Applying the Flanker Task to Political Psychology:
A Research Note

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One of the two stated objectives of the new "Research Note" section of Political Psychology *is to present short reports that highlight novel methodological approaches. Toward that end, we call readers' attention to the "flanker task," a research protocol widely employed in the study of the cognitive processes involved with detection, recognition, and distraction. The flanker task has increasingly been modified to study social traits, and we believe it has untapped value in the area of political psychology. Here we describe the flanker task—discussing its potential for political psychology—and illustrate this potential by presenting results from a study correlating political ideology to flanker effects.*

KEY WORDS: attention, flanker task, liberals conservatives, emotions

Imagine you were given the assignment of identifying some feature of a still image appearing in the center of a computer screen—a letter, a number, or the direction an arrow is pointing. Now imagine conducting this task when additional letters, numbers, or arrows are placed on each side of the central, target image. These "flanking" images are sometimes congruent with that target image

(e.g., flanking arrows and the target arrow may point in the same direction) or the flanking images may be incongruent (e.g., flanking arrows point in the opposite direction from the target arrow). If you are like most people, you will be significantly quicker to identify the target trait when the flanking images are congruent compared to when they are incongruent.

The task just described is known as the Eriksen Flanker Task (Eriksen & Eriksen, 1974) or often just as the Flanker Task, and the difference in response times between congruent and incongruent is known as the flanker effect. Since its introduction, the flanker task has been widely used by cognitive psychologists and others who have found flanker effects a valuable platform for studying attention, detection, distraction, executive control, and other aspects of cognition. This ability to measure cognitive tendencies has made the flanker task an invaluable tool to study various aspects of cognitive impairment due, for example, to the use of drugs, such as alcohol and antihistamines (Tiplady, Degia, & Dixon, 2005) or to neurological disorders such as Parkinson's disease and schizophrenia (Jones, Helmsley, & Gray, 1991; Wylie et al., 2009). The flanker paradigm has also been adapted to study a variety of other phenomena linked to attentional biases. For example, relapse-related attention biases in alcohol abusers have been studied by comparing the distracting effects of alcohol paraphernalia to neutral objects (Cox, Blount, & Rozak, 2000). Moreover, the flanker task is noteworthy in that it affords the opportunity to examine two separate performance measures if desired—response time (RT) and accuracy—as an inability to inhibit distracting stimuli in incongruent displays lead to both slower RTs and greater susceptibility to errors relative to congruent displays.

Because of its broadly demonstrated ability to measure individual-level variation in cognitive patterns through flanker effects, especially attentional focus and executive control, scholars are increasingly recognizing that the flanker paradigm is an excellent platform to investigate how such cognitive patterns might be socially relevant. There has been particular interest in patterns of attentional bias and distraction inhibition when emotional valence is attached to the target and flanking images. For example, scholars have used facial images in flanker tasks to explore the particular emotional expressions or taboo-related content that captures attention (Fenske & Eastwood, 2003: Grose-Fifer, Hoover, Rodrigues, & Zottoli, 2009; Matthewson, Arnell, & Mansfield, 2008; for more on facial recognition, see Spezio, Loesch, Gosselin, Mattes, & Alvarez, 2012). Such studies are useful in explaining variation in neural disorders like autism that impact the ability to recognize, attend, and respond appropriately to social cues (Dichter, Felder, & Bodfish, 2009; Dichter & Belger, 2007).

Despite its increasing use as a means to investigate socially relevant cognitive patterns, the flanker task does not seem to have come to the attention of researchers in the field of political psychology. This is unfortunate as scholars of political psychology are generally interested in how cognitive differences might systematically discriminate political attitudes and behavior (Dodd, Hibbing, & Smith, 2011; Vigil, 2010), and they are intensely interested in the role affect plays in determining political temperament (Frijda, Kuipers, & Schure, 1989; Marcus, Neuman, & McKuen, 2000; Brader, 2006; Valentino et al., 2011). Such studies repeatedly show that affect and individual-level cognitive patterns are important influences on political orientations. As the flanker task is well-suited to examine exactly those topics of interest, we believe it has much to offer students of political psychology.

