androstenone sensitive than males and this fact is apparent in our results (thus making it crucial that gender was controlled in the results presented in column 2 of Table 1). In our sample, compared to males, females report androstenone as having a much stronger odor (mean of 4.29 for females and 3.30 for males (p < .05) and the significant coefficient for this link in Figure 1 echoes this situation. No other control variable was significantly related to androstenone detection but two control variables were related to the preference for social order index. Religiosity is correlated with stronger preferences for protecting the social order and education has the opposite effect. Higher levels of education correlate with weaker preferences for policies that can be interpreted as protecting the social order.

Once these expected effects are taken into consideration, however, the link running from variations in this particular gene to political orientations is clear. No direct link between allelic variations in OR7D4 and preferences for the social order is present (we can think of no theoretical reason why it should be) but we do see evidence of an indirect link. The WM or "G" allele does diminish androstenone detection, as noted above and as recorded in the relevant link in the figure, and when embedded in the full model, androstenone detection is related to preferences for the social order (.26). Multiplying the first link (-.20) by the second (.26) indicates an indirect path from OR7D4 through androstenone detection that accounts for 5.2 percent of the variation in

preferences for social order. At first blush, this may seem a paltry effect but placing the size of this relationship in context makes a difference. At best, single gene studies report effect sizes at least this small even for phenotypes known to be highly heritable such as height. In fact, the 40 or so genetic variants known to be related to height *together* account for less than 5 percent of the variance in that phenotype (Weedon et al. 2008). Seen in this light, the fact that our single gene study accounts for 5 percent of the variance in people's preferences for the social order of their society is substantial. In fact, any larger effect for a single gene connected to the detection of a single chemical by just a single of our multiple senses would not have been credible. Put differently, it is probably the case that most political scientists and laypeople would be surprised to learn that five percent of the variance in an important cluster of political preferences is accounted for by sensitivity to a human odorant that in real life is present at subthreshold levels. Of course, we mention again that, given the small N, the genetic component of our analysis is only intended as a pilot study. Our core contention is that the ability to detect androstenone (whatever the source of this ability) has political ramifications. We leave it to subsequent researchers with much larger samples to pursue these suggestive molecular genetic results.

Conclusion

Androstenone is a universal human odorant that is not detected universally. Variation in androstenone levels has been related to small-scale social and emotional responses such as reactions to facial images. In this paper, we tested for the possibility that variation in androstenone detection is related to mass-scale political orientations. Given the nature of androstenone, we reasoned that, if there is a relationship with politics,

it is likely to center on issues concerning dominance, authority, hierarchy, competition, leadership, and security; in other words, with social order. Preliminary tests support the connection of androstenone detection to general political orientations with some indication that preferences for the social order are more affected than preferences for economic policies or for policies relevant to sex and reproduction. Moreover, a pilot study using samples of the participants' DNA indicates a correlation between androstenone detection and allelic variations at a locus in the OR7D4 gene, meaning that there may be an indirect link between this particular genetic polymorphism and certain political orientations.

The results presented here—particularly the genetic results—are provisional and should be replicated before confidence is placed in them but the possibilities are novel and perhaps intriguing. Even the suggestion of a relationship between political orientations and something as base and ostensibly non-political as olfactory sensitivity to the odor of androstenone is striking. Therefore, provisional as they are, we believe the results are suggestive enough to encourage future work on the connection between olfaction and politics, and not just the element of olfaction connected to disgust. When it is recognized that subthreshold stimuli can affect political beliefs, the analytical possibilities expand greatly. People may not be consciously aware of their sensitivities to the androstenone emitted by the individuals they encounter, but it would appear that even subthreshold levels of detection may be enough to affect political orientations. The magnitude of the correlations presented here make it clear that an individual's politics certainly are not determined by their olfactory receptors but at the same time the results do suggest that politics may be subtly influenced by them.

