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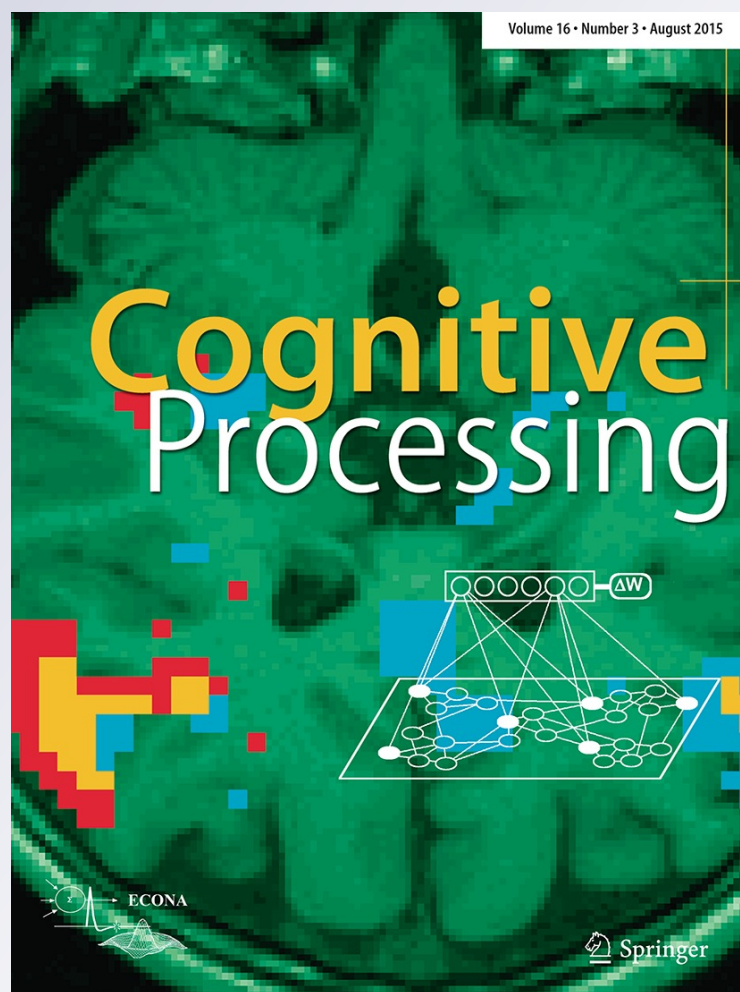
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# The politics of attention contextualized: gaze but not arrow cuing of attention is moderated by political temperament

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**Abstract** It is known that an averted gaze can trigger shifts of attention in an observer, a phenomenon known as gaze-cuing effect. Recently, Dodd et al. (*Atten Percept Psychophys* 73:24–29, 2011) have reported a reliable gaze-cuing effect for liberals but not for conservatives. The present study tested whether this result is gaze-specific or extends over nonsocial spatial signals. Conservatives and liberals took part in a spatial-cuing task in which centrally placed gaze and arrow cues, pointing rightward or leftward, were followed by a peripheral onset target requiring a simple detection response. Whereas a reliable cuing effect was present for both gaze and arrow cues in the case of liberals, conservatives showed a reduced cuing response only for gaze cues. These results provide further support for the pattern reported by Dodd et al. (2011) and are consistent with the view that conservatives are less susceptible to the influence of spatial cues provided by other individuals.

**Keywords** Social attention · Gaze cuing · Arrow cuing · Political temperament

## Introduction

Individuals tend to orient attention in response to gaze direction of others, a phenomenon which is experimentally investigated presenting a face with averted gaze followed

by a peripheral target requiring some type of response (Friesen and Kingstone 1998). Reaction times (RTs) to targets occurring at the cued location (i.e., congruent trials) are typically shorter than those to targets appearing at an uncued location (i.e., incongruent trials), irrespective of whether gaze direction is predictive of target location (e.g., Driver et al. 1999; Galfano et al. 2011; for a review, see Frischen et al. 2007).