For example, political research often examines the influence of directed attention, and flanker paradigms are well suited to analyze what political symbols, faces, or other politically relevant images capture or distract attention. This research attention, research has obvious relevance for those seeking to better understand the effectiveness or impact of certain types of political communication (e.g., images used in television campaign advertising or even symbols on yard signs or bumper stickers). Given that flanker tasks tap into executive control processes which are critical for cognitive inhibition, comprehension, and updating, these paradigms could also be readily adapted to study

whether attentional focus for political images is increased or attenuated by certain types of distractors (flankers) such as political symbols, messages, or emotionally arousing stimuli. Flanker designs could also be used to study if those more actively involved in politics are cognitively distinct in their ability to maintain attentional focus on political images in the presence of such distractors. More generally, the flanker paradigm can be used to assess whether differing cognitive patterns in response to a wide range of stimuli correlate with political attitudes or behaviors. The potential questions of relevance to students of political psychology that the flanker task can be employed to answer are limited only by the imagination of researchers.

Variation in Attention to Particular Emotions

To provide a concrete illustration of the manner in which the flanker task could be useful to researchers in political psychology, we describe a project of our own examining differential flanker effects across the ideological continuum. Growing evidence indicates that liberals and conservatives differ not just in their political preferences but also in their core dispositional traits, including personality, values, attitudes toward authority, moral foundations, physiology, and even anatomy and genetics (Altemeyer, 1996; Amodio, Jost, Master, & Lee, 2007; Graham, Haidt, & Nosek, 2009; Hatemi et al., 2011; Kanai, Feilden, Firth, & Rees, 2011; Mondak, Hibbing, Canache, Seligson, & Anderson, 2010; Oxley et al., 2008; Schwartz, Caprara, & Vecchione, 2010; Settle, Dawes, Christakis, & Fowler, 2010).

Though an impressive list, the primary focus of the literature just cited is on traits that participants ascribe to themselves (survey self-reports) or biological traits. Relatively few studies address the cognitive correlates of political orientations: how people think (not what they think they think) and what they pay attention to. Identifying those sorts of cognitive and attentional patterns is critical to developing a better understanding of what distinguishes differing political orientations. This is because attention clearly plays a central role in regulating emotion (Gross & Thompson, 2007), and emotion is just as clearly an influential basis of political attitudes and behaviors (Frijda, Kuipers, & Schure, 1989; Marcus, 2002). Indeed, a considerable theoretical and empirical research literature suggests that conservatives and liberals differentially respond to emotionally valenced stimuli, especially faces (Calvo & Esteves, 2005; Dodd et al., 2012; Tomkins, 1963; Vigil, 2010). What is generally lacking in these studies are direct tests of whether the well-established affective biases of liberals and conservatives translate into attentional biases, i.e., whether liberals and conservatives selectively pay more or less attention to particular stimuli in their environments. Testing this hypothesis and investigating the dimensions that might elicit such attentional biases is important given that social information comes in rich arrays, with multiple stimuli varying in congruity and affect that demand real-time processing. For example, from a diverse range of stimuli some people may allocate greater attention to—or have attention captured by—angry faces; for others, happy faces may primarily draw attention. Given the existing literature, it seems reasonable to hypothesize that such variations are related to political orientations.

If we focus on two core emotions—happiness and anger—the flanker task provides an ideal protocol for investigating exactly these sorts of possibilities. Specifically, we hypothesize that when the target stimulus is an angry face, people holding right-of-center political beliefs will register more muted flanker effects. The basis for this hypothesis is the assumption that conservatives devote more cognitive resources—in this case, attention—to potentially threatening stimuli in their environment (angry faces) and previous research showing that, compared to liberals, conservatives tend to be more physiologically responsive to threatening images and to fixate on them more quickly (Dodd et al., 2012). Thus, when the target is angry, a cognitive pattern characterized by attentional bias to potential threats should lead to a narrowing of attention toward the target which in turn will make the distractors less salient and, as such, less likely to interfere. Still, if liberals are characterized by

cognitive patterns that lead to attentional bias toward positively valenced stimuli, we would expect them to display the opposite pattern from conservatives (muted flanker effects when the target is happy). The key point is that there are numerous demonstrations that emotional stimuli can capture and/or modify attention and that these effects are sensitive to individual differences (Frischen, Eastwood, & Smilek, 2008). The flanker paradigm can be easily adapted to test for the possibility that liberals and conservatives allocate attention differently.

