Political Psychology

Political Psychology, Vol. 40, No. 3, 2019
doi: 10.1111/pops.12527

Fired Up by Morality: The Unique Physiological Response Tied to Moral Conviction in Politics

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Studies provide mounting evidence that morally convicted attitudes elicit passionate and unyielding political responses. Questions remain, however, whether these effects occur because moral conviction is another strong, versus a distinctly moral dimension of attitude strength. Building on work in moral psychology and neuroscience, I argue that moral conviction stems from a distinctive mode of mental processing that is tied to automatic affective reactions. Testing this idea using a lab experiment designed to capture self-reported moral conviction and physiological arousal, I find that conviction about political objects positively predicts arousal evoked by the objects, while attitude extremity and importance do not. These findings suggest that moral conviction items do tap into moral processing, helping to validate the conviction measure. They also illustrate the value of using physiological indicators to study politics, help explain why morally convicted attitudes trigger such fervent responses, and raise normative questions about political conflict and compromise.

KEY WORDS: attitude strength, moral conviction, moral psychology, physiological arousal, political conflict and compromise, skin conductance

As images of protest over moral concerns and reports about conflict over sacred values inundate the news, we face frequent reminders that people's deeply held beliefs about right and wrong often trigger hostile, vehement, and unyielding responses. In fact, citizens who view an issue as a fundamental moral concern are more willing to support retribution, vigilantism, and violence to achieve their goals (Reifen Tagar, Morgan, Halperin, & Skitka, 2014; Skitka & Houston, 2001; Zaal, Laar, Ståhl, Ellemers, & Derks, 2011). At the same time, however, people's moral beliefs motivate political participation and inspire courage to stand against injustice despite personal cost (Skitka & Bauman, 2008; Skitka, 2012). For good and for bad, people's moral convictions trigger more ardent responses than other strong but nonmoral attitudes, raising questions about why this is the case.

Moral conviction is defined as a metacognition or perception that an attitude is linked to one's fundamental beliefs about right and wrong (see Skitka, 2010, 2014). Morally convicted attitudes uniquely predict political responses ranging from partisan hostility to political engagement to refusal to compromise (see Ryan, 2014; Skitka & Morgan, 2014). While we know that convictions predict a host of fervent and unyielding political behaviors, we know less about why they prompt such distinct reactions. This uncertainty stems, in part, from lingering questions about what moral conviction items assess—a distinctly moral attitude dimension or another iteration of attitude strength that people interpret as moral conviction when they are prompted to by certain survey items. Morality and politics is a burgeoning area of research, and studies continue to uncover new political effects of

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moral conviction. Moving forward, therefore, we need to determine whether the widely used moral conviction battery captures a distinct attitude dimension versus an artifact of question wordings and respondent attributes. The answer to this question has important implications for how we think about the depth, stability, and fervor of moralized attitudes.

In this study, therefore, I present and test a theory about what we should see if moral conviction survey items really measure a moral way of thinking. Building on work in psychology and neuroscience, I argue that moral conviction stems from a distinctive mode of mental processing characterized by automatic visceral and emotional reactions. As a result, moralized attitudes are more closely tied than nonmoral attitudes to strong affective responses that motivate action, heighten hostility, and forestall compromise. Based on this theory, I hypothesize that the moral conviction people report about political objects will positively predict the physiological arousal triggered by these objects, but the attitude extremity and importance will not. To test these expectations, I conduct a novel lab-based experiment designed to assess moral conviction and physiological arousal, based on skin conductance, while participants complete a computer survey about political issues, parties, and leaders. Then, I run models testing how moral conviction scores and other attitude dimensions correlate with physiological arousal.

I find that higher moral conviction scores significantly predict higher physiological arousal, but higher attitude extremity and attitude importance scores do not. These results support my theory that moral conviction is integrally linked to physiological processes related to intuition, affect, and arousal. They also suggest that moral conviction items are tapping into a uniquely moral attitude dimension, supporting the construct validity of the conviction measure. These findings illustrate the strategic value of using physiological indicators to study politics, begin to shed light on why morally convicted attitudes are so deeply held, inherently motivating, and strongly divisive, and raise normative questions about moral conviction in politics.

Moral Conviction

Studies in moral and political psychology suggest that some political attitudes stem from a different source than personal preferences, group norms, religious beliefs, or individual values: They stem from moral conviction. Moral conviction is a metacognition that an attitude is grounded in one's core beliefs about right and wrong, and initial evidence suggests it is a unique construct (see Skitka & Morgan, 2014). In surveys, moral conviction does not reduce to personality traits, ideology, partisan strength, or other dimensions of attitude strength like extremity, importance, or certainty (Ryan, 2014; Skitka, Bauman, & Sargis, 2005). Nor does it reduce to religious beliefs or commitment, despite past assumptions of a tight link between morality and religion (Morgan, Skitka, & Wisneski, 2010; Skitka, Bauman, & Lytle, 2009).[1] For some individuals, their sense of right and wrong stems from their religious beliefs, but for others, it stems from different sources. All that is necessary to define moral conviction is the perception that an attitude is grounded in one's moral beliefs, regardless of the source of those beliefs, which means that conviction varies substantially from person to person (Ryan, 2014). Morally convicted attitudes, or attitudes held with strong moral conviction, do share unifying features: They are experienced as objectively true, universally applicable, inherently motivating, emotionally charged, and strongly independent (Skitka, 2010, 2014).

Moralized attitudes also trigger more negative emotions, hostile actions, and courageous resolve in politics than attitudes based on preferences, values, or conventions alone (see Skitka & Morgan, 2009, 2014). Moral conviction evokes powerful feelings of anger and disgust (Mullen & Skitka, 2006; Ryan, 2014), motivates greater social distance from and intolerance toward opponents (Skitka et al., 2005; Wright, Cullum, & Schwab, 2008), and elicits punitive responses like retribution, vigilantism,

[1]DeScioli and Kurzban (2009, 2013) and Rai and Fiske (2011) suggest that the specialized mental processes that underlie our sense of right and wrong developed to help facilitate social coordination by regulating relationships and punishing deviations from norms of cooperation.

and violence (Reifen Tagar et al., 2014; Skitka & Houston, 2001; Zaal et al., 2011). Moralized attitudes also lead citizens to oppose political compromise and reject material incentives (Ryan, 2017), and they heighten partisan bias, hostility, and division (Garrett & Bankert, 2018). At the same time though, moral conviction motivates political engagement, cause-related activism, and courage to stand against injustice despite pressure to conform (Skitka & Bauman, 2008; Skitka, Hanson, & Wisneski, 2017; van Zomeren, Postmes, & Spears, 2012). In sum, moralized attitudes often evoke distinctly passionate and unyielding political behaviors. Questions remain, however, about why, reflecting lingering uncertainty regarding what moral conviction items assess.