Recently, it has been shown that this phenomenon, known as gaze-cuing effect, can be affected by several social factors. On the one hand, features of the cuing face can alter the magnitude of gaze cuing. For instance, signals of physical dominance (e.g., Jones et al. 2010) and high social status (Dalmaso et al. 2012, 2014; Pavan et al. 2011) elicit a stronger effect. More relevant for the present study, participants' individual differences have also been shown to play a critical role. Indeed, a greater gaze-cuing effect has been observed in people with higher need for belongingness (Wilkowski et al. 2009) and higher levels of anxiety (Fox et al. 2007). Dodd et al. (2011) have observed that also political temperament moderates gaze cuing. They first measured political orientation by asking participants to indicate their standing in relation to a series of sensitive social issues. Next, they administered a standard gaze-cuing task with three stimulus onset asynchronies (SOAs) between cue and target onset and found a reliable gaze-cuing effect among liberals but not among conservatives. According to Dodd et al. (2011), this may be consistent with the idea that conservatives, as compared to liberals, assign greater value to personal autonomy and therefore might be less likely to be influenced by others. However, the pattern reported by Dodd et al. (2011) might not be confined to gaze cues and, instead, reflect a reduced attentional response to any central cue that “pushes” spatial attention. In other words,

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conservatives might prove to be less sensitive to any cue that is interpreted as an external drive. In order to explore this latter hypothesis, in the present study we used the procedure employed by Dodd et al. (2011) and examined attention shifting in both conservatives and liberals by comparing gaze and arrow cues. Similar to gaze, arrow cues have been shown to elicit reflexive shifts of attention and are often used as a useful term of comparison for assessing the relative impact of social and symbolic cues both in normal individuals (e.g., Bayliss et al. 2005; Bayliss and Tipper 2005; Galfano et al. 2012; Kuhn and Benson 2007; Kuhn and Kingstone 2009; Kuhn et al. 2011; Marotta et al. 2014; Tipples 2002) and in clinical populations (e.g., Akiyama et al. 2008; Dalmaso et al. 2013; Marotta et al. 2013).

In sum, the first goal of the present study was to provide further empirical evidence supporting the results reported by Dodd et al. (2011), namely, the presence of a reliable gaze-cuing effect among liberals but not (or at least reduced) among conservatives. Importantly, because the current study was conducted in a different country, consistent evidence would speak in favor of the generalizability of the findings in different social contexts. The second goal of this study was assessing the extent to which the absence of (or at least reduction in) cuing effect exhibited by conservatives is specific to gaze cues or extends to symbolic cues such as arrows. Dodd et al. (2011) interpreted their findings as stemming from *social* variables that are relevant in interpersonal relations (e.g., autism-like traits, empathy, and trust) and are expected to be differently detectable among liberals and conservatives. In line with Dodd and colleagues, it could thus be predicted that ideology-based differences would mainly emerge for *social* signals—such as eye gaze—rather than for symbolic cues—such as an arrow. Because we used an additional cue, unlike Dodd et al. (2011), we only included two SOAs in order to simplify the experimental design.

## Methods

### Participants

Sixty-eight undergraduate students (mean age = 20.1 years, SD = 5.32, 13 males) at the University of Padova took part in the study in exchange for course credits. All participants gave written informed consent prior the beginning of the study, reported normal or corrected-to-normal vision, and were naïve to the purpose of the experiment. The study was conducted in accordance with the guidelines laid down in the Declaration of Helsinki and was approved by the Ethics Committee for Psychological Research at the University of Padova.

### Questionnaire on political ideology

Political ideology was assessed separately from the main study through an online survey created with the software Survey Monkey, as part of a mass testing at the beginning of the semester. Participants were asked to express their level of agreement (from 1 = “not at all” to 7 = “very much”) toward eight social issues (i.e., reduction in immigration, abortion, medically assisted procreation, homosexual marriage, legalization of soft drugs, euthanasia, use of stem cells, and adoption by homosexual couples;  $\alpha = .74$ ). Responses were rescaled so that higher scores corresponded to more conservative views. This scale has been already widely used in previous research (e.g., Carraro et al. 2011; Castelli and Carraro 2011).

