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Who Can Deviate from the Party Line? Political Ideology Moderates Evaluation of Incongruent Policy Positions in Insula and Anterior Cingulate Cortex

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Abstract Political polarization at the elite level is a major concern in many contemporary democracies, which is argued to alienate large swaths of the electorate and prevent meaningful social change from occurring, yet little is known about how individuals respond to political candidates who deviate from the party line and express policy positions incongruent with their party affiliations. This experiment examines the neural underpinnings of such evaluations using functional MRI (fMRI). During fMRI, participants completed an experimental task where they evaluated policy positions attributed to hypothetical political candidates. Each block of trials focused on one candidate (Democrat or Republican), but all participants saw two candidates from each party in a randomized order. On each trial, participants received information about whether the candidate supported or opposed a specific policy issue. These issue positions varied in terms of congruence between issue position and candidate party affiliation. We modeled neural activity as a function of incongruence and whether participants were viewing ingroup or outgroup party candidates. Results suggest that neural activity in brain regions previously implicated in both evaluative processing and work on ideological differences (insula and anterior cingulate cortex) differed as a function of the interaction between incongruence, candidate type (ingroup versus outgroup), and political ideology. More liberal participants showed greater activation to incongruent versus congruent trials in insula and ACC, primarily when viewing ingroup candidates. Implications for the study of democratic representation and linkages between citizens' calls for social change and policy implementation are discussed.

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I could never toe the party line. I'd wear out the carpet crossing the floor.
– Hazel McCallion, former mayor of Mississauga, Ontario.

Introduction

Representation is the crucial link between citizens' calls for social change and actual policy change, and a key element of ensuring representation in any democratic system is the ability of citizens to elect and monitor public officials who align with their views on major political issues so that policies can be implemented that represent the diverse preferences of the public. However, political parties are often pressured to appeal to their base in such a way that elected officials are encouraged to constrain their policy positions and "toe the party line"—i.e., to follow the ideals and policy preferences of their political party (and its more extreme members) rather than their often more moderate constituency. Political parties desire to distinguish themselves from other parties by highlighting these differences, which only increases the likelihood of gridlock (Binder, 2003; Haas, 2016; Mondak & Mitchell, 2008). In a two-party system such as that of the USA, this can lead to unprecedented levels of political polarization and alienation of large swaths of the electorate (see, e.g., Masket, 2009; McCarty, Poole, & Rosenthal, 2006; Sinclair, 2006; Theriault, 2008). Polarization in political elites and a divided government slows down government productivity through political gridlock (Binder, 2003; Edwards III, Barrett, & Peake, 1997), which in turn slows down social change. Thus, somewhat ironically, one of the major obstacles preventing meaningful social change in US politics is the inability of elected officials to compromise with political opponents from across the aisle.

In this paper, we address the question of how citizens actually respond to an elected official who deviates from party-based expectations. In general, trust in government and public satisfaction with the degree of representation that exists in the USA are fairly low (Hibbing & Theiss-Morse, 2002; Pew Research Center, 2015), and an increasingly popular viewpoint is that the USA should make it easier for third-party candidates or political "outsiders" to gain traction in government (Hibbing & Theiss-Morse, 2002; Jones, 2014). However, despite the public's desire for increased representation, we do not fully understand how people respond to politicians who deviate from the party line, which is a prerequisite for diminishing elite polarization and reducing the alienation it yields. How do individuals react when a politician voices opinions that are incongruent with his or her party affiliation? To what degree are incongruent policy positions scrutinized by members of the public?

We used functional magnetic resonance imaging (fMRI) to examine how neural activity in regions of the brain associated with evaluative processing differs when a candidate states policy positions that are either congruent or incongruent with what

would normally be expected given the candidate's party affiliation. Neural activity in regions implicated in social judgment and person perception has been shown to differ as a function of expectancy violations (e.g., Cloutier, Gabrieli, O'Young, & Ambady, 2011), and we sought to extend this work to regions of the brain implicated in attitudes and evaluative processing of information, including the amygdala, insula, and anterior cingulate cortex (ACC; see, e.g., Cunningham, Haas, & Jahn, 2011; Cunningham & Zelazo, 2007; Cunningham, Zelazo, Packer, & Van Bavel, 2007). We examine the degree to which these brain regions were differentially activated for congruent versus incongruent policy statements in order to gauge when individuals were more likely to attend to deviations from party-based expectations.

Importantly, we also test for asymmetries in how people respond to these deviations. First, it is possible that individuals respond differently to incongruence from members of their own party than to incongruence from members of another party, as the attitudes literature suggests individuals are more likely to engage in cognitive elaboration when information is personally relevant (Petty & Cacioppo, 1986) and neuroscience work has suggested that neural processing in emotion-related regions (insula) and regions implicated in cognitive control (anterior cingulate, dorsolateral prefrontal cortex) differ when viewing photographs of ingroup versus outgroup party elites (Kaplan, Freedman, & Iacoboni, 2007). Second, we test for the possibility that incongruence is processed differently between liberals and conservatives. A growing literature has examined psychological differences between individuals endorsing right- or left-of-center beliefs, and mounting evidence suggests liberals and conservatives differ in how they deal with ambiguity (Golec & Federico, 2004; Jost, Glaser, Kruglanski, & Sulloway, 2003), monitor internal conflict (Amodio, Jost, Master, & Yee, 2007; Jost & Amodio, 2012), and manage cognitive dissonance (Nam, Jost, & Van Bavel, 2013). In line with this work, we investigate how neural responses to incongruent policy statements differ between liberals and conservatives.

The results of this study reflect a first step in identifying the mechanisms underlying how individuals react to public officials deviating from expectations. Calls for increased representation and laments about polarization and the alienation of average citizens are commonplace throughout contemporary democracies, yet we do not have a detailed understanding of the social cognitive and neural processes underlying how individuals process and respond to candidates who deviate from party stereotypes. Further, identifying asymmetries in how individuals respond to incongruent policy positions is essential because if people respond to incongruence in ingroup candidates differently than outgroup candidates, or if people from opposite ends of the ideological spectrum process incongruence differently, it suggests the electorate may make deviating from the party line easier for some candidates than for others.