Most studies examining the relationship between moral conviction and other political, social, and cognitive variables utilize Skitka and colleagues' innovative survey-based measurement strategy to assess moral conviction (see Skitka, 2010). This approach relies on face-valid items that attempt to capture a person's intuitive recognition that something is a moral concern by directly asking how much their opinion reflects their beliefs about right and wrong. The conviction battery is an advancement over other empirical methods of assessing morality. Rather than assuming what issues should be categorized as moral or nonmoral, it allows scholars to measure the substantial individual-level variance that exists in the extent to which people moralize any given issue. For this reason, moral conviction items better capture the reality that many people consider certain "economic" issues, but not other putatively "moral" issues, to be matters of right and wrong (Ryan, 2014). Also, this measure avoids conflating morality and religion, which are distinct constructs (Morgan et al., 2010; Wisneski, Lytle, & Skitka, 2009).

Despite the many advances in this methodological approach, we lack evidence that it captures distinctly moral perceptions. It is quite plausible that the moral conviction battery evaluates other aspects of attitudes or cognition, which people then interpret as moral conviction when they are prompted to by certain survey questions. For example, a woman who cares deeply about gun control for personal but nonmoral reasons might answer that she feels "very much" conviction about gun control because she worries that a more moderate response signals indifference. In contrast, a man who instinctively considers immigration to be a matter of right and wrong might moderate his self-reported conviction after overthinking his survey response. As these examples suggest, the hypothesized connection between moral conviction and a moral way of processing remains to be established.

I posit that moral conviction does stem from a distinctive form of mental processing that is rapid, visceral, and emotion laden. As a result, moralized attitudes automatically trigger heightened affective responses in comparison to other attitude dimensions. These responses provide a mechanism to test the validity of the moral conviction battery. If moral conviction survey items are tapping into a distinctly moral attitude dimension, they should correlate with heightened visceral responses. Evidence of such a connection would shed more light on the psychophysiological processes underlying the passionate political behaviors predicted by self-reported moral conviction.

Deontological Processing

Humans are equipped with a dynamic suite of cognitive mechanisms for making moral appraisals, which are comprised of complex interactions between multiple brain regions and neural networks that prompt the perception that something is a matter of right and wrong.[2] Dual-process theories posit that two primary types of information processing underlie moral judgments (see Greene, 2008, 2009).[3] Consequentialist, or utilitarian, processing is defined by its focus on the out-

[2]Neuroscience research raises doubts about the existence of a specific brain region for morality, suggesting that moral judgments stem from a complex suite of neural systems (see Greene, 2015). Boccia et al. (2017) and Pascual, Gallardo-Pujol, and Rodrigues (2013) overview the multiple brain regions linked to morality.

[3]These types of processing loosely reflect the philosophical theories of consequentialism, which says that killing a person is acceptable if it maximizes the number of lives saved, and deontology, which says that killing a person is intrinsically wrong regardless of how many lives it saves.

come of an action in terms of the costs and benefits incurred. This rational mode of processing is slow, controlled, and cognitive.[4] In contrast, deontological processing is defined by its emphasis on rules and obligations of right and wrong that are indifferent to consequences. This intuitive mode of processing is rapid, automatic, and affective (Cushman, Young, & Hauser, 2010).[5]

I expect that moral conviction largely stems from this latter type of deontological thinking, which triggers the perception that something is a matter of right and wrong. This prediction emanates in part from similarities between moralized attitudes and sacred values, which appear linked to deontological processing. Up to this point, the moral conviction and sacred values literatures have remained largely separate. Sacred values are values that people treat as possessing transcendental significance that precludes comparisons or trade-offs (Tetlock, 2003; Tetlock et al., 2000). While they are defined in different terms and often more closely linked to religion in the literature, sacred values trigger similar responses as moralized attitudes. Both constructs lead people to reject material incentives and to oppose compromise at all costs (Baron & Spranca, 1997; Dehghani et al., 2010; Fiske & Tetlock, 1997; Ryan, 2017). They both encourage more violent solutions to conflict (Ginges & Atran, 2013; Ginges, Atran, Medin, & Shikaki, 2007; Reifen Tagar et al., 2014; Skitka & Houston, 2001), strongly resist social influence (Aramovich, Lytle, & Skitka, 2012; Hornsey, Majkut, Terry, & McKimmie, 2003; Sheikh, Ginges, & Atran, 2013), and motivate political participation (Marietta, 2008; Skitka & Bauman, 2008).

The close connection between sacred values and moral conviction suggests that these constructs stem from similar cognitive mechanisms, and evidence indicates that sacred values are linked to deontological processing. These values often lead individuals to behave as "devoted actors," following a rule-bound logic to do what is right regardless of risks or rewards, rather than a utilitarian logic of costs and benefits (Atran, 2016; Bennis, Medin, & Bartels, 2010). FMRI studies also show that sacred values activate regions of the brain that help process deontic rules, including the temporoparietal junction and anterior temporal lobe (Berns et al., 2012; Duc, Hanselmann, Boesiger, & Tanner, 2013; Kaplan et al., 2017). These findings indicate that sacred values are linked to deontological processing, which suggests that morally convicted attitudes are as well, although this connection remains to be tested.

Research on moral conviction also independently suggests a link between conviction and deontological processing. First, the defining attributes of moral conviction reflect the type of effects we would expect from deontological processing. Moralized attitudes are perceived to be objectively true, universally applicable, inherently motivating, and tightly linked to emotions (Skitka, 2010, 2014). These attributes reflect affective responses to deontic rules about right and wrong, not deliberate evaluations of situational costs and benefits. Second, moral conviction encourages quicker judgments, which we would expect from rapid deontological processing (Wisneski et al., 2009). Finally, citizens who score high on a moral conviction battery are more receptive to rule-based arguments than to cost-benefit appeals, suggesting a connection between moralized attitudes and deontological processing (Ryan, 2019). Other dimensions of attitude strength like intensity, extremity, and personal relevance fail to predict the same responsiveness to deontological arguments.