### Spatial-cuing task: stimuli, apparatus, and procedure

Gaze and arrow stimuli were used as cues in two distinct blocks that were selected in a random order. We have chosen to present the different cues in separate blocks because it has been shown that gaze cuing can be sensitive to contextual factors such as the presence of other cuing stimuli within the same block of trials (Pavan et al. 2011). In the gaze-cue block, the cue was very similar to that used by Dodd et al. (2011), namely a schematic face ( $6^\circ$  of diameter) with gaze pointing either rightward or leftward. In the arrow-cue block, the cue was an arrow ( $3.8^\circ \times 1.6^\circ$ ) pointing either rightward or leftward. The arrow appeared with a symmetric head and tail in order to be comparable to the two eyes conveying directional information (see also Galfano et al. 2012). A PC running E-prime 1.1 handled stimulus presentation and data collection. Participants sat approximately 57 cm from a 17-inch monitor ( $1024 \times 768$  pixels, 60 Hz) on which stimuli were presented in white against a black background.

The procedure was similar to that used by Dodd et al. (2011). Each trial began with a fixation cross ( $1^\circ$ ) presented in the center of the screen for 250 ms. In the face-cue block, a face without pupils was shown for 750 ms and then replaced with the same face with gaze pointing rightward or leftward. After either 200 or 700 ms, depending on SOA, a white-dot target ( $1^\circ$ ) appeared  $2.5^\circ$  to the right or to the left of the cue. In the arrow-cue block, fixation was followed by the arrow-cue without head and tail (i.e., a horizontal line segment). Afterward, the same arrow with both head and tail pointing rightward or leftward appeared. Timing parameters were the same in the face-cue and arrow-cue blocks. Participants were instructed to maintain fixation at the center of the screen and to press the space bar as

fast as possible when the target appeared (target present trial), and to refrain from responding if the target did not appear (catch trial). They were explicitly instructed that cue direction was uninformative with respect to target location. Catch trials were used in order to avoid anticipations. The red words “NO RESPONSE” or “ERROR” were presented when participants failed to respond within 2000 ms (i.e., omissions) or responded on catch trials (i.e., false alarms), respectively. Finally, a blank screen appeared for 500 ms (see Fig. 1). Then, the next trial began. Each experimental block was composed of 160 target present trials and 40 catch trials, and it was preceded by a practice block composed of eight target present trials and two catch trials. Target present trials and catch trials were presented in random order. There were potentially 40 data points for each condition defined by cue–target spatial congruency, cue type, and SOA.

## Results

False alarms were extremely low (.08 % of trials) and were removed. Missed responses (.02 % of trials) and outliers, defined as trials for which RTs were two SDs above or below the mean of each participant divided by condition (3.8 % of trials), were also removed. Due to the low rate of errors, these were not analyzed further.

First, we classified participants as either conservatives or liberals on the basis of their responses to the questionnaire. A preliminary analysis revealed that the median value was 3.57, a score reported by three participants. The split half thus resulted in groups with different size (35 liberals and 33 conservatives; 7 and 6 males, respectively). Mean RTs for correct responses were submitted to a repeated-measures mixed model ANOVA with cue–target spatial congruency (congruent vs. incongruent), cue type (arrow vs. gaze), and SOA (200 vs. 700 ms) as within-participant factors, and with political ideology (liberal vs. conservative) as between-participants factor. The main effect of cue–target spatial congruency was significant,  $F(1,66) = 90.301$ ,  $p < .001$ ,  $\eta_p^2 = .578$ , owing to shorter RTs on congruent ( $M = 321$  ms,  $SE = 5.30$ ) than on incongruent ( $M = 329$  ms,  $SE = 5.55$ ) trials. The main effect of SOA was also significant,  $F(1,66) = 150.315$ ,  $p < .001$ ,  $\eta_p^2 = .695$ , owing to shorter RTs on longer ( $M = 312$  ms,  $SE = 5.51$ ) than on shorter ( $M = 338$  ms,  $SE = 5.53$ ) SOA. In addition, the cue–target spatial congruency  $\times$  cue type interaction was significant,  $F(1,66) = 7.342$ ,  $p = .009$ ,  $\eta_p^2 = .100$ , a pattern that was further qualified by the four-way cue–target spatial

congruency  $\times$  cue type  $\times$  SOA  $\times$  political ideology interaction,  $F(1,66) = 4.087$ ,  $p = .047$ ,  $\eta_p^2 = .058$ .<sup>1</sup>