Research Design

In order to test whether individuals holding conservative/liberal policy preferences are more attentive to angry/happy faces, we utilized faces displaying angry or happy expressions, presenting either as a target image or as flanking images in the context of the flanker paradigm. The facial images were drawn from the NimStim Facial Stimulus Set, a database created specifically to provide images of facial expressions that untrained research participants would readily recognize (Tottenham et al., 2009). We selected 12 images of angry and happy faces from this database and used these as a pool for the images presented in a flanker task. Prior to completing the flanker task, we asked our subjects to rank all 12 images on a scale of 1 (disliked the most) to 8 (liked the most). The two happy images with the highest scores on this scale and the two angry images with the lowest scores were used as the basis for the flanker task for each subject (this means subjects viewed different sets of happy and angry faces).[1]

For the flanker task itself, subjects were presented with three faces on a computer screen—a centrally located target image and two identical flankers, one on either side of the target image. All images were identical in size (113×133 pixels) and presented on a white background. The task was administered with E-prime 1.2, on a 20-inch monitor with participants approximately 40 cm from the computer screen. The flanking stimuli displayed either the same emotion as the target (congruent) or a different emotion (incongruent). Participants were verbally instructed to focus on the center image, to ignore the images on either side of that image, and to indicate whether they liked the central image by responding as quickly as possible by pressing the "z" key if they disliked the target or the "/" if they liked the target. As subjects had already rated these images as strongly likeable/unlikeable, making such judgments was assumed to be easy and straightforward (as a consequence, the present focus is on RT rather than accuracy though the flanker paradigm can easily be adapted to increase task difficulty and, in turn, allow for an examination of both RT and errors on a given trial). After pressing the "z" or "/" key, the next stimulus appeared and the process repeated. Each subject responded to four stimuli—an incongruent-angry target, a congruent-angry target, an incongruent-happy target, and a congruent-happy target. Figure 1 provides an example of how the four images might be presented to a typical subject (the four images, of course, presented sequentially and separately). Our key measure taken from the flanker task is RTs, defined as time in milliseconds between stimulus exposure and hitting the "z" or "/" key.

Our subjects consisted of N = 119 undergraduates (63 female and 56 males) who participated in the study in return for course credit. In addition to the flanker task, subjects completed a short survey that included questions on party identification and basic demographics (sex and age). We measured political orientation by asking participants to self-report their preferences on 24 separate political issues (pacifism, socialism, pornography, illegal immigration, women's equality, death penalty, Patriot Act, premarital sex, gay marriage, abortion rights, evolution, patriotism, Biblical truth, Iraq War, welfare spending, globalization, pollution control, small government, school standards, foreign aid, free trade obedience, and compromise) and coded these responses such that 1 = conservative

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[1] The 12 images used as the basis for selection were balanced for race and gender across valence type, and there was no significant difference in mean scores for these images by race, gender, or political orientation of our subjects.
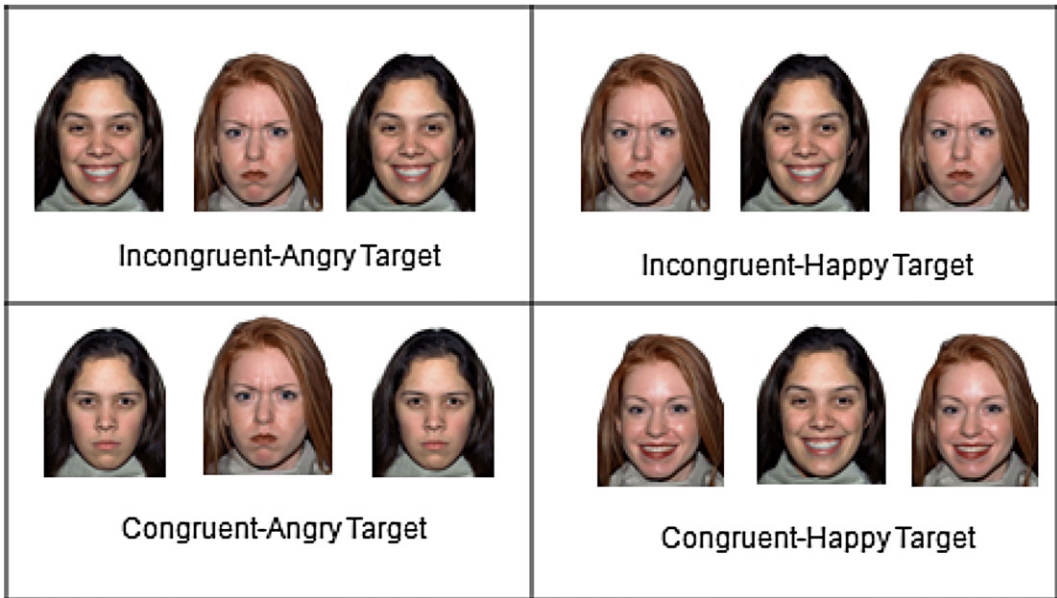
Figure 1. Congruent and incongruent flanker conditions. Examples of congruent and incongruent flanker stimuli taken from the NimStim Face Stimulus Set (Tottenham et al., 2009). Please contact Nim Tottenham at tott0006@tc.umn.edu for more information concerning the stimulus set.