Building on the theory that moral conviction stems from a deontological style of processing, I further expect that moral conviction is uniquely linked to both the visceral and emotional responses associated with deontological processing (see Greene, 2009, 2014). Regarding the former, people first identify whether something is a moral concern based on automatic, reflexive responses, rather than controlled, conscious reasoning (Greene & Haidt, 2002; Haidt, 2001, 2007). This rapid process

[4]In this case, the term "rational" denotes using effortful, reflective reasoning to reach a decision, rather than the normative optimality or sensibility of a decision.

[5]Other theories of moral judgment and decision-making, including dynamic system approaches and intuitionist models, also recognize the fundamental importance of automatic, affective processing for moral cognition (see Haidt, 2001, 2007; Moll, Zahn, de Oliveira-Souza, Krueger, & Grafman, 2005; Van Bavel, Feldman-Hall, & Mende-Siedlecki, 2015).

occurs within a hundred milliseconds (Decety & Cacioppo, 2012), and cognitive loads have no effect on deontological judgments, which suggests that these judgments are involuntary and effortless (Greene, Morelli, Lowenberg, Nystrom, & Cohen, 2008). Moreover, people frequently report knowing that something is morally wrong without being able to articulate reasons why, illustrating the importance of intuition for moral perceptions (Cushman et al., 2006; Haidt, Koller, & Dias, 1993).

Regarding the latter, deontological judgments activate parts of the brain involved with emotional processing, including the amygdala, ventromedial prefrontal cortex, and posterior cingulate cortex (Blair, 2007; Decety, Michalska, & Kinzler, 2012; Greene, Nystrom, Engell, Darley, & Cohen, 2004; Greene, Sommerville, Nystrom, Darley, & Cohen, 2001; Moll et al., 2002). Damage to these areas results in impaired moral judgments, including moral insensitivity and utilitarian responses to harmful scenarios (Ciaramelli, Muccioli, Ladavas, & di Pellegrino, 2007; Damasio, 1994; Glenn, Raine, & Schug, 2009; Koenigs et al., 2007; Mendez, Anderson, & Shapira, 2005). In addition, stronger emotional arousal elicits more frequent deontological processing and intense moral judgments (Conway & Gawronski, 2013; Navarrete, McDonald, Mott, & Asher, 2012; Schnall, Haidt, Clore, & Jordan, 2008; Strohminger, Lewis, & Meyer, 2011; Wheatley & Haidt, 2005).

Based on these findings, I expect that moral conviction is distinctly tied to the automatic visceral and affective responses triggered by a deontological way of thinking. These responses provide a benchmark to assess the validity of the moral conviction measure, as well as leverage to help explain why moralized attitudes are more likely to engender the type of passionate, uncompromising behaviors that frequently characterize the political landscape today.

Physiological Arousal

To test this theory, we need some way to assess the connection between deontological styles of thinking and moral conviction, and physiological arousal is arguably an effective indicator. Since deontological processing occurs automatically, intuitively, and often outside conscious awareness, it might be difficult for individuals to accurately report this style of thinking in response to survey items. Affective arousal, however, automatically leads to measurable changes in physiological parameters like heart rate, respiratory rate, perspiration, and muscle tension (Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000; Damasio, 1994, 1999). Since measures of these changes rely on readings from sensors rather than self-reports, they allow us to assess intuitive emotional responses like those linked to deontological processing. In fact, political scientists have increasingly leveraged physiological indicators to analyze people's visceral reactions to campaign ads (Wang, Morey, & Srivastava, 2014), political discourse (Mutz, 2007), threatening sounds (Oxley et al., 2008), and positive and negative images (Dodd et al., 2012; Smith, Oxley, Hibbing, Alford, & Hibbing, 2011), providing further evidence that these measures are useful for assessing the type of automatic affective processes that support deontological judgments.

Studies show that deontological judgments are tied to stronger physiological responses than other categories of evaluation (e.g., Cushman, Gray, Gaffey, & Mendes, 2012; Moretto, Ladavas, Mattioli, & di Pellegrino, 2010; Park, Kappes, Rho, & Bavel, 2016; Teper, Inzlicht, & Page-Gould, 2011). Based on the theorized connection between moral conviction and deontological styles of processing, therefore, higher moral conviction scores should correlate with heightened levels of physiological arousal if moral conviction survey items are, in fact, tapping into this distinct style of information processing. This leads to the expectation:

H1: Moral conviction about specific political objects will positively predict physiological arousal triggered by the objects.

The relationship between moral conviction and affective arousal is admittedly complex, with affect serving as both a consequence and antecedent of conviction (see Brandt, Wisneski, & Skitka, 2015; Skitka, 2014; Wisneski & Skitka, 2017). My purpose in this study is to evaluate the association, rather than the causal ordering, between conviction and arousal, and the choice to define moral conviction as the predictor and physiological arousal as the response is, in part, based on methodological expedience. I also opt to define moral conviction as the regressor in keeping with previous studies (see Ryan, 2014).

Since moral conviction is arguably more closely linked to deontological processing than other dimensions of attitude strength, it should also be more closely tied to the type of heightened affective response that emanates from deontological thinking. If moral conviction is distinctly tapping into a style of thinking that is rapid, visceral, and emotion laden, it should distinctly correlate with stronger visceral reactions in a way that other dimensions of attitude strength do not. Consequently, nonmoral attitude dimensions like extremity and importance should evoke less physiological arousal than moral conviction, leading to the hypotheses:

H2: Attitude extremity about specific political objects will not significantly predict physiological arousal triggered by the objects.

H3: Attitude importance about specific political objects will not significantly predict physiological arousal triggered by the objects.

Electrodermal activity (EDA) is a particularly appropriate indicator to assess the physiological arousal expected to be linked with moral conviction. EDA refers to changes in the electrical properties of the skin (see Boucsein, 2012). Higher EDA stems from increased activation of the sympathetic branch of the autonomic nervous system (ANS), which is the fight or flight system. When people are aroused, their sympathetic nervous system (SNS) is activated, causing their sweat glands to release moisture. This increased moisture heightens the rate of movement of electricity across the surface of the skin, increasing EDA. The most widely studied property of EDA is skin conductance, and higher skin conductance indicates greater autonomic arousal.