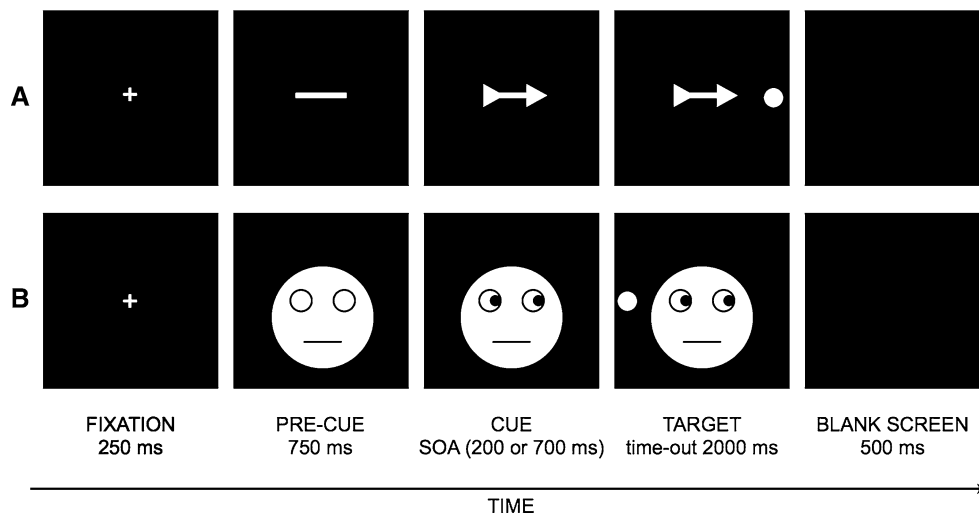
In order to clarify this interaction, RT data of conservatives and liberals were submitted to two separate repeated-measures ANOVAs with the same within-participant factors as earlier.

As for liberals, the main effect of cue–target spatial congruency was significant,  $F(1,34) = 41.135$ ,  $p < .001$ ,  $\eta_p^2 = .547$ , owing to shorter RTs on congruent ( $M = 323$  ms,  $SE = 7.05$ ) than on incongruent ( $M = 331$  ms,  $SE = 7.20$ ) trials. The main effect of SOA was also significant,  $F(1,34) = 70.363$ ,  $p < .001$ ,  $\eta_p^2 = .674$ , owing to shorter RTs on longer ( $M = 312$  ms,  $SE = 6.99$ ) than on shorter ( $M = 342$  ms,  $SE = 7.61$ ) SOA. No other main effect or interaction emerged. For the sake of completeness, two-tailed paired-samples  $t$  tests confirmed that regardless of SOA, liberals shifted their attention in response to both arrow and gaze (all  $ps < .007$ ; Fig. 2). The robustness of the observed pattern was further tested by means of the Bayesian Information Criterion (BIC), which was computed following the procedure described by Masson (2011). This approach helps to clarify which model (null vs. alternative hypothesis) is better supported by the available data. The posterior probability supporting the hypothesis that gaze cuing and arrow cuing were present for the 200-ms SOA was  $p_{\text{BIC}}(\text{H1ID}) = 0.989$  and  $p_{\text{BIC}}(\text{H1ID}) = 0.999$ , respectively, and for the 700-ms SOA was  $p_{\text{BIC}}(\text{H1ID}) = 0.879$  and  $p_{\text{BIC}}(\text{H1ID}) = 0.999$ , respectively. Within this framing, BIC values higher than .50 suggest that evidence is more consistent with the alternative hypothesis and, therefore, these additional analyses provided further support to the presence of reliable orienting irrespective of cue type and SOA.