Table 1: Personality, Psychological, and Political Batteries and Androstenone Detection

	Intensity	
	Corr	Partial Corr
Personality Batteries		
Conscientiousness	09	.04
Emotional Stability	.01	.09
Openness	.02	.06
Agreeableness	.11	.15
Extroversion	.07	.12
Psychological Batteries		
BIS	06	10
BAS	.02	.10
Literalism	.16*	.00
Disgust	.16*	00
Threat	.17**	05
Political Batteries		
Society Works Best	.10	.22**
Preferences for Social Order	.19**	.24**
Wilson-Patterson Full Battery	.10	.20**
Sex/Reproduction Subset	.12	.12
Economic Issues Subset	.04	.15

* p < .10, ** p < .05

Figure 1: Path Diagram of the Connection between Allelic Variations in OR7D4 and Preferences for the Social Order*



*All links shown are statistically significant (p < .05).

References

- Amodio, David M., John T. Jost, Sarah L. Master, and Cindy M. Yee. 2007. "Neurocognitive Correlates of Liberalism and Conservatism." *Nature Neuroscience* 10: 1246-47.
- Bargh, J.A., P.M. Gollwitzer, A.Lee-Chai, K. Barndollar, and R. Trotschel. 2001. The Automated Will: Nonconscious Activation and Pursuit of Behavioral Goals." *Journal of Personality and Social Psychology* 81: 1014-27.
- Booth, Alan, Doublas A. Granger, Alan Mazur, and Katie T. Kivlighan. 2006. "Testosterone and Social Behavior." *Social Forces* 85 (1): 167-91.
- Bremner, E.A., J.D. Mainland, R.M. Khan, and N. Sobel. 2003. "The Prevalence of Androstenone Anosmia." *Chemical Senses* 28: 423-32.
- Castiello, U., G.M. Zucco, V. Parma, C. Ansuini, and R. Tirindelli. 2006. "Cross-modal Interactions between Olfaction and Vision when Grasping." *Chemical Senses* 31: 665-671.
- Cowley, J. J., Johnson, A. L., and Brooksbank, B. W. 1977. "The Effect of Two Odorous Compounds on Performance in an Assessment-of-people Test." *Psychoneuroendocrinology* 2: 159–172.
- De Dreu, Carsten K.W., Lindred L. Greer, Michel J.J. Handgraaf, Shaul Shalvi, Gerben A. Van Kleef, Matthijs Baas, Femke S. Ten Velden, Eric Van Dijk, and Sander W.W. Feith. 2010. "The Neuropeptide Oxytocin Regulates Parochial Altruism in Intergroup Conflict Among Humans." Science 328: 1408-1411.
- Filsinger, E. E., Braun, J. J., Monte, W. C., and Linder, D. E. 1984. "Human (Homo sapiens) Responses to the Pig (Sus scrofa) Sex Pheromone 5 alpha-androst-16-en-3-one." *Journal* of Comparative Psychology 98: 219–222.
- Fiore, Ann Marie, Xinlu Yah, and Eunah Yoh. 2000. "Effects of a Product Display and Environmental Frangrancing on Approach Responses and Pleasurable Experiences." *Psychology & Marketing* 17 (1): 27-54.
- Gloor, P. 1997. The Temporal Lobe and Limbic System. New York: Oxford University Press.
- Goldstein, David B. 2009. "Common Genetic Variation and Human Traits." *New England Journal of Medicine* 360 (April 23): 1696-98.
- Gower, D.B., and B.A. Ruparelia. 1993. "Olfaction in Humans with Special Reference to Odorous 16-androstenes: Their Occurrence, Perception and Possible Social, Psychological and Sexual Impact." *Journal of Endocrinology* 137: 167-187.
- Gustavson, A.R., M.E. Dawson, and D.G. Bonett. 1987. "Androstenol, a Putative Human Pheromone Affects Human Male Choice Performance." *Journal of Comparative Psychology* 101: 210-12.