Whereas other physiological responses, such as cardiovascular and gastrointestinal activity, are controlled by both the SNS and the parasympathetic nervous system (PNS), EDA only lies under SNS control. For this reason, skin conductance has long been accepted as a direct and reliable indicator of emotional arousal (Dawson, Schell, & Filion, 2007; Kreibig, 2010).[6] Research also shows that skin conductance is influenced by regions of the brain that are linked to moral processing (Critchley, 2002; Critchley, Elliott, Mathias, & Dolan, 2000), and several studies have used skin conductance to investigate the link between affective arousal and moral judgments (e.g., Moretto et al., 2010; Navarrete et al., 2012; Teper et al., 2011).

Procedures and Measurement

To test these hypotheses, I conducted a lab-based experiment designed to capture self-reported moral conviction and physiological arousal while participants completed a computer survey about political issues, parties, and leaders. The experiment took place at a large public university in the Southeast from April to May of 2015, and 72 college students took part in the study.[7]

Participants were recruited from an introductory American government class and given course credit for completing the study, as well as the chance to win a $25 gift card. There was variation

[6]Skin conductance is a valid measure of the intensity of arousal, but not of the valence of arousal, like positive versus negative affect, nor of discrete emotions, like anger versus disgust (Figner & Murphy, 2011).

[7]Karl (2015) reports no difference in the EDA of college and adult participants.

within the sample regarding party identification (57% Democratic, 40% Republican), ideology (54% liberal, 31% conservative, 15% moderate), gender (51% male, 49% female), and race and ethnicity (74% White, 14% Black, 13% other). The mean age of the sample was 19.9 years.

Participants came into the lab one at a time. After they listened to and signed an informed consent document, equipment was attached to capture skin conductance. Two disposable electrodes were placed on the thenar and hypothenar eminences of the palm of subjects' nondominant hand (Dawson et al., 2007). Following established protocol, participants' hands were not pretreated prior to electrode attachment (Boucsein et al., 2012).

After equipment was attached, participants were brought into a soundproof observation room and seated in a chair with an armrest table where they could rest their measurement hand. The chair faced a 21.5-inch computer monitor that displayed an online survey. The room was also equipped with three cameras. Two cameras were focused on the participant to record behavioral data and to allow the researcher to control for participant movement. One camera was focused on the computer monitor. After an acclimation period of approximately nine minutes, participants were led through standard calibration exercises to verify that the physiological response equipment was attached and recording properly (Boucsein et al., 2012). Next, participants were instructed to get comfortable and keep their measurement hand as still as possible over the course of the experiment. For the study, participants completed a standard 30- to 40-minute computer survey, administered through the Qualtrics survey platform. They were instructed to go through the survey at their own pace, using a mouse to answer questions with their nonmeasurement hand. Then, they were left by themselves to take the survey, which began with a 90-second baseline period to establish their resting EDA. Participants answered basic demographic questions before starting the experiment.

The experiment was divided into blocks of questions regarding nine political issues, two political parties, and four political leaders. Because the purpose of this study is to examine within-subject differences in moral conviction and physiological responsiveness, participants all answered the same questions about every issue, party, and leader. The issues were abortion, the death penalty, fracking, free trade agreements, illegal immigration, mandatory vaccinations, the minimum wage, student loan forgiveness, and same-sex marriage. These issues were selected to ensure that participants were asked about a range of political issues they might consider to be moral or nonmoral, economic or social, politicized or nonpoliticized, and relevant or irrelevant. The leaders—John Boehner, Hillary Clinton, Barack Obama, and Mitt Romney—were selected because they were prominent at the time the study was conducted. The parties were the Democratic and Republican Parties. Issue, party, and leader prompts were all included to test whether conviction items tap into moral processing across a range of political objects.

Each block of questions followed the same order. First, participants were asked to read and think about a generic statement regarding one of the 15 issues, parties, or leaders. Figure 1 provides two examples of the types of prompts participants received: one for fracking and the other for Hillary Clinton. Each prompt served as the stimulus to evoke physiological arousal, and the time participants spent on the survey page for each prompt defined the main stimulus interval (SI) during which skin conductance was recorded.[8] Because the onset latency of skin conductance responses is typically one to three seconds after the stimulus (Boucsein, 2012; Figner & Murphy, 2011), observations where the SI was less than three seconds were excluded from the analyses. Results are the same if these observations are included, as shown in the online supporting information.

To help ensure that the experiment was a hard test of the hypotheses, the political prompts were designed so that any arousal would result from the content of the prompts, rather than the method of

[8]While EDA studies often set a consistent SI length, I opted to let participants read prompts at their own pace, allowing them to process and respond to the text in a more natural, realistic way. This setup mirrors other studies that use EDA to study moral judgments, which allow participants to read and respond to moral prompts in their own time (e.g., Krosch, Figner, & Weber, 2012). Controls for stimulus length allow me to correct differences in the time participants spent on each prompt while still allowing them to proceed at their preferred pace.

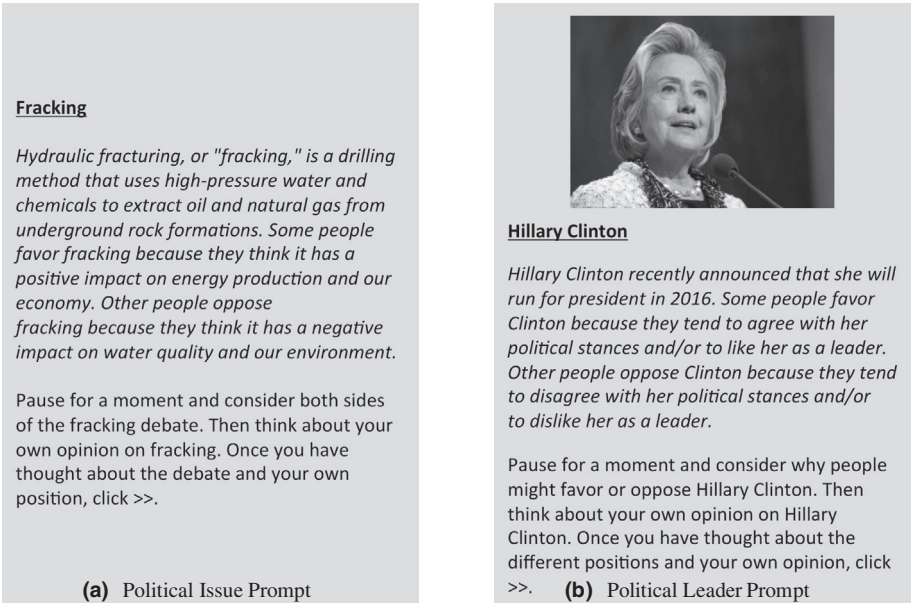

Figure 1. Examples of political prompts shown during stimulus intervals.

delivering them. Whereas EDA studies typically rely on emotive images, video clips, or loud sounds to elicit arousal (e.g., Dodd et al., 2012; Oxley et al., 2008; Smith et al., 2011; Mutz, 2007), for the 11 issue and party prompts, I simply had participants read the type of statement that would appear on a basic Gallup or Pew Research Center survey.[9] Because the structure and amount of attention required by a prompt can influence arousal (Lang, 1990; Potter & Choi, 2006), every prompt was designed to be brief, easy to read, and following the same format. The four leader prompts did include a generic picture to help participants identify the respective political leader, but additional analyses, included in the online supporting information, show that results are the same when these prompts are excluded. Based on the subdued content of the prompts, any arousal should be triggered by the political object described in the prompt.