Table 1. Effects for Congruent and Incongruent Flankers

Target	Congruent Flanker	Incongruent Flanker	Mean Difference	t-test
All	736.02	746.29	−10.27	2.27**
Angry Targets	718.88	732.64	−13.76	2.35**
Happy targets	753.15	759.94	−6.78	1.1

Note. Cell entries are response times (RTs) in milliseconds. N = 119
**$p < .05$

position; .5 = uncertain; 0 = liberal position. Next we summed these 24 items into a simple additive index, thus permitting gradations of political orientation depending upon the number of issues on which they agreed with one party or the other.[2]

Results

We begin with evidence that our group of subjects was typical in demonstrating the flanker effect. As indicated in the first row of Table 1, on the whole, participants were over 10 milliseconds faster to respond when the flankers were congruent with the target than when they were incongruent ($p < .05$). Though a 10-millisecond difference may seem inconsequential, it is consistent with typical findings in the literature on attentional cueing (Fenske & Eastwood, 2003; Hommel, Pratt, Colzato, & Godijn, 2001; Posner, 1980) and represents a systematic difference in attentional bias. In short, similar to the vast majority of flanker task samples, our subjects were processing and being slowed

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[2] Descriptive statistics on key variables are as follows: mean age = 20.05, mean issue position score = 12.28; partisan break down was 53 self-identified Democrats and 66 self-identified Republicans.

by incongruent flanking images even though instructed to ignore these images. Not all targets produce the same sorts of flanker effects, however; previous research using the flanker task has found that responses are faster overall to angry targets compared to happy targets (Van Honk, Tuiten, de Haan, van den Hout, & Stam, 2001), presumably for the evolutionarily sensible reason that it is more important to pay attention to threatening than to nonthreatening stimuli (Fox, Russo, & Dutton, 2002). This interpretation is supported by research showing that, compared to positive stimuli, negative (threatening) stimuli activate separate neural pathways (Carver, Sutton, & Scheier, 2000; Carver & White, 1994). Once again, our data are consistent with previous evidence. Compared to happy targets, angry targets elicited RTs approximately 30 milliseconds faster both when the flankers were congruent (angry) and incongruent (happy). Consistent with angry targets receiving an enhanced level of attention, it is also worth noting that RTs are slowest when a happy target is presented with angry flankers and fastest when an angry target is presented with angry flankers.

Our primary purpose here, though, is not to replicate long-established flanker effects but to provide an illustration of how this research paradigm might help investigate whether differential sensitivity to flankers is correlated with political orientations. Our central hypothesis is that these sorts of differential flanker effects will be clearest when the target is threatening, i.e., an angry facet. We have a secondary hypothesis that similar flanker effects may also be present for happy targets if liberals have an attentional bias for hedonic or positively valenced stimuli, though the research record supporting this hypothesis is less strong. To test these hypotheses we constructed a measure of sensitivity to the flanker effects presented in Table 1; for each subject we simply subtracted the first column (RTs for congruent flankers) from the second column (RTs for incongruent flankers) for angry and happy targets. On this scale, negative numbers indicate a faster response time to congruent flankers and positive numbers indicate a faster response to incongruent flankers.

We find a statistically significant relationship between ideology and flanker effect sensitivity (congruent minus incongruent RT); r = .24, $p < .01$. The comparable correlation for happy targets is substantively and statistically indistinguishable from zero (r = −01, $p = .89$). These two relationships are visually portrayed using scatterplots in Figures 2 and 3.