- Haidt, Johanthan, and Jesse Graham. 2007. "When Morality Opposes Justice: Conservative Have Moral Intuitions that Liberals May Not Recognize." *Social Justice Research* 20: 98-116.
- Hatemi, Peter K., Nathan A. Gillespie, Lindon J. Eaves, Brion S. Maher, Bradley T. Webb, Andrew C. Heath, Sarah E. Medland, David C. Smyth, Harry N. Beeby, Scott D. Gordon, Grant W. Montgomery, Ghu Zhu, Enda M. Byrne, and Nicholarf G. Martin. 2011. "A Genome-Wide Analysis of Liberal and Conservative Political Attitudes." *Journal of Politics* 73 (1): 271-85.
- Havlicek, Jan, Alice K. Murray, Tamsin K. Saxton, and S. Craig Roberts. 2010. "Current Issues in the Study of Androstenones in Human Chemosignaling." *Vitamins and Hormones* 83: 47-81.
- Hummer, Tom A., and Martha K. McClintock. 2009. "Putative Human Pheromone Androstadienone Attunes the Mind Specifically to Emotional Information." *Hormones* and Behavior 55: 548-59.
- Inbar, Yoel, David A. Pizarro, and Paul Bloom. 2009. "Conservatives are More Easily Disgusted than Liberals." *Cognition and Emotion* 23 (4): 714-28.
- Insel, T.R., and L.J. Young. 2001. "The Neurobiology of Attachment." *Nature Reviews Neuroscience* 2: 129-36.
- Jacob, Suma, Sheila Garcia, Davinder Hayreh, and Martha K. McClintocki. 2002. "Psychological Effects of Musky Compounds: Comparison of Androstadienone with Androstenol and Muscone." *Hormones and Behavior* 42: 274-83.
- Jacob, Tim J.C., Liwei Wang, Sajjida Jaffer, and Sara McPhee. 2006. "Changes in the Odor Quality of Androstadienone During Exposure-Induced Sensitization." *Chemical Senses* 31: 3-8.
- Kanai, Ryota, Tom Feilden, Colin Firth, and Geraint Rees. 2011. "Political Orientations are Correlated with Brain Structure in Young Adults." *Current Biology* 21: 1-4.
- Keller, Andreas, Hanyi Zhuang, Qiuyi Chi, Leslie B. Vosshall, and Hiroaki Matsunami. 2007. "Genetic Variation in a Human Odorant Receptor Alters Odour Perception." *Nature* 449: 468-473.
- Kirk-Smith, M.D., and D.A. Booth. 1980. "Effects of Androstenone on Choice of Location in Others' Presence." Olfaction and Taste 7: 1-3.
- Kline, John P., Gary E. Schwartz, and Ziya V. Dikman. 2006. "Interpersonal Defensiveness and Diminished Perceptual Acuity for the Odor of a Putative Pheromone: Androstenone." *Biological Psychology* 74: 405-413.
- Knaapila, Antti, Hely Tuorila, Karri Silventoinen, Margaret J. Wright, Kirsten O. Kyvik, Lynn F. Cherkas, Kaisu Keskitalo, Jonathan Hansen, Nicholas G. Martin, Tim D. Spector, Jaakko Kaprio, and Markus Perola. 2008. "Genetic and Environmental Contributions to Perceived Intensity and Pleasantness of Androstenone Odor: An International Twin Study." *Chemical Perception* 1: 34-42.
- Kosfeld, Michael, Markus Heinrichs, Paul J. Zak, Urs Fischbacher, and Ernst Fehr. 2005. "Oxytocin Increases Trust in Humans." *Nature* 435 (2 June 2005): 673-76.