Second, participants were asked their opinion about the issue, party, or leader described in the stimulus prompt. Third, they were asked questions to assess their moral conviction about the political object, as well as questions to measure object importance. Finally, participants were asked questions about object familiarity and several emotions that might have been evoked by an object.[10] After answering questions about one political object, and before they were shown the key stimulus prompt for another political object, participants were shown a blank screen with a large "X" in the center for 15 seconds. This time period served as the interstimulus interval (ISI).[11] Issue, party, and leader blocks were presented randomly to account for any order effects or habituation of the electrodermal response.[12] Figure 2 illustrates the order of survey pages in each block.

At the end of the survey, participants answered several questions to operationalize variables that might influence conscious filtering of self-reported moral conviction, including political knowledge,

[9]Prompt wordings are included in the online supporting information.

[10]Question wordings are included in the online supporting information.

[11]A 10-second ISI is sufficient to study different responses to one stimulus relative to another (Boucsein, 2012; Breska, Maoz, & Ben-Shakhar, 2011).

[12]Some EDA literature suggests that participants should be shown an initial scenario to familiarize them with the task and reduce arousal triggered by the newness of a scenario (e.g., Dawson et al., 2007), so every participant was shown the issue of free trade agreements first.

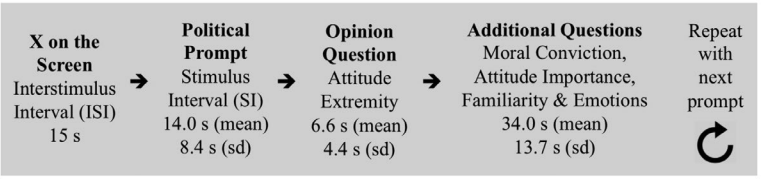

Figure 2. Order of survey pages in political issue, party, and leader blocks.

cognitive-processing styles, personality traits, and religious commitment. Then, the survey concluded with another 90-second baseline period. After the study was finished, physiological response equipment was removed, and participants were debriefed about the purpose of the experiment. The entire process took about an hour.

Physiological response data was recorded continuously throughout the survey and stored for analysis.[13] Video footage of the participants and surveys was also recorded continuously during the experiment and time synced with the physiological response data. While participants completed the survey, I watched a live video feed of their computer screen in a separate control room, placing an electronic marker in the physiological response data file every time a new survey page came up on screen, as well as when participants coughed or sneezed. These markers were used during data analysis to specify the SI and ISI and to remove signal artifacts.

Moral Conviction is operationalized using the standard questions: (1) "To what extent is your opinion on [issue X] a reflection of your core moral beliefs and convictions?" and (2) "To what extent is your opinion on [issue X] deeply connected to your fundamental beliefs about right and wrong?" Response options range from "not at all" to "very much" on a 5-point scale. Following established protocol, scores on the two questions are averaged together to form one Moral Conviction score for each issue (Ryan, 2014; Skitka, 2014).[14]

The average Moral Conviction score across all 15 political objects is 3.08 (*SD* = 1.22), which reflects "moderate" Conviction.[15] Average Conviction about the political objects ranges from a high of 4.00 (*SD* = 1.00) on abortion to a low of 1.96 (*SD* = 1.18) on John Boehner. Abortion, same-sex marriage, and the death penalty top the list of issues that are viewed as moral concerns, while the minimum wage, fracking, and free trade fill in the bottom slots.[16]

Physiological Arousal is operationalized as the ratio of change in EDA for each political prompt. This ratio is calculated by dividing the average skin conductance level (SCL) obtained during an SI by the average SCL obtained during the ISI that preceded it.[17] Because individuals vary dramatically in their resting SCL and overall responsiveness, EDA studies usually standardize data to reflect within-subject changes from a previous baseline period (see Dawson et al., 2007; Miller & Long, 2007). This method adjusts for individual differences in responsiveness and provides a more reliable measure than absolute SCL (Ben-Shakhar, 1985). To better ensure that Arousal scores are not pulled toward extreme values by aberrant spikes, I exclude observations that are >±3 *SD* from the mean (see Renshon, Lee, & Tingley, 2015). Results hold with different thresholds for outliers.

[13]Skin conductance was recorded using Mindware's Cardio Mobile Ambulatory Impedance Cardiograph (Model 50-2303-00) and BioLab software (v 3.1.1), sampled at 500 Hz (samples/second).

[14]Cronbach's α statistics are generally 0.90 and above for the two questions (see Skitka & Morgan, 2014), and Cronbach's α for this study is 0.90. I get similar results if I use one question or the other to operationalize Moral Conviction, instead of the average score.

[15]This score is slightly higher than the average Moral Conviction reported about 10 political issues tested on the 2012 ANES Evaluations of Government and Society Study (2.88, *SD* = 1.13).

[16]Average Conviction and Arousal scores for each object are reported in the online supporting information.

[17]Skin conductance data was assessed using MindWare's EDA Analysis Software (v 3.1).

Physiological Arousal scores range from 0.847 to 1.211. Scores over 1 reflect an increase in average SCL relative to the previous ISI, and scores below 1 indicate a decrease in average SCL. The mean Arousal score across all 15 political objects is 0.998 (*SD* = 0.049), which reflects the slight downward drift in SCL over the length of the SI.[18] Average Physiological Arousal for each political issue ranges from a high of 1.010 (*SD* = 0.056) during the death-penalty prompt to a low of 0.970 (*SD* = 0.046) during the free-trade prompt.