What these results suggest is that when targets are angry, individuals with more conservative issue positions have response times for incongruent flankers that are nearly as fast as, or even faster than, congruent flankers. Individuals endorsing more liberal issue positions, on the other hand, show slower response times to angry targets with incongruent flankers as per traditional flanker effects. This indicates that conservatives exhibit an enhanced sensitivity to angry targets; these targets capture attention and lead to a narrowing of attention which eliminates flanker effects in much the same way that flanker effects are eliminated when target location is spatially precued prior to the flanker display (Paquet & Lortie, 1990). In contrast, there is no evidence at all for a comparable effect for liberals and positively valenced targets. When only happy targets are analyzed, political ideology is completely unrelated to the effects of incongruent flankers, with a coefficient that is close to 0 (−.01) and statistically nonsignificant at even the .10 level. In other words, it is not the case that liberals are fixated on happy targets to the point that they are unaffected by the nature of the flankers. Likewise, it is not the case that conservatives are merely less distractible generally but rather only when the targets are angry.

These patterns are robust to statistical controls; flanker sensitivity for angry targets continues to significantly correlate with ideology while controlling for age, gender, and party identification (partial r = .20, p = .03; party identification is a dummy variable where 1 = Republican and 0 = Democrat). Flanker sensitivity for happy targets remains insignificant (partial r = .10, p = .26). Our data cannot resolve the causality issue of whether flanker sensitivity influences political temperament or vice versa, but results from a regression analysis (with the issue index as the dependent variable and standard controls) are interesting for what they reveal about the comparative effect sizes of these variables. The coefficients for age and gender are statistically insignificant, and even if we
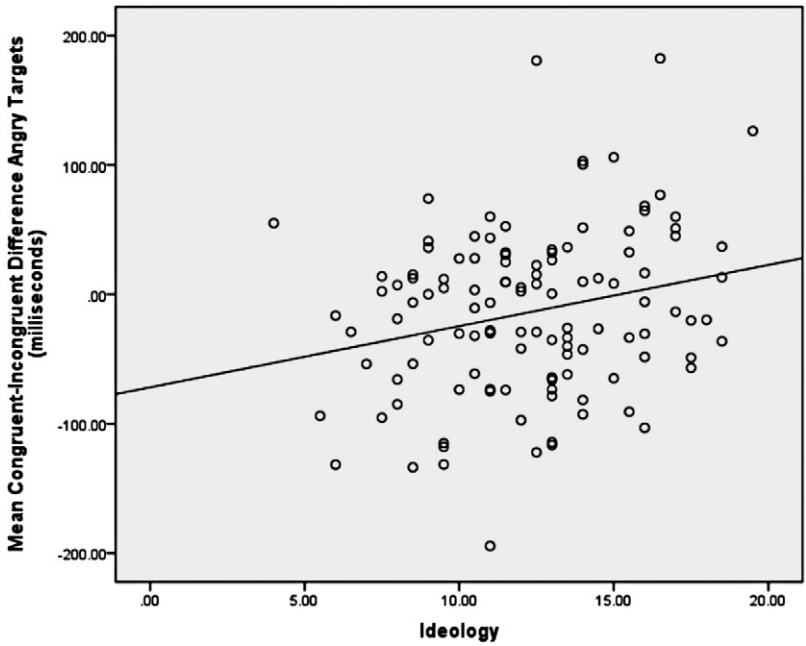
Figure 2. Flanker effect and ideology—angry targets. X-axis is ideology measured using a Wilson-Patterson Index where higher numbers reflect more conservative issue attitudes. Y-axis is difference in response times (in milliseconds) between angry target with congruent flankers and angry targets with incongruent flankers. Simple (Pearson) correlation is r = .24 (p < .01).
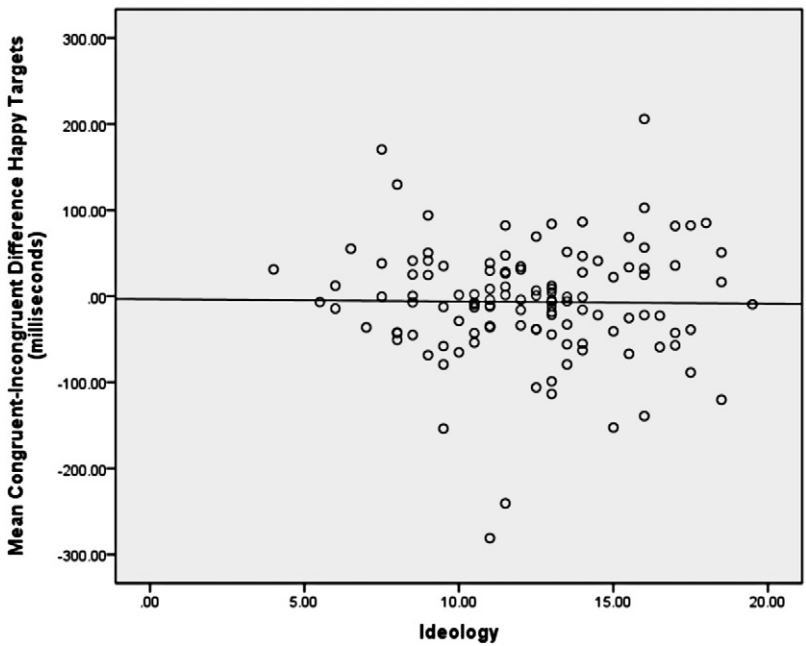