- Liberman, Peter, and David Pizarro. 2010. "All Politics is Olfactory." *New York Times* (23 October 2010).
- Lodge, Milton, and Charles S. Taber. 2005. "Automaticity of Affect for Political Candidates, Parties, and Issues." *Political Psychology* 26 (3): 455-82.
- Lundstrom, Johan N., and Mats J. Olsson. 2005. "Subthreshold Amounts of Social Odorant Affect Mood, but not Behavior, in Heterosexual Women When Tested by a Male, but not a Female, Experimenter." *Biological Psychology* 70: 197-204.
- Lundstrom, Johan N., Mats J. Olsson, Benoist Schall, and Thomas Hummel. 2006. "A Putative Social Chemosignal Elicits Faster Cortical Responses than Perceptually Similar Odorants." *NeuroImage* 30: 1340-46.
- McDermott, Rose, Dominic Johnson, Jonathan Cowden, and Stephen Rosen. 2007. "Testosterone and Aggression in a Simulated Crisis Game." *The ANNALS of the American Academy of Political and Social Science* 614: 15-33.
- Menashe, Idan, Orna Man, Doron Lancet, and Yoav Gilad. 2003. "Different Noses for Different People." Nature Genetics 34 (2): 143-44.
- Mombaerts, P. 1999. "Molecular Biology of Odorant Receptors in Vertebrates." *Annual Review of Neuroscience* 22: 487-509.
- Morrin, Maureen, and S. Ratneshwar. 2000. "The Impact of Ambient Scent on Evaluation, Attention, and Memory for Familiar and Unfamiliar Brands." *Journal of Business Research* 49 (2): 157-165.
- Neuberg, S., D. Kenrick, and M. Schaller. 2011. "Human Threat Management Systems." *Neuroscience Biobehavioral Reviews* 35: in press.
- Neville, K.R., and L.B. Haverly. 2004. "Olfactory Cortex." In *The Synaptic Organization of the Brain*, Fifth Edition, ed., G.M. Shepherd, pp. 415-54. New York: Oxford University Press.
- Oxley, Douglas R., Kevin B. Smith, John R. Alford, Matthew V. Hibbing, Jennifer L. Miller, Mario Scalora, Peter K. Hatemi, and John R. Hibbing. 2008. "Political Attitudes Vary With Physiological Traits." *Science* 321: 1667-1670.
- Pause, Bettina M. 2004. "Are Androgen Steroids Acting as Pheromones in Humans?" *Physiology* & *Behavior* 83: 21–29.
- Pause, B. M., R. Ferstl, and G. Fehm-Wolfsdorf. 1998. "Personality and Olfactory Sensitivity." Journal of Research on Personality 32: 510-18.
- Sargeant, Mark J.T. 2010. "Female Perceptions of Male Body Odor." *Vitamins and Hormones* 83: 25-45.
- Saxton, T. K., Lyndon, A., Little, A. C., and Roberts, S. C. 2008. "Evidence that Androstadienone, a Putative Human Chemosignal, Modulates Women's Attributions of Men's Attractiveness." *Hormones & Behavior* 54: 597–601.
- Schaal, Benoist, and Richard H. Porter. 1991. "Microsomatic Humans' Revisited: The Generation and Perception of Chemical Signals." Advances in the Study of Behavior (20): 135-199.

- Schnall, Simone, Jonathan Haidt, Gerald L. Clore, and Alexander H. Jordan. 2008. "Disgust as Embodied Moral Judgment." *Personality and Social Psychology Bulletin* 34 (8): 1096-1109.
- Settle, Jaime E., Christopher T. Dawes, Nicholas A. Christakis, and James H. Fowler. 2010. "Friendships Moderate an Association between a Dopamine Gene Variant and Political Ideology." *Journal of Politics* 72 (4): 1189-98.
- Sherwood, Lauralee. 2010. *Human Physiology: From Cells to Systems*, 7th Edition. Belmont, Cal.: Brooks/Cole.
- Smith, Kevin B., Douglas R. Oxley, Matthew V. Hibbing, John R. Alford, and John R. Hibbing. 2011. "Linking Genetics and Political Attitudes: Re-Conceptualizing Political Ideology." *Political Psychology* 32(3): 369-397.
- Stockhorst, Ursula and Reinhard Pietrowsky. 2004. "Olfactory Perception, Communication, and the Nose-to-brain Pathway." *Physiology & Behavior* 83: 3-11.
- Tobin, Vicky A., Hirofumi Hashimoto, Douglas W. Wacker, Yuki Takayanagi, Yuki Takayanagi, Kristina Langnaese, Celine Caquineau, Julia Noack, Rainer Landgraf, Tatsushi Onaka, Gareth Leng, Simone L. Meddle, Mario Engelmann, and Mike Ludwig. 2010. "An Intrinsic Vasopressin System in the Olfactory Bulb is Involved in Social Recognition." *Nature* 464: 413-17.
- Tybur, Joshua M., Debra Lieberman, and Vladas Griskevicius. 2009. "Microbes, Mating, and Morality: Individual Differences in Three Functional Domains of Disgust." *Journal of Personality and Social Psychology* 97: 103-122.
- Tybur, Joshua M., Leslie A. Merriman, Ann E. Caldwell Hooper, Melissa M. McDonald, and Carlos David Navarrete. 2010. "Extending the Behavioral Immune System to Political Psychology: Are Political Conservatism and Disgust Sensitivity Really Related?" *Evolutionary Psychology* 8 (4): 599-616.
- Vigil, Jacob M. 2010. "Political Leanings Vary in Facial Expression Processing and Psychosocial Functioning." *Group Processes and Intergroup Relations* 13 (5): 547-58.
- Wang, L., L. Chen, and T. Jacobs. 2004. "Evidence for Peripheral Plasticity in Human Odour Response." Journal of Physiology 554: 236-44.
- Weedon, Michael N., Hana Lango, Cecilia M. Lindgren, Chris Wallace, David M. Evans, et al. 2008. "Genome-wide Association Analysis Identifies 20 Loci that Influence Height." *Nature Genetics* 40: 575-83.
- Wilson, G.D. and J.R. Patterson. 1968. "A New Measure of Social Conservatism." British Journal of Social and Clinical Psychology. 7: 264-269.
- Woodward, James, and John Allman. 2007. "Moral Intuitions." *Journal of Physiology-Paris* 101: 179-202.
- Wysocki, Charles J., and Gary K. Beauchamp. 1984. "Ability to Smell Androstenone is Genetically Determined." *Proceedings of the National Academy of Sciences* 81: (August): 4899-902.
- Zhou, Wen, and Denise Chen. 2009. "Sociochemosensory and Emotional Functions: Behavioral Evidence for Shared Mechanisms." *Psychological Science* 20 (9): 1118-24.