To compare the effects of Moral Conviction on Physiological Arousal to the effects of other dimensions of attitude strength, I also include questions to evaluate attitude extremity and importance. To operationalize *Attitude Extremity*, or "the extent to which an attitude deviates from neutrality" (Krosnick & Petty, 1995, p. 6), I ask participants their opinion on each political issue, party, and leader. Responses range from "strongly favor" to "strongly oppose" on a 5-point scale, which is folded on its midpoint to construct a 3-point scale of attitude extremity. *Attitude Importance*, or "the extent to which an individual cares deeply about and is personally invested in an attitude" (Krosnick, Boninger, Chuang, Berent, & Camot, 1993, p. 1132), is operationalized by asking participants, "How important is this issue to you personally?"[19] Answers range from "not important at all" to "extremely important" on a 5-point scale.

Moral Conviction significantly correlates with Attitude Extremity and Attitude Importance (r = 0.45 and 0.54, respectively).[20] As we would expect, individuals have more extreme opinions about issues they hold with moral conviction, and they tend to view these issues as more important to them personally. Regressing Conviction on Extremity and then Importance, however, shows that each respective variable explains about 21% and 29% of the variance in Conviction, mirroring previous survey findings that Conviction is a distinct construct (e.g., Skitka et al., 2005). Higher Conviction also significantly correlates with stronger partisanship, ideology, and emotion (r = 0.08, 0.11, and 0.62, respectively), as other studies have found (e.g., Ryan, 2014).[21]

Analyses and Results

To assess my first expectation that Moral Conviction positively predicts Physiological Arousal, I pool the data from the 72 participants and 15 political prompts, excluding outliers and observations where the stimulus interval (SI) is less than three seconds (N = 1,014). Then, I regress (OLS) Physiological Arousal on Moral Conviction.[22] As a strict test, I include fixed effects for each participant and prompt to control for any unique characteristics of the individuals or political objects that might be driving the results.[23] I also control for *Stimulus Length* (3.0 to 60.8 s) to account for differences in the time participants spent reading each prompt.[24] Variables are coded on a 0 to 1 scale for ease of comparison.

Table 1 summarizes the results of this analysis. It shows that Moral Conviction has a significant positive effect on Physiological Arousal, so that moving from the least to the most Conviction increases Physiological Arousal by approximately 6% of the total range of Arousal. As hypothesized,

[18]This result is typical of the average EDA response reported in other studies (see Dawson et al., 2007; Gruszczynski, Balzer, Jacobs, Smith, & Hibbing, 2013).

[19]For the sake of time and clarity, this question is only asked about the nine political issues.

[20]Pearson's r correlations for these and other variables are included in the online supporting information.

[21]Regressing Moral Conviction on Average Emotion, defined below, suggests that Emotion explains about 39% of the variance in Conviction, illustrating the tight but not synonymous connection between self-reported moral conviction and emotion.

[22]Because I am interested in the correlation between these variables, the side of the model to which they are assigned is ultimately unimportant and has no effect on the results.

[23]To alleviate concern that model specification is driving the results, I run several other models, which yield the same results and are included in the online supporting information.

[24]$\text{Physiological Arousal}_i = \beta 0 + \beta 1\ \text{Moral Conviction}_i + \beta 2\ \text{Stimulus Length}_i + \beta\{3 - 17\}\ \text{prompt fixed effects}_i + \beta\{18 - 89\}\ \text{participant fixed effects}_i + e_i$.

scores on the Moral Conviction measure positively correlate with the type of heightened visceral reaction associated with deontological processing.

To test my second and third hypotheses that neither Attitude Extremity nor Attitude Importance significantly predicts Physiological Arousal, I pool the data from the 72 participants and nine issue prompts, for which both Extremity and Importance are assessed, once again excluding outliers and observations where the SI is less than three seconds ($N = 615$). I regress (OLS) Physiological Arousal on Moral Conviction, Attitude Extremity, and Attitude Importance, and I include fixed effects for each participant and prompt and a control for Stimulus Length. To facilitate comparison, variables are standardized on a 0 to 1 scale.

Table 2 presents the results of this analysis. Moral Conviction has a significant positive effect on Physiological Arousal, while neither Attitude Extremity nor Attitude Importance has a significant effect on Arousal. Moving from the least to the most Conviction about political issues increases Physiological Arousal by approximately 8% the total range of Arousal. In contrast, moving from the lowest to highest levels of Attitude Extremity and Importance predicts no significant increase in Arousal. These results support my expectations that neither Attitude Extremity nor Attitude Importance significantly predicts Physiological Arousal.[25] They also indicate that moralized

Table 1. Estimated Effect of Moral Conviction on Physiological Arousal

	Physiological Arousal
Moral Conviction	0.06** (0.02)
Stimulus Length	0.02 (0.05)
(Intercept)	0.38** (0.02)
Prompt Fixed Effects	Included
Participant Fixed Effects	Included
R^2	0.14
N	1,014

Note. Variables coded 0–1. Heteroskedasticity-consistent standard errors. Data from issue, party, and leader prompts. $^{*}p < 0.05$, $^{**}p < 0.01$, two-tailed test.

Table 2. Estimated Effects of Moral Conviction, Attitude Extremity, and Attitude Importance on Physiological Arousal

	Physiological Arousal
Moral Conviction	0.08* (0.03)
Attitude Extremity	0.001 (0.02)
Attitude Importance	0.01 (0.03)
Stimulus Length	−0.05 (0.06)
(Intercept)	0.38** (0.03)
Prompt Fixed Effects	Included
Participant Fixed Effects	Included
R^2	0.19
N	615

Note. Variables coded 0–1. Heteroskedasticity-consistent standard errors. Data from issue prompts only. $^{*}p < 0.05$, $^{**}p < 0.01$, two-tailed test.

[25]Joint F-tests reveal no significant difference between the fit of models that include and exclude Attitude Extremity and Importance, negating the notion that insignificant results for these attitude dimensions stem from multicollinearity. Results are included in the online supporting information.

attitudes trigger stronger visceral reactions than important or extreme attitudes, providing further evidence that moral conviction is uniquely related to the type of physiological arousal we would expect from a deontological way of thinking.