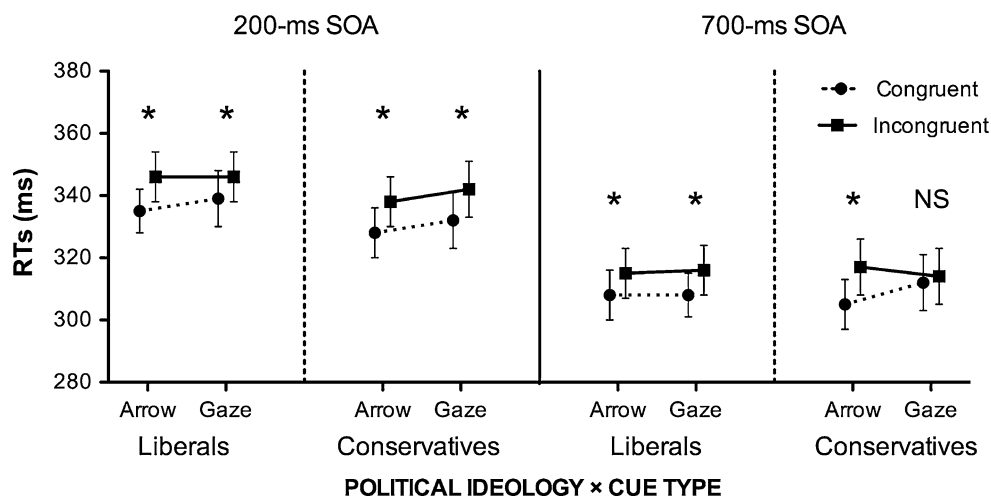
As for conservatives, the main effect of cue–target spatial congruency was significant,  $F(1,32) = 50.531$ ,  $p < .001$ ,

<sup>1</sup> Because the two groups of liberals and conservatives differed in size, we tried to test whether the assignment of the three respondents with the median score to the ideology questionnaire to the group of liberals might have somehow affected the results. To this aim, a further mixed model ANOVA with cue–target spatial congruency (congruent vs. incongruent), cue type (arrow vs. gaze), SOA (200 vs. 700 ms), and political ideology (liberal vs. conservative) was conducted on mean RTs after classifying the three respondents as conservatives. Importantly, the four-way cue–target spatial congruency  $\times$  cue type  $\times$  SOA  $\times$  political ideology interaction was still significant,  $F(1,66) = 5.008$ ,  $p = .029$ ,  $\eta_p^2 = .071$ . This pattern suggests that assigning respondents scoring around the median value to one group rather than the other did not affect the results. In addition, in order to clarify the robustness of the observed pattern, we also adopted a different strategy by considering ideology as a continuous variable. To this end, mean RTs were submitted to an ANCOVA with cue–target spatial congruency, cue, and SOA as within-participant factors, and political ideology as covariate. Critically, the four-way cue–target spatial congruency  $\times$  cue type  $\times$  SOA  $\times$  political ideology interaction was statistically significant,  $F(1,66) = 4.364$ ,  $p = .041$ ,  $\eta_p^2 = .062$ .

**Fig. 1** Examples of an arrow-cue congruent trial (a) and a gaze-cue incongruent trial (b)



**Fig. 2** Mean RTs ( $\pm$ SEM) for congruent and incongruent trials as a function of cue type and SOA divided for liberals and conservatives. \*Significant differences ( $p < .05$ ) between RTs for incongruent and congruent trials



$\eta_p^2 = .612$ , owing to shorter RTs on congruent ( $M = 320$  ms,  $SE = 7.97$ ) than on incongruent ( $M = 328$  ms,  $SE = 8.52$ ) trials. The main effect of SOA was also significant,  $F(1,32) = 94.961, p < .001, \eta_p^2 = .748$ , owing to shorter RTs on longer ( $M = 312$  ms,  $SE = 8