APPENDIX:

Individual Questionnaire Items for Measures of Conservatism

Preferences for Social Order

"Setting aside the way the political system actually is, which of these captures the way *you* would most like it to be (mark any number from 1 to 10)?"

Q1.	1 - Policies that openly tolerate new lifestyles10 - Policies that are guided by traditional values.	
Q2.	 Leaders who are cautious and open to dissenting opinions Leaders who are decisive and firm. 	
Q3.	1 - Policies that do not stress protection and security10 - Policies that do everything possible to protect against external threats.	
Q4.	 Policies that display compassion for rulebreakers Policies that strictly punish rulebreakers. 	
Q5.	1 - Policies that benefit the poor even if they are not making an effort10 - Policies that benefit the rich even if they are undeserving.	
Wilson-Patterson Index		

"Here is a list of various topics. Please indicate how you feel about each topic."

Note: 5-pt scale - strongly agree to strongly disagree,

Each item coded where a higher score = a more conservative issue position

- 1. School prayer
- 2. Pacifism
- 3. Stop illegal immigration
- 4. Death penalty
- 5. Government-arranged healthcare
- 6. Premarital sex
- 7. Gay marriage
- 8. Abortion rights
- 9. Evolution
- 10. Biblical truth
- 11. Increase welfare spending
- 12. Protect gun rights
- 13. Increase military spending
- 14. Government regulation of business
- 15. Small government

- 16. Foreign aide
- 17. Lower taxes
- 18. Stem cell research
- 19. Abstinence-only sex education
- 20. Allow torture of terrorism suspects

"Society Works Best" Scale Items

"Here are a number of statements about politics, policy and leadership that you may or may not agree with. For each statement, we would like you to indicate the extent to which you agree or disagree. *Thinking about politics...*"

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Note: 5-pt scale – strongly agree to strongly disagree
Each item coded where a higher score = a more conservative issue position
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- 1. the government should try to make sure that every person has a job and a good standard of living.
- 2. leaders should recognize that there is only victory or defeat.
- 3. traditional values should be promoted by the government.
- 4. people should be encouraged to keep their religious beliefs out of policy debates.
- 5. wealth should be distributed more evenly to everyone.
- 6. the death penalty should be available to deter criminals.
- 7. our defenses should be made stronger.
- 8. people should be required to behave according to accepted societal beliefs on what is morally right and wrong.
- 9. rehabilitating criminals should be stressed over punishment.
- 10. our border should be heavily policed
- 11. leaders should not be questioned too much about what they are doing.
- 12. accused criminals should be given many rights.
- 13. government should not interfere with the fact that some people will be naturally more successful than others.
- 14. we should prevent too many outsiders from moving here.
- 15. competition should be allowed to determine who succeeds and who fails economically.