In the previous models, covariates would be collinear with the fixed effects, so none were included. To get some baseline by which to compare the effect of Arousal to that of other potential predictors, I regress (OLS) Physiological Arousal on Moral Conviction, Attitude Extremity, Attitude Importance, and several other predictors. I include a dummy variable for gender (*Female*), a dummy variable for race/ethnicity (*White*), and a continuous variable for *Age* (18 to 36). I control for *Strength of Partisanship* (4-point scale) and *Strength of Ideology* (4-point scale), which I operationalize by folding 7-point party identification and ideology at their midpoints. I also run a model replacing these predictors with 7-point party identification and ideology, but these variables have no significant effect on Arousal, as shown in the online supporting information.[26] To account for individual differences in information processing, I include a variable for *Political Knowledge* (5-point scale), measured by summing correct answers to four general political knowledge items, and an indicator of *Need for Cognition* (3-point scale), formed by averaging two standard items assessing how much people enjoy effortful thought. I control for *Religious Commitment* (6-point scale), operationalized by averaging two items that evaluate how frequently people attend religious services and pray. To ensure that Moral Conviction is not simply a proxy for self-reported emotion, I also control for *Average Emotion* (5-point scale), formed by taking the mean of three emotions—anger, disgust and negative affect—that are closely related to conviction (see Ryan, 2014).[27] To account for differences in the time participants spent reading each prompt, I again control for Stimulus Length. Finally, I include prompt and participant random effects to model any clustering in the data. All variables are coded 0 to 1 to facilitate comparison.

Table 3 presents the results of this analysis. Once again, self-reported Moral Conviction about political issues predicts how much Physiological Arousal is evoked by the issues, while self-reported Attitude Extremity and Attitude Importance do not. In fact, Moral Conviction is the only significant predictor in the model, with an estimated marginal effect of 0.09 on Physiological Arousal, which equates to an increase of 9% of the total range of Arousal across the scale of Conviction. Meanwhile, other variables that typically predict political evaluations have no significant effect on Arousal. Neither Political Knowledge, Strength of Partisanship, Strength of Ideology, nor Religious Commitment predicts how much Physiological Arousal is evoked by different political prompts. These results support my expectation that self-reported Conviction correlates with the type of heightened visceral reaction we would expect from deontological processing, while other attitude dimensions and political predictors do not. This lends further evidence to the idea that moralized attitudes are uniquely tied to a mode of thinking that is rapid, intuitive, and affective. At the same time, however, Conviction is more than just a proxy for self-reported affect, as it significantly predicts Physiological Arousal even after controlling for Average Emotion.[28]

Discussion

The patterns of EDA and self-reported moral conviction observed in this study indicate that heightened levels of autonomic nervous system activity are triggered when people confront issues they perceive to be linked to their sense of right and wrong. These same patterns do not occur when

[26]This null finding tentatively supports work showing that liberals and conservatives share similar cognitive, motivational, and moral processes (see Skitka, Morgan, & Wisneski, 2015; Skitka & Washburn, 2016), in contrast to work showing they display substantial neurocognitive and psychophysiological differences (see Hibbing, Smith, & Alford, 2014; Jost & Amodio, 2012).

[27]I get the same results using other combinations of emotions, including fear, frustration, worry, and sadness, or excluding emotion altogether.

[28]Joint F-test results, included in the online supporting information, further strengthen this assessment.

Table 3. Comparing the Effect of Moral Conviction on Physiological Arousal to That of Other Covariates

	Physiological Arousal
Moral Conviction	0.09**[2] (0.03)
Attitude Extremity	0.02 (0.02)
Attitude Importance	0.003 (0.03)
Average Emotion	(−0.05) (0.03)
Political Knowledge	(−0.04) (0.03)
Strength of Partisanship	0.02 (0.03)
Strength of Ideology	(−0.01) (0.03)
Religious Commitment	(−0.01) (0.02)
Need for Cognition	(−0.04) (0.02)
Age	(−0.02) (0.05)
Female	(−0.005) (0.01)
White	(−0.002) (0.02)
Stimulus Length	(−0.06) (0.04)
(Intercept)	0.42**[2] (0.03)
Prompt Random Effects	Included
Participant Random Effects	Included
AIC	−584.46
BIC	−509.29
N	615

Note. Variables coded 0–1. Data from issue prompts only.

$^{*}p < 0.05$, $^{**}p < 0.01$, two-tailed test.

people consider political objects that are tied to extreme or important attitudes. This finding of a distinct connection between moralized attitudes and physiological arousal of the type we would expect from a deontological style of thinking has several important implications for how we think about moral conviction, attitude research, and political behavior.

First, results from this study support the working assumption of the burgeoning morality and politics literature that moral conviction survey items accurately assess moral processing. The significant positive relationship between conviction scores and physiological arousal pokes holes in the idea that moral conviction is simply an artifact of survey questions or a product of utilitarian reasoning. Also, the fact that moral conviction predicts physiological arousal, while other dimensions of attitude strength do not, discredits the notion that moral conviction is simply another iteration of a nonmoral attitude dimension. Rather, these results suggest that moral conviction items are tapping into physiological responses that occur prior to conscious reasoning and reflect deontological thinking, which supports the construct validity of the measure. This finding is important because it lays a foundation for future studies to leverage moral conviction as a distinctly moral attitude dimension and to rely on moral conviction items to assess it.

In extension, this finding helps connect two lines of research in moral psychology that have remained largely isolated from each other. On the one hand, studies in cognitive psychology and neuroscience show that humans are equipped with a complex suite of mental processes that underlie perceptions of morality (see Greene, 2015; Pascual et al., 2013). On the other hand, research in moral and political psychology suggests that people can identify and report their intuitive perception that something is a matter of right and wrong, and this self-reported moral conviction

predicts multiple political outcomes (see Skitka & Morgan, 2014). This latter research operates under the assumption that moral conviction survey items tap into the sort of complex moral processing identified by the former research, and this study provides initial support for the assumed connection.

The results also tentatively suggest a link between sacred values and morally convicted attitudes. While these two constructs are defined in different ways, findings from this study indicate that moral conviction stems from the same deontological processing as sacred values do (see Berns et al., 2012). Therefore, insights about political conflict and compromise from the sacred values literature might apply to moralized attitudes, although further work is needed to test this idea.

Second, results from this study raise important questions about the current state of public opinion research. Extant studies typically define and measure an attitude as a person's evaluation of a given political object in terms of support or opposition, favor or disfavor. As a result, most survey items focus on attitude extremity, which reflects how strong a person's position is in one direction or the other. In this study, however, extremity does a poor job capturing participants' automatic visceral reaction to political objects. This finding suggests that if public opinion researchers want to evaluate people's deeper, unfiltered responses to political cues, they need to consider including survey items that measure other attitude dimensions like moral conviction.