Partisan Cues and Evaluation of Incongruent Information

From the perspective of political psychology, the way that people process information about policy statements in relation to political candidates and groups

can be understood in terms of social identity and partisan stereotypes (Green, Palmquist, & Schickler, 2002; Greene, 1999; Huddy, Mason, & Aarøe, 2015; Rahn, 1993). Stereotypes, including those related to political groups or identities, often serve as a cognitive heuristic that simplifies the political decision-making process by establishing expectations about preferred policy positions based on group membership. Political scientists have demonstrated that voters often use partisan stereotypes and cues as a cognitive heuristic when evaluating political candidates and situations (e.g., Lau & Redlawsk, 2001; Malhotra & Kuo, 2008). Party identification cues can be such a strong heuristic that when politicians vote or support an issue across party lines, political sophisticates behave as though they are misinformed (Dancey & Sheagley, 2013) and the general electorate from the respective party may show greater support for the issue (Cohen, 2003; Nicholson, 2011). Deviation from reliance on stereotypes is likely to occur only in particular circumstances, such as when issues are salient, or for specific types of voters, such as those with more knowledge or information (Arceneaux, 2008).

Social psychological research has shown that stereotyping is largely an automatic cognitive process. Counterstereotypical or incongruent information is often ignored or assimilated to an existing stereotype, but the use of stereotypical information is influenced by motivation (Hilton & von Hippel, 1996). People can and sometimes do think more carefully about stereotype incongruent information or attitudinally incongruent information more generally, but only when it has motivational significance or if they are predisposed to engage in more careful thinking. Contemporary attitude theory and research suggests that evaluative processing more generally is largely automatic, but influenced by context, motivation, and goals (Cunningham et al., 2007; Fazio, 2007). Automatic evaluation involves processing in a number of subcortical regions implicated in emotion and affect, including amygdala and insula, whereas cortical regions such as anterior cingulate, orbitofrontal cortex, and prefrontal cortex may help to signal the need for engaging additional higher-order processing (Cunningham et al., 2011; Cunningham & Zelazo, 2007; Cunningham et al., 2007). This work has established a network of brain regions likely implicated in the evaluation of information—regardless of the type of information encountered. Incongruent information, or events that violate expectations, is met with relatively automatic affective reactions in the amygdala and insula that are translated into higher-order processing via the ACC, orbitofrontal cortex, and prefrontal cortex.

Much of the existing cognitive neuroscience work examining how people respond to stereotypically incongruent information has focused on the domain of person perception, examining how people respond to individual exemplars who deviate from expectations. These tasks have shown that expectancy violations in person perception are associated with activation in regions related to mentalizing, or simulating the minds of others (e.g., medial prefrontal cortex and temporoparietal junction) and more generally, regions associated with conflict detection and cognitive control (anterior cingulate and dorsolateral prefrontal cortex, e.g., Cloutier et al., 2011; Hehman, Ingbretsen, & Freeman, 2014). It is worth noting here that expectancy violations are not the only factor that influences the degree to which people engage in mentalizing, as other work has shown people are more likely to

mentalize in relation to ingroup versus outgroup members (Mitchell, Macrae, & Banaji, 2006). This suggests that people are likely to attend not only to whether or not information is incongruent with expectations, but also other aspects of the situation such as the group membership of the evaluative target.

The aforementioned research can readily be applied to political attitudes. Recent work in political neuroscience has begun to examine processes involved in political evaluation, such as political candidate perception and evaluation. Much of this work has presented participants with names or faces of political candidates and found activation in many of the same brain regions involved in evaluative processing more generally. For example, fMRI studies have shown activation in anterior cingulate cortex (ACC), insula, and dorsolateral prefrontal cortex (dlPFC) when people are evaluating *disliked* or opposition political candidates (Kaplan et al., 2007; Spezio et al., 2008). However, other fMRI work has shown that some of these regions also respond to *favored* candidates (Tusche, Kahnt, Wisniewski, & Haynes, 2013), suggesting that it may be premature to explain these effects purely on the basis of positive versus negative valence or liked versus disliked candidates. Many of these brain regions are believed to serve multiple functions, and there is ongoing debate about what the exact nature of function in these regions might be. For example, the ACC has been implicated in cognitive control, conflict monitoring, and exploring alternative courses of action (e.g., Botvinick, 2007; Carter et al., 1998; Kolling, Behrens, Wittmann, & Rushworth, 2016). Insula responds to motivationally relevant information or salience and may aid in the process of integrating cognitive with emotional information (Gu, Liu, Van Dam, Hof, & Fan, 2013; Uddin, 2015), and there is also some evidence that activation in these regions—insula and ACC—may be linked (Medford & Critchley, 2010).

Therefore, a limitation of the existing work in this area is that we do not necessarily know what activation to candidate faces or names actually represents in terms of underlying cognitive processing or decision making, unless participants are given a specific task to complete during fMRI where the nature of the decision is understood. In the present work, we focus mainly on how people evaluate policy information. We use the context of candidate evaluation, but are less interested in how people are evaluating the candidates per se, and more focused on how they are evaluating policy information associated with those candidates. This allows us to examine the extent to which evaluative processing is impacted by incongruence. While existing work has begun to explore the neural basis of political evaluation, we still have much to learn about the mechanisms underlying this process and how evaluative processing functions in the domain of politics.

Ideological Differences in Political Evaluation

Existing work in political psychology has argued that individuals with right-of-center ideological beliefs have stronger preferences for order and structure and more difficulty processing ambiguity than those with left-of-center ideological beliefs (e.g., Golec & Federico, 2004; Jost et al., 2003, 2007). The theory underlying this work is that conservatives seek to impose structure on the world in order to manage negative emotions, and indeed, conservatism has been correlated with a variety of

survey measures examining this general tendency across cultures (Atieh, Brief, & Vollrath, 1987; Chirumbolo, Areni, & Sensales, 2004; Fay & Frese, 2000; Gillies & Campbell, 1985; Jost et al., 2003; Kemmelmeier, 2007; Leone & Chirumbolo, 2008; Zavala, Golec, Cislak, & Wesolowska, 2010). With regard to brain differences, research has shown conservatives to have greater neural sensitivity to negative emotions (Ahn et al., 2014) and less neural sensitivity to cues for altering habitual response patterns than liberals, suggesting that conservatism is associated with decreased conflict monitoring compared to liberalism (Amodio et al., 2007). These findings have been corroborated by evidence that gray matter volume in the brain regions associated with conflict monitoring (i.e., ACC) are greater in liberals and gray matter volume in the brain regions associated with detecting emotional relevance (i.e., right amygdala) was greater in conservatives (Kanai, Feilden, Firth, & Rees, 2011). Taken together, these findings suggest liberals are more tolerant of ambiguity, but are also more likely to detect conflict and adjust evaluations and behavior accordingly.

When it comes to evaluating political candidates, we expected ideological asymmetries in conflict monitoring to manifest when people responded to candidates expressing policy positions incongruent with their party affiliation. Given that, as explained earlier, party affiliations act largely as social identities and party labels cue people to infer policy positions about candidates, we expected incongruent policy positions to reflect deviations from what is expected given party stereotypes. In general, incongruent policy positions should trigger enhanced processing of political candidates because they should elicit an affective response and activate conflict monitoring systems in the brain. However, given the literature on ideological differences in conflict monitoring, we expected the activation of these systems (i.e., insula, ACC) to be particularly strong for liberals compared to conservatives. Further, work in social psychology suggests people attend to and evaluate objects that are personally relevant more intensely than objects that are less personally relevant (Petty & Cacioppo, 1986), and because of this enhanced processing, we expected ideological asymmetries in evaluation of incongruent policy positions to be particularly relevant when evaluating ingroup candidates (i.e., candidates from the individuals' own party).

Overview of Present Work

In the present work, we used functional MRI (fMRI) to examine the impact of incongruent information on political evaluation. We leveraged instances of issue positions conflicting with hypothetical candidates' party identification as an opportunity to study how people responded to incongruent information in the political domain, and how responses to incongruent information varied across individuals with different ideological belief systems. This investigation has direct implications for understanding how individuals respond to candidates deviating from the party line and thus also holds implications for understanding the psychological factors that constrain political elites' policy positions in an increasingly polarized government. Further, by examining ideological asymmetries in these processes, this study provides a first step in understanding how some

political elites may experience varying degrees of scrutiny or success for deviating from party norms. However, it is important to note that this study is not an investigation of candidate evaluations, person perception, or voting decisions, but rather how individuals deal with expectancy violations and incongruence more broadly within the context of politics.

We focused our inquiry on brain regions previously implicated in both attitudes and evaluative processing more generally (Cunningham et al., 2011; Cunningham & Zelazo, 2007; Cunningham et al., 2007) and evaluation in the political domain (Westen, Blagov, Harenski, Kilts, & Hamann, 2006)—namely the amygdala, insular cortex, and anterior cingulate cortex. Based on prior work in social and cognitive neuroscience (Botvinick, 2007; Carter et al., 1998; Kolling et al., 2016), we expected the insula and ACC to be especially responsive to conflict and incongruence. The insula, specifically, should be involved in helping integrate emotional and affective responses with an evaluative decision, especially when individuals are confronted with an expectancy violation. It is less clear whether we should expect to see differences in the amygdala in a task like this, given that the task is fairly complex and the amygdala is thought to be activated mainly during tasks that involve quick, affective or emotional responses. However, we nonetheless examined activation in the amygdala because some work has suggested the function of the amygdala is to automatically evaluate whether objects have motivational relevance, which we expect to be the case in this task (e.g., Cunningham, Johnson, Gatenby, Gore, & Banaji, 2003; Cunningham, Van Bavel, & Johnsen, 2008).

We measured political ideology in order to examine whether it moderated neural responses to incongruent information for ingroup versus outgroup political candidates. Based on prior literature on psychological differences between liberals and conservatives, we expected ideology to moderate neural activation in the insula and ACC, and possibly amygdala. Specifically, functional activation in left insula has been associated with greater liberalism during behavioral decision-making and emotion-related tasks (Ahn et al., 2014; Schreiber et al., 2013). Other work has suggested there may be both structural and functional differences related to ideology in ACC, such that liberals are more likely to engage in conflict monitoring (which may be reflected in ACC activation; Amodio et al., 2007) and show larger gray matter volume in ACC (Kanai et al., 2011). In addition, existing work has shown that conservatives showed more activation in right amygdala during a decision-making task (Schreiber et al., 2013). Thus, we expected incongruent policy positions to be associated with increased activity in the ACC and insula for liberals and increased activity in the right amygdala for conservatives. However, the existing literature on ideological differences in political neuroscience is still relatively sparse, so we were open to alternate possibilities. Finally, based on work in social psychology on role of personal relevance in cognitive elaboration (Petty & Cacioppo, 1986), we expected these differences to be predominantly relevant for evaluations of statements by ingroup candidates.

Method

Participants

Fifty-eight healthy adults (34 females and 24 males; age range 19–59, $M = 25.4$, $SD = 9.2$) participated in the experiment. Participants were politically diverse, with 32 identifying as liberal and 26 identifying as conservative. Participants were recruited from the University of Nebraska-Lincoln and the surrounding community. All participants were right-handed, had normal or corrected-to-normal vision, and no known history of neurological disorders. Participants were safety screened to ensure eligibility for MRI and provided informed consent in accord with study approval by the institutional review board. They were compensated $30 USD for their participation.

Experimental Design and Stimuli

Participants came to the MRI center and participated in a rapid event-related fMRI experiment where they evaluated the policy positions of hypothetical political candidates during MRI. Prior to the scan, participants were informed about the order of MRI scans and received an overview of the experimental task. Participants were instructed that they would be evaluating issue positions attributed to hypothetical political candidates, but we asked them to think about these candidates as if they were real candidates running for office. They knew they would see a series of policy statements that each candidate either supported or opposed and that they should tell us whether that issue position made them feel *good* or *bad*. We did not define these terms for participants, but told them that responses were subjective and we wanted to know what they thought. They were encouraged to focus on the issue positions and not explicitly instructed to form an impression of the candidate. There was no expectation that they needed to remember each candidate after the block of trials ended (i.e., participants knew they would not be asked follow-up questions about the candidates themselves). They were encouraged to balance speed with accuracy in responding, but to rely on their initial response given the limited response window.

The experiment had a 2 *trial type* (congruent/incongruent) × 2 *block type* (ingroup/outgroup) within-subjects design.[1] The experimental paradigm was designed to manipulate incongruence as a function of the candidates' issue positions and political party affiliation. Experimental stimuli were presented in the scanner using E-Prime 2.0.10 (Psychology Software Tools, 2012). Prior to the start of each block, participants received information about the political candidate (Democrat or Republican) that they would be evaluating for that set of trials. All participants evaluated policy positions attributed to four different candidates (two Democrats and two Republicans) in a randomized order, and all hypothetical

[1] We also varied task uncertainty but that is beyond the scope of the present manuscript and will not be discussed here.

candidates were White males.[2] Both trial order and interstimulus interval (ISI) duration were predetermined using Optseq2 (https://surfer.nmr.mgh.harvard.edu/optseq), a software package designed to help maximize efficiency and ability to accurately model the hemodynamic response in rapid event-related designs (see Burock, Buckner, Woldorff, Rosen, & Dale, 1998; Dale, Greve, & Burock, 1999).

On each trial, participants received information about a specific policy position attributed to the candidate and information about whether the candidate supported or opposed that issue. Next, a policy statement appeared, and participants were asked to evaluate how they (subjectively) felt about the candidate's position on that issue by selecting either good or bad using the response pad while in the scanner (*1 = good, 2 = bad*). Each trial (see Fig. 1, for example) consisted of presentation of a cue (750 ms) followed by a policy statement (4250 ms) and a fixation cross that was on screen for each jittered interstimulus interval (ISI: 2500, 5000, 7500, 10,000, or 12,500 ms). A majority of the issue positions (66.6%) in each block were congruent with the candidate's political identification (as determined by behavioral pilot data), but a smaller subset were incongruent with his identification (33.3%) to allow for examination of both congruent and incongruent issue positions. While this means participants saw fewer incongruent trials relative to congruent trials, this was done to increase external validity of the task, as most mainstream political candidates tend to hold fairly consistent issue positions (e.g., Jennings, 1992).

After the MRI portion of the study, participants completed a post-scan survey where they provided additional ratings of the 96 policy statements they saw while in the scanner. Participants rated how important each issue was to them personally on a 7-point scale ranging from 1 = *not at all important* to 7 = *extremely important* and rated their own support or opposition to each statement on a 7-point scale ranging from 1 = *support completely* to 7 = *oppose completely*.[3] The order of these blocks was counterbalanced so that some participants evaluated *support* first and others started with *importance*. Participants then responded to a series of demographic questions, including a one-item measure of political ideology asking them to place themselves on a continuum from 1 = *very liberal* to 6 = *very conservative*.[4] The mean response on the political ideology item was near the midpoint of the scale ($M = 3.34$, SD = 1.40). This item was mean-centered for analysis.

[2] The candidates themselves were not the primary focus of this experiment, so this choice was made to minimize potential variability in candidate evaluation as a function of gender or race. Six candidate images were chosen from the Chicago Face Database (Ma, Correll, & Wittenbrink, 2015), based on gender, race, and perceived age. Four images were randomly selected for each participant and shown in randomized order.

[3] Participants also completed a number of individual difference measures after scanning, but these are beyond the scope of the current manuscript and will not be discussed in more detail here.

[4] No option for "moderate" was offered in order to ensure we could discriminate between candidates that would be most likely seen as "ingroup" and "outgroup" candidates. Further, partisan "leaners" and even Independents have been shown to largely manifest the same-party-based evaluations as partisan identifiers and tend to show meaningful implicit preferences (Hawkins & Nosek, 2012; Iyengar & Westwood, 2015; Keith et al., 1986; Lundberg & Payne, 2014).

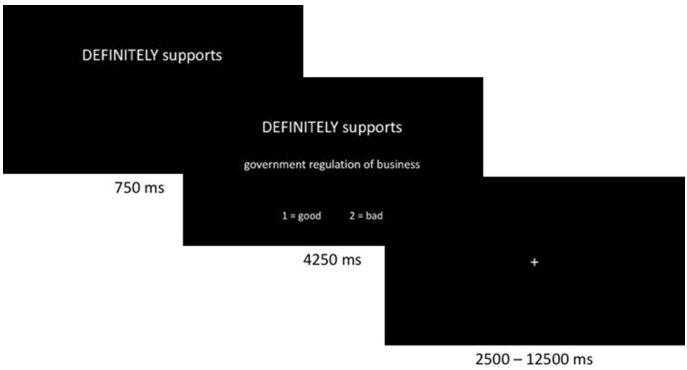

Fig. 1 Example trial from experimental task participants completed during MRI

Policy Statements. We generated a long list of relevant policy statements including social, economic, and foreign policy issues. Policy statements were pilot tested using a separate sample obtained through Amazon's Mechanical Turk ($N = 255$). Participants in the pilot study rated their support or opposition to each of the issues, how important each issue was to them, and whether each issue was likely to be supported more by Democrats or Republicans (all on 7-point scales). Policy statements for this experiment were selected from pilot data based on the degree to which they were clearly Democratic or Republican issues and equated as much as possible for degree of support or opposition and issue importance. Statements were separated into four lists to be used for randomization in E-Prime (two lists of Democratic positions, two Republican). Participants saw each statement twice over the course of the experiment, but issues were not seen twice for a single candidate (see Appendix for full list of stimuli).

MRI Data Acquisition

MRI data were acquired using a Siemens Skyra 3.0 Tesla MRI with a 32-channel head coil. Prior to functional imaging, a high-resolution T1-weighted 3D anatomical image (MPRAGE; *field of view (FoV) read* = 256 mm, *slice thickness* = 1.0 × 1.0 × 1.0 mm, r*epetition time (TR)* = 2400 ms, *echo time (TE)* = 3.37 ms, *inversion time (TI)* = 991 ms, *prescan normalize on*, *PAT mode GRAPPA*) was collected for spatial normalization. Functional MRI data were acquired with acquisition parallel to the AC-PC line to maximize whole-brain coverage (42 slices, *FoV read* = 220 mm, *slice thickness* = 3.0 × 3.0 × 3.0 mm, *TR* = 2500 ms, *TE* = 30 ms, *flip angle* = 80°, *prescan normalize off*). Participants completed four blocks of functional scanning, lasting approximately 8.5 min each. The first five volumes of each run were discarded to avoid variability due to pre-steady-state functional data.

MRI Data Preprocessing and Analysis

MRI data were preprocessed using fMRI Expert Analysis Tool (FEAT) in FMRIB Software Library (FSL; Jenkinson, Beckmann, Behrens, Woolrich, & Smith, 2012; Smith et al., 2004) on MacOS. The high-resolution 3D anatomical image (MPRAGE) was skull stripped using FSL's Brain Extraction Function (BET; Smith, 2002). Data from functional runs were subjected to normalization, registration to both MPRAGE and standard space (MNI152), spatial smoothing at FWHM of 5 mm, slice timing correction (to correct for interleaved data acquisition), and motion correction using MCFLIRT (Jenkinson, Bannister, Brady, & Smith, 2002).

Analyses were conducted using the general linear model (GLM) as implemented in FSL. Time-series data were modeled at the first level (the trial level) using FMRIB's Improved Linear Model (FILM), and then, higher-level analysis (across sessions first, and then across subjects) was carried out using FMRIB's Local Analysis of Mixed Effects (FLAME; see Smith et al., 2004). First, the blood oxygen level-dependent (BOLD) signal was modeled at the trial level for each run as a function of *trial type* (congruent/incongruent). Data from each run were then averaged across subjects using a fixed effects model. At the subject level, we also modeled the effect of *block type*—whether the political candidate in each block shared the participant's ideological identification (ingroup candidate) or not (outgroup candidate). This allowed us to examine whether incongruence effects differ as a function of the target of evaluation (ingroup vs. outgroup candidate), in addition to the effects of policy information. The subject-level analyses were then combined into group-level region of interest (ROI) analyses using FSL FLAME1. ROI analyses on left amygdala, right amygdala, bilateral insula, and anterior cingulate cortex were masked prior to analysis (using anatomical masks from the Harvard–Oxford Cortical/Subcortical Atlases provided with FSL) and cluster corrected to correct for multiple comparisons. In FSL, a Z-statistic > 2.0 was used to define contiguous clusters, and then, cluster probabilities were compared to the (corrected) cluster significance threshold of $p < .05$ using Gaussian random field theory (Worsley, 2001).

In order to plot the BOLD activation related to political ideology, cluster masks were created using *fslmaths* for each significant cluster of activation, and mean activation to trial type as a function of block type (i.e., incongruent outgroup, incongruent ingroup, congruent outgroup, congruent ingroup) was extracted using these cluster masks in *FEATQuery*.

Results

Behavioral Task Data

First, we examined the data from the behavioral task participants completed while in the scanner. A repeated-measures ANOVA was used to examine response latency as a function of *trial type* (congruent/incongruent), *evaluative response* (good/bad),

and *block type* (ingroup/outgroup candidate). Overall, participants were significantly faster to respond on congruent ($M = 2553$ ms, SD = 741 ms) versus incongruent trials ($M = 2631$ ms, SD = 726 ms; $F(1,51) = 33.14$, $p < .001$). Responses were also significantly faster when participants selected the *good* ($M = 2546$ ms, SD = 742) versus *bad* ($M = 2613$ ms, SD = 730 ms) response option ($F(1,52) = 11.96$, $p = .001$); however, it is worth noting here that participants always selected the *good* option with their index finger. There was no overall main effect of response latency for *block type* (ingroup/outgroup candidate). Looking at interaction effects among *trial type* (congruent/incongruent), *response* (good/bad), and *block type* (ingroup/outgroup) revealed a significant interaction of *response* with *block type* ($F(1,56) = 9.19$, $p = .004$) and a significant three-way interaction with *trial type* ($F(1,57) = 22.09$, $p < .001$). Overall, participants were faster to respond *good* ($M = 2437$, SD = 754) than *bad* ($M = 2712$, SD = 695) on congruent ingroup trials and on incongruent outgroup trials (*good*: $M = 2570$, SD = 727; *bad*: $M = 2683$, SD = 768). Participants were faster to respond *bad* than *good* for both incongruent ingroup trials (*bad*: $M = 2609$, SD = 707; *good*: $M = 2715$, SD = 700) and congruent outgroup trials (*bad*: $M = 2535$, SD = 740; *good*: $M = 2626$, SD = 727), although these differences were smaller. These results show that as expected, individuals were faster to respond *good* when their ingroup stated a position consistent with their party affiliation or when the outgroup stated a position incongruent with their party affiliation, and vice versa with regard to responding *bad*.

Next, we ran a similar repeated-measures ANOVA model adding mean-centered *political ideology* as a between-subjects factor, with *trial type*, *evaluative response*, and *block type* all modeled as within-subjects factors. This model again showed a significant three-way interaction of *trial type*, *response*, and *block type*, but this was qualified by a four-way interaction including *political ideology* ($F(1,55) = 12.03$, $p = .001$). This interaction suggests that political ideology moderated the effects of *trial type*, *response*, and *block type* on response latency. In order to interpret this interaction effect, we dichotomized the ideology variable (*1–3 = liberal, 4–6 = conservative*) and re-ran the model described in the above paragraph separately for both liberals and conservatives.

For liberal participants, there were significant main effects of *trial type* ($F(1,25) = 29.04$, $p < .001$) and *evaluative response* ($F(1,27) = 8.55$, $p = .007$) on response latency. Liberals also showed a significant interaction of *block type* with *response* ($F(1,30) = 12.86$, $p = .001$) and a significant three-way interaction with *trial type* ($F(1,31) = 34.27$, $p < .001$). All other effects for liberals were not statistically significant. For conservative participants, there were significant main effects of *trial type* ($F(1,22) = 6.47$, $p = .020$) and *response* ($F(1,20) = 5.28$, $p = .033$). None of the interaction effects were statistically significant for conservatives. Figure 2 shows mean response latency as a function of political ideology. Overall, the biggest difference is that response latency for liberal participants varied more as a function of trial type than it did for conservative participants. Liberal participants, for example, were quicker to respond *good* ($M = 2398$, SD = 767) versus *bad* ($M = 2841$, SD = 711) on congruent ingroup trials. Conservative participants show the same pattern (good: $M = 2509$,

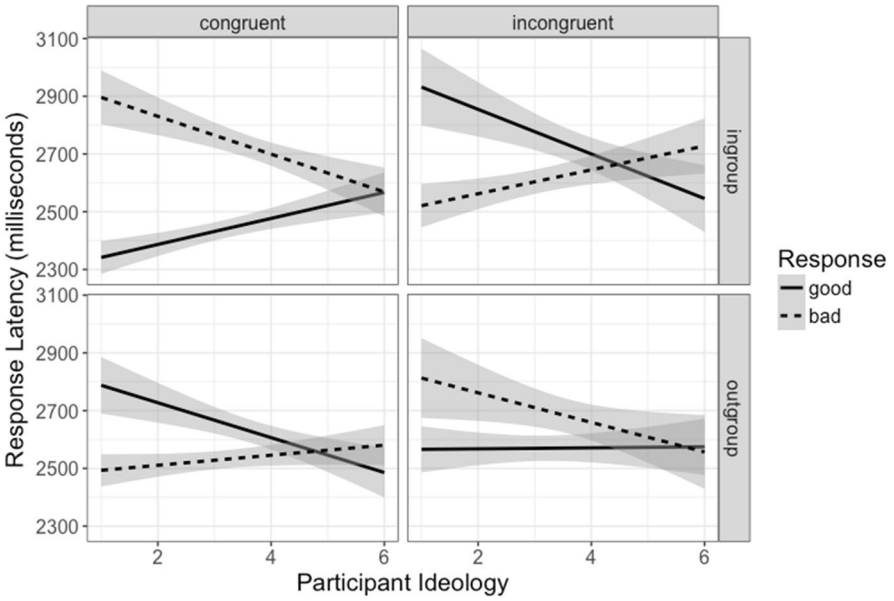

Fig. 2 Response latency (milliseconds) as a function of *trial type* (congruent/incongruent), *evaluative response* (good/bad), *block type* (ingroup/outgroup), and *political ideology* (1 = liberal, 6 = conservative)

SD = 728; bad: $M = 2637$, SD = 678) for congruent ingroup trials, but not to the same degree. Overall, response latency for liberals varied more as a function of *trial type*, *response*, and *block type*. In other words, conservatives were less likely to exhibit qualifications in the timing of their responses based on congruence and party affiliation of the candidate.

Finally, we examined descriptive data for the number of trials on which participants responded *good* versus *bad* as a function of trial type, block type, and political ideology (see Fig. 3). Consistent with the variation in response latency, we can see that liberals appeared to be modifying their responses more in relation to trial type and block type. For example, they were more likely to judge consistent ingroup trials as *good* versus *bad*, whereas conservatives showed more of a 50–50 split.

fMRI Data

Blood oxygen level-dependent (BOLD) signal was modeled as a function of *trial type* (congruent/incongruent) and *block type* (ingroup/outgroup candidate). ROI analyses revealed significant clusters of activation in anterior cingulate, insula, and amygdala that will be detailed below (see Table 1 for full list of significant clusters).

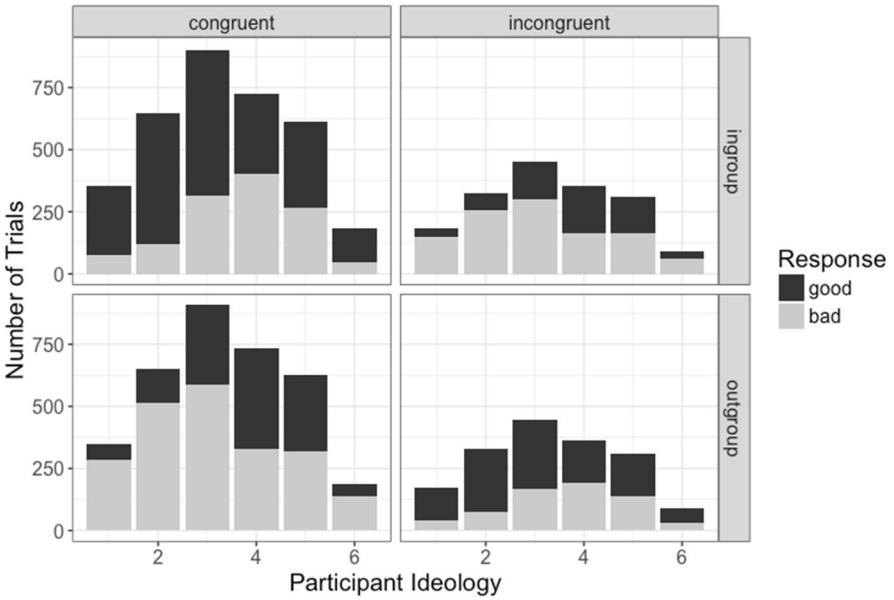

Fig. 3 *Evaluative response* (good/bad) as a function of *trial type* (congruent/incongruent), *block type* (ingroup/outgroup), and *political ideology* (1 = liberal, 6 = conservative)

Main Effect of Incongruent > Congruent Trials

First, we examined the main effect of incongruence by examining directional contrasts designed to compare differences in BOLD activation between incongruent and congruent trials. Region of interest analyses revealed significant clusters of activation in anterior cingulate, insula, and amygdala for *incongruent* > *congruent* trials (see Fig. 4). Consistent with the view that ACC is involved in processing incongruent information, we saw a large cluster of activation in dorsal ACC and paracingulate in response to incongruent > congruent trials (see Fig. 4a; 2354 voxels, Z-max = 4.51, $p < .001$; MNI Coordinates: $X = -4$, $Y = -14$, $Z = 50$). The same contrast (incongruent > congruent) also showed bilateral activation in insula and lateral orbitofrontal cortex (OFC; see Fig. 4b), with a larger cluster of voxels on the right (441 voxels, Z-max = 3.84, $p = .005$; MNI coordinates: $X = 32$, $Y = 28$, $Z = -2$) than the left (252 voxels, Z-max = 3.33, $p = .042$; MNI coordinates: $X = -26$, $Y = 22$, $Z = -8$). Finally, there was a significant cluster in right amygdala active for the incongruent > congruent contrast (see Fig. 4c; 213 voxels, Z-max = 3.47, $p = .018$; MNI coordinates: $X = 32$, $Y = -2$, $Z = -28$). No significant activation was observed in left amygdala.

We also examined the reverse contrast to see whether any of these ROIs showed greater activation to congruent versus incongruent trials. No significant clusters of activation were shown. We modeled whether neural processing of incongruence differed when participants were evaluating ingroup versus outgroup candidates and again, there were no overall main effects of block type emerged in these ROIs.

Table 1 Significant clusters of BOLD activation in ROIs for main effects and interactions of trial type (congruent/incongruent), block type (ingroup/outgroup), and political ideology. *X, Y, Z* coordinates are in MNI152 space

Contrast	Anatomical label(s)	Side	Cluster size	*p* value	Peak activation (*Z* score)	*X*	*Y*	*Z*
Incongruent > congruent	Anterior cingulate gyrus; paracingulate gyrus	–	2354	< .001	4.51	− 4	− 14	50
Incongruent > congruent	Insular cortex; lateral orbitofrontal cortex	Right	441	.005	3.84	32	28	− 2
Incongruent > congruent	Insular cortex; lateral orbitofrontal cortex	Left	252	.042	3.33	− 26	22	− 8
Incongruent > congruent	Amygdala	Right	213	.018	3.47	32	− 2	− 28
Trial type × block type × political ideology	Anterior cingulate gyrus; paracingulate gyrus	–	1413	.001	3.76	10	46	12
Trial type × block type × political ideology	Insular cortex; lateral orbitofrontal cortex	Left	428	.009	3.49	− 44	22	− 6

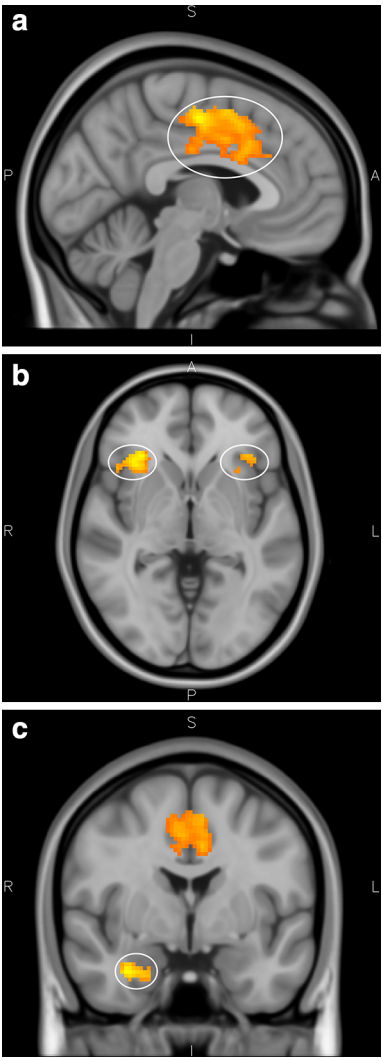

Fig. 4 BOLD activation in ACC, bilateral insula, and right amygdala in response to *incongruent* > *congruent* trials. Images were created by overlaying the thresholded *Z*-statistic image on a standard space template (MNI152). Images are centered on the peak voxel for each cluster from the ROI analyses in: **a** anterior cingulate, **b** insula, **c** right amygdala

Moderation by Political Ideology

Next, we added self-reported political ideology (mean centered) to the group-level analysis in FSL as a continuous covariate to examine whether ideology moderated responses to incongruent versus congruent trials, and whether that response differed for ingroup versus outgroup candidates. Ideology did not have a significant influence on overall responses to incongruent versus congruent trials, but we did observe significant clusters in ACC and insula for the *ingroup* > *outgroup* contrast, suggesting that ideology had an impact on the degree to which these ROIs were responding to incongruent versus congruent issue positions from ingroup versus

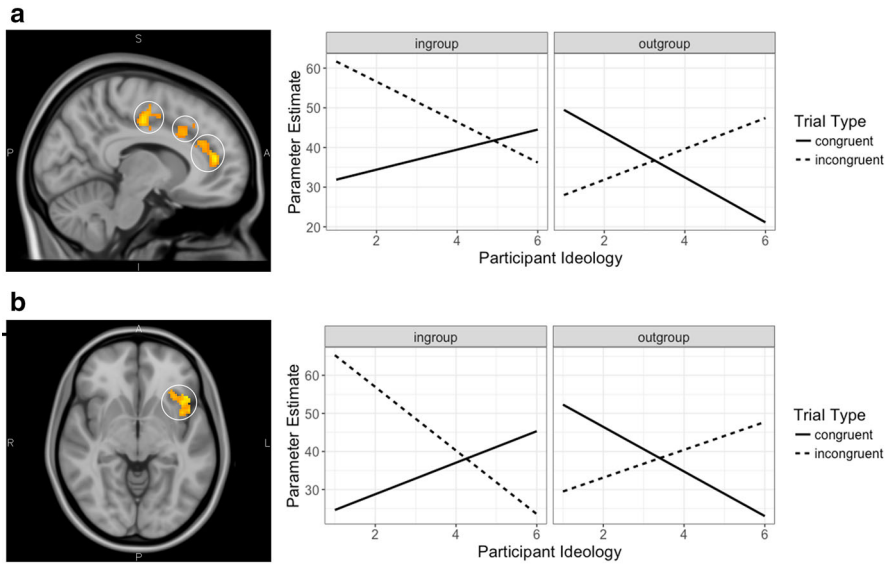

Fig. 5 BOLD activation in response to the interaction of *trial type* (incongruent > congruent), *block type* (ingroup > outgroup), and *political ideology* (liberal > conservative) in **a** anterior cingulate cortex and **b** left insula. Images were created by overlaying the thresholded *Z*-statistic image on a standard space template (MNI152). Plots represent mean parameter estimates by condition extracted from functional clusters

outgroup candidates (see Fig. 5). We did not find any significant clusters of activation in relation to political ideology in left or right amygdala.

There was a significant cluster of activation for the interaction of *trial type* (incongruent > congruent), *block type* (ingroup > outgroup), and *political ideology* (liberal > conservative) in the ACC (see Fig. 5a; 1413 voxels, Z-max = 3.76, $p < .001$; MNI coordinates: $X = 10$, $Y = 46$, $Z = 12$). As shown in the scatterplot in Fig. 5a, ACC activation to incongruence from ingroup versus outgroup candidates showed a negative relationship with political ideology. In other words, more liberal participants showed greater activation in ACC to incongruent versus congruent trials for ingroup (Democratic) candidates, whereas more conservative participants showed greater ACC activation to incongruent versus congruent trials for outgroup (Democratic) candidates. This is consistent with the behavioral data described above, where we observed liberal participants showed greater variability in both response latency and evaluative response for ingroup candidates—consistent with the view that they were more responsive to incongruence on those trials and perhaps more likely to engage in cognitive elaboration for incongruent trials, slowing their response time.

The same pattern emerged in a region of left insula (see Fig. 5b; 428 voxels, Z-max = 3.49, $p = .009$; MNI coordinates: $X = -44$, $Y = 22$, $Z = -6$). More liberal participants showed greater activation in left insula in response to incongruent versus congruent trials for ingroup candidates, whereas more conservative

participants showed greater activation in left insula in response to incongruent versus congruent trials for outgroup candidates.

Discussion

In sum, this experiment provides some initial evidence that neural processing of political issue positions differs as a function of both incongruence and group status, and these effects vary across political ideology. We observed neural activation in anterior cingulate cortex (ACC), insula, and amygdala in relation to incongruent versus congruent trials. Activation in both ACC and insula was moderated by group status (whether participants were evaluating an ingroup versus outgroup political candidate) and participants' political ideology. Liberal participants were more likely to show greater activation in ACC and insula in response to incongruent versus congruent trials, namely when political candidates were ingroup members. Liberal participants were also more likely than conservative participants to base their evaluative decisions on whether or not information was incongruent, and showed more evidence for differentiation in terms of response latency. Relative to more conservative participants, liberal participants were more likely to rate congruent ingroup trials as good (vs. bad) and incongruent ingroup trials as bad (vs. good), and they were slower to respond when deviating from this response pattern.

There is an extant literature in political science on how individuals process political information and political candidates, yet an understanding of the psychological mechanisms by which people make political evaluations is far from complete, and an understanding of the neural mechanisms underlying political evaluations is in its infancy. The primary implication of the findings presented here is that people may be more likely to attend to incongruent issue positions for same-party candidates, but that liberals are more likely to do this relative to conservatives. This is consistent with prior literature arguing that liberals are more likely to detect and process conflict relative to conservatives (Amodio et al., 2007), as well as prior fMRI work that has shown differences in neural processing between liberals and conservatives in these regions during emotion-related or decision-making tasks (e.g., Ahn et al., 2014; Schreiber et al., 2013). It is also consistent with prior work showing that people tend to engage in additional processing in regions such as medial prefrontal cortex for incongruent social targets (Cloutier et al., 2011; Hehman et al., 2014), but shows that this can be extended to regions involved in evaluative processing and conflict detection more generally (i.e., insula, ACC) and that processing is influenced by both political ideology and by group membership in the political domain.

One limitation of the present work is that we relied on hypothetical political candidates to present information to participants. While this allowed for greater experimental control, it may limit the extent to which the results generalize to evaluation of real-life political figures, given that real life is often much more complicated. There were no personally meaningful outcomes associated with the

task participants completed in this study, so it is possible that our liberal participants were more motivated to engage processing incongruence in the task, but perhaps conservative participants would be more likely to do so under other conditions. Future work might explore the moderating (or mediating) role of other variables that may impact the degree to which people engage in cognitive elaboration about incongruent political information, such as political knowledge or the Need for Cognition (Cacioppo & Petty, 1982; Cacioppo, Petty, Feinstein, & Jarvis, 1996).

The implications of these findings for democratic representation are substantial. Government has become increasingly polarized for a number of reasons, including institutional design pressures and pressures for parties to "toe the party line" (i.e., constrain their policy positions to those that fit strictly within the party platform) in order to gain support among their base (Dalton, 2008; Masket, 2009; Sinclair, 2006; Theriault, 2008). Citizens have often lamented such polarization as alienating broad swaths of the more politically moderate electorate, but as this study suggests, how individuals process elites' congruent versus incongruent policy positions may also provide a constraint on the ability of politicians to stray from the party line. The results of this study suggest that when individuals evaluate the policy positions of their party's candidates, deviations from party stereotypes are likely to receive additional processing and be labeled as "bad" compared to policy positions that fit party stereotypes. These findings may be concerning to those who see political polarization as a problem as well as to those who desire meaningful social change, as they demonstrate the psychological processes that help to hinder the likelihood of political compromise, which is necessary for translating *desired* policy into *implemented* policy given the divided nature of government in the USA.

Further, the observed ideological asymmetries in evaluative processing of incongruent policy positions suggest the electorate may be more likely to scrutinize incongruence coming from Democratic candidates and politicians compared to Republicans. Activation in ACC and insula does not, however, necessarily indicate punishment of incongruent policy positions among Democrats. For example, it is possible that activity in these brain regions would also be observed for attempts to reconcile incongruence with party loyalties or engage in motivated reasoning. However, the behavioral results regarding evaluative decisions and response latency suggest liberals are more likely to see incongruence among Democrats as negative. This does not mean there are not situations under which Republican elites are scrutinized for holding incongruent issue positions, but this may be the exception rather than the rule. The ideological asymmetries in our results have some interesting implications. In terms of resistance to compromise, it may be Democrats rather than Republicans who face the greatest scrutiny by constituents for deviating from party-based expectations. If less scrutiny is applied to Republicans for policy deviations, it may indicate that specific liberal causes and policies have *some* electoral viability among Republican candidates. In other words, Republican candidates and representatives may be allowed to adopt liberal stances on some subset of issues without facing scrutiny from their Republican constituents. This is

speculative, however, and may be dependent on the extent to which these policy deviations are highlighted for voters by third parties such as the media or interest groups.

This implication may seem odd given other empirical findings that suggest, for example, that political conservatives are less open-minded (Mondak, 2010) and less tolerant of ambiguity (Jost et al., 2003, 2007) relative to liberals, and that elite polarization over the past few decades has been driven predominantly by shifts among Republican elites toward increasingly conservative policy positions (McCarty et al., 2006). There could be multiple explanations for this apparent discrepancy. For example, it may be the case that whereas liberals respond more to ideological inconsistency within Democratic candidates and representatives, conservatives respond more simply to group dynamics such as party affiliation and loyalty (i.e., whether the candidate or representative is viewed as a dedicated member of their ingroup). Alternatively, some work points to increasing fractionalization among Republican elites and members of the public—that is, the development of distinct clusters and coalitions within the Republican Party, each with particular sets of issues on which they are extreme (see Hare & Poole, 2014). Contemporary political disagreement among Republican elites regarding health insurance, social issues, and foreign policy supports this proposition. If this is true, it could suggest that the Republican platform is significantly fractured to the degree that conservative members of the public have a difficult time identifying policy positions that are incongruent. In other words, the ideological differences we observed here could be context-dependent. Future research should continue to examine ideological asymmetries in responses to incongruent policy positions and the extent to which these differences may shift over time.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Appendix

Policy Statements

Democratic Statements

Banning the death penalty
Requiring guns be locked in a safe
Government insurance covering all medical costs
Legalization of medical marijuana
Teaching evolution
A path to US citizenship for illegal immigrants
Legalizing same-sex marriage
Sex education in schools
Requiring body cameras on police officers
Harsher punishment for police use of excessive force
Allowing cyclists to use public streets
Same-sex civil unions
Waiting periods for gun purchase
Government regulation of business
Mandatory recycling
Expanding Medicaid
Federal government action to reduce unemployment
Automatic citizenship for immigrants
Restricting the death penalty
A ban on semiautomatic weapons
Maintaining the legal right to abortion
Raising the federal minimum wage
Federal government action on global warming
Diplomatic solution with ISIS in Iraq
Government benefits for low-income families
Economic incentives for businesses reducing pollution
Requiring background checks to buy guns
Requiring United Nations approval for US military action
USA aid to Africa to help fight Ebola
Increased racial diversity in police departments
Decreasing defense spending
Granting amnesty to some immigrants
Lighter prison sentences for victimless crimes
A ban on religious symbols in schools
The right to have an abortion
Physician-assisted suicide
Legalizing marijuana
Universal health care

Limitations on gun ownership
Government regulation of pollution
Allowing gay people to adopt
Legalizing prostitution
Higher taxes for the top 1%
Withdrawing troops from Iraq and Afghanistan
Government funding for stem-cell research
A ban on school prayer
Euthanasia for terminally ill patients
Decreasing the size of the army

Republican Statements

Sending troops to fight ISIS
Invading Iran
A ban on travel from West Africa to prevent spreading Ebola
Punishing women who drink or use drugs during pregnancy
The war on drugs
Fracking (injecting liquid into rocks to extract oil and gas)
The use of military attack drones
Decreasing government services
The death penalty
Capital punishment
The right of citizens to own guns
Allowing illegal immigrants to work only low paying jobs
Mandatory military service in the USA
Outlawing abortion
Eliminating Medicare
Allowing abortion only in cases of rape or incest
Allowing high school students to have guns
A ban on gay couples from adopting children
Requiring parental consent for teen abortions
Racial profiling under some circumstances
Loosening restrictions on gun ownership
Sending illegal immigrants to work camps
Privatization of health insurance
Racial profiling of African Americans
School prayer
A ban on sex and violence from television
Protecting all gun ownership
Posting the 10 Commandments in every classroom
Privatization of social security

Decreased regulation of business
Government access to private email to fight terrorism
Deportation of unaccompanied minors
Laws requiring voter identification
Restrictions on immigration
A ban on affirmative action
A ban on same-sex marriage
Time limits on welfare benefits
Killing anyone who joins ISIS
Intervening in the Israel–Palestine conflict
Dismantling the welfare program
Deportation of all illegal immigrants
Expanding the use of the death penalty
Increasing defense spending
A ban on environmental regulations
Establishing English as the official language
Legalizing carrying concealed weapons
Suspending civil liberties to fight terrorism
Abstinence-only sex education

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