Figure 3. Flanker effects and ideology—happy targets. X-axis is ideology measured using a Wilson-Patterson Index where higher numbers reflect more conservative issue attitudes. Y-axis is difference in response times (in milliseconds) between happy target with congruent flankers and happy targets with incongruent flankers. Simple (Pearson) correlation is r = −.01 (p = .89).

treat them as meaningful, their substantive impact is small. The unstandardized coefficient for gender is .323, suggesting that gender makes a difference of less than half-a-point on the issue index, which had an observed range of 4 to 20. The unstandardized coefficient for age is −.01, so the model estimates that being 100 years old is associated with a one-point reduction in the conservative flavor of issue positions. The unstandardized coefficient for flanker sensitivity is .008, which seems small but translates into a plus or minus change of 125 milliseconds being associated with a one-point shift in the index, an impact that is both statistically significant and substantively meaningful; flanker sensitivity in our sample ranges from −195 to .182. If we plug those numbers into our regression model, the estimated effects are a −1.5-point shift in the issue index for the minimum value and a 1.4-point increase for the maximum value—an estimated 2.9-point difference in issue index scores between minimum and maximum that is not far from the 3.5-point difference captured by the coefficient for the party dummy. These findings strongly support our hypothesis that threatening targets evoke differential flanker effects between liberals and conservatives.

We would caution against normative interpretations of these findings. It is certainly not inherently bad to be attentive to angry stimuli. In fact, it is probably quite sensible from an evolutionary point of view, though as with most tendencies it can be overdone. The important point is not that one ideological group is better than another but that important subthreshold differences exist across people in the extent to which they attend to angry images, and this variation correlates with political beliefs.

Discussion

In this research note, we sought to introduce the flanker task as a reliable, simple, and easy to operationalize research paradigm of considerable potential for investigating how affective and attentional differences may systematically vary with political orientations. The flanker task requires no special equipment beyond a computer able to present images and software capable of recording response time. The algorithm for generating the variable of interest is no more complicated than subtracting mean response time in one condition (congruent image and flankers) from mean response time in another condition (incongruent image and flankers). The paradigm is based on a much replicated baseline result in which response to incongruent flankers is slower than response to congruent flankers, and the task is so flexible that it can be adapted to tap anything from the relapse risk of addicts to the emotional awareness of children at various stages of development. The utility of the flanker task for political psychology is more than an abstraction, as our empirical illustration gives an indication of its potential value. It would appear the flanker paradigm is capable of revealing politically interesting, previously unreported differences in attention to affective stimuli.

While our focus has been on the flanker task, a number of related research paradigms are used in cognitive psychology that may be of similar value to political psychology research. For example, the attentional cueing task (Posner, 1980) has been continually adapted to determine the influence of a variety of stimuli on the allocation of spatial attention (Eimer, 1997; Fischer, Castel, Dodd, & Pratt, 2003; Hommel, Pratt, Colzato, & Godijn, 2001; Pratt & Hommel, 2003). In particular, the gaze-cuing task allows researchers to examine joint attention—the ability to follow the direction of another's eye movements or gaze—which is relevant for discerning the interests and intent of other people with existing evidence that political temperament systematically correlates with patterns in joint attention (Dodd et al., 2011). Similarly, the emotional Stroop task (Gotlib & McCann, 1984), the dot probe task (MacLeod, Mathews, & Tata, 1986) and visual search tasks (Hansen & Hansen, 1988) are widely used to measure selective attention—especially selective attention to threatening stimuli—and thus may have particular relevance given findings presented here and in other research. Moreover, each of these tasks is particularly sensitive to the relationship between target and distractor information, allowing for an examination of both attentional bias to target information as well as attentional capture from distracting sources. These and other research paradigms widely used by

cognitive psychologists may be of enormous value in helping students of political psychology to investigate how cognitive patterns relate to political temperaments.

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