Third, this study highlights untapped potential in applying physiological response indicators to validate survey items and investigate the underlying causes and consequences of political attitudes and behaviors. In recent years, studies have increasingly leveraged physiological measures like skin conductance to study political outcomes, showing that EDA predicts social policy attitudes and ideology (Dodd et al., 2012; Oxley et al., 2008; Renshon et al., 2015), levels of political participation (Gruszczynski et al., 2013), and responses to political ads and discourse (Mutz & Reeves, 2005; Wang et al., 2014). As evidenced in this study, assessing people's automatic visceral reaction to political prompts also allows us to bypass response effects and consciously filtered answers to evaluate the moral conviction measure.

Beyond helping to establish the construct validity of conviction items, physiological response patterns also tell us something about the nature of moral conviction beyond what self-reported measures can. While survey research sheds needed light on the attributes and outcomes of moral conviction, it offers less insight into the underlying psychological mechanisms that trigger the perception that an issue is a matter of right and wrong. The correlation between physiological arousal and moral conviction shown in this study suggests that heightened visceral reactions might help signal to people that something is a moral concern or that heightened arousal and stronger self-reported conviction jointly stem from the mental processing of deontic rules. Further work is needed to parse out the causal story. In either case, moral conviction appears linked to the broader affective arousal directly triggered by a political object, more than to the discrete or incidental emotions that are evoked, a finding that fits with prior work (e.g., Wisneski & Skitka, 2017). The fact that moral conviction significantly predicts affective arousal even after controlling for self-reported emotion also provides further evidence that biological measures complement self-reports to better capture people's full response to political stimuli (see Wagner et al., 2015).

Fourth, the evidence of a distinct connection between moral conviction and automatic physiological arousal sheds light on why moral conviction might evoke more motivated, unyielding, and often divisive behavior than other strong but nonmoral attitudes. We know that moralized attitudes trigger more hostile opinions, punitive actions, violent responses, uncompromising positions, social intolerance, political participation, and cause-related activism than the most strongly held nonmoral attitudes (Skitka, Washburn, & Carsel, 2015). From a strictly logical, consequentialist perspective, this behavior makes little sense. Why would people engage in costly actions because of attitudes imbued with moral conviction? Still, we see it time and again

in politics. Israelis and Palestinians accept high levels of violence, including retributive strikes and civilian casualties, to achieve morally convicted ends. People reject procedural justice and even endorse vigilantism when they hold morally convicted attitudes about a case. Citizens turn down financial rewards to prevent political opponents from gaining ground on issues they view as moral concerns. Participants in social movements courageously fight for causes they believe are right, despite the personal costs.

Such passionate, uncompromising behavior makes more sense in light of the evidence that moralized attitudes are uniquely tied to a deontological style of information processing that automatically triggers strong physiological reactions. Moral conviction appears to be integrally linked to psychophysiological processes that are rapid, intuitive, and affectively charged, and these processes likely override logical arguments about positive or negative consequences. As such, the effects of moralized attitudes might be more automatic and ingrained than previous work has shown. Also, attempts to persuade people with money, reason with them about the merits of compromise, or sell them on procedural solutions arguably face an uphill battle when regions of their brain that are linked to affective arousal are firing on all cylinders because they moralize an issue. Further work is needed to investigate this supposition.

As an important aside, physiological arousal and moral conviction are likely even more closely tied in real-world settings than they are in this experiment. Whereas most physiological response studies use stirring images, emotive video clips, and loud sounds to stimulate arousal, participants in this study primarily read simple statements. Still, political objects that were linked to moral conviction triggered higher levels of physiological arousal. Because the stimuli in this lab experiment were relatively weak, I expect that moral conviction elicits even stronger visceral reactions in everyday life, as people watch vivid news stories, engage in heated discussions, negotiate contentious deals, and navigate political conflicts related to their moral convictions.

Finally, the close connection between arousal and conviction shown in this study raises several questions for future work. First, studies show that prompts to regulate or reduce emotional arousal encourage respondents to shift from deontological to utilitarian judgments (e.g., Feinberg, Willer, Antonenko, & John, 2012; Lee & Gino, 2015). Building on this idea, future research should investigate whether tactics like emotion reappraisal and suppression moderate the effects of moral conviction, encouraging rational deliberation, cooperation, and compromise. Second, this study leaves unanswered questions about individual-level and issue-level factors that might predict differences in deontological processing, physiological arousal, and moral conviction. Future research should assess, for example, whether individuals who are more physiologically responsive are more likely to moralize politics or whether experimentally manipulating arousal influences moral conviction about different issues. In conclusion, listening to opposing arguments, respecting political rivals, and accepting pragmatic compromises are key tenets of democratic deliberation and policymaking. At the same time, however, social and political advances in a democracy often depend on people's courage and certitude to stand for their beliefs. Moral conviction tends to prevent the former and promote the latter, and the results of this study suggest that both implications of morally convicted attitudes are deeply rooted in a rapid, reflexive style of thinking. As the American political climate becomes increasingly moralized, therefore, strong visceral responses are more and more likely to characterize political interactions—both for good and for bad.

ACKNOWLEDGMENTS

I would like to thank Brant Nix, Victoria Benson, and Eric Hodges at University of North Carolina's Biobehavioral Lab for their invaluable help with equipment training, lab setup, and study logistics. I am also deeply grateful to Tom Carsey, Tim Ryan, Kristyn Karl, Mike

MacKuen, Jim Stimson, and Andrea Benjamin for the insightful feedback and generous support they provided for this project. Finally, I am thankful to Derek Epp, Eric Garrett, Joshua Jansa, John Lappie, and Douglas Soffel for helping to pilot test this study and to the anonymous reviewers for providing valuable comments on previous versions of this article. This project was generously funded by the Lucas Miller Glass Summer Research Fellowship. Correspondence concerning this article should be addressed to Kristin N. Garrett, Wheaton College, PSIR, 501 College Ave., Wheaton, IL 60187. E-mail: kristin.n.garrett@wheaton.edu

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article at the publisher's web site:

Variable Overview

Table S1. Average Moral Conviction and Physiological Arousal for Each Political Prompt

Results Referenced in Article

Figure S1. Comparing the Effect of Moral Conviction on Physiological Arousal to That of Other Covariates

Additional Analyses

Table S2. Joint F-test Results for Dimensions of Attitude Strength

Table S3. Joint F-test Results for Moral Conviction and Average Emotion

Table S4. Pearson's r Correlations

Additional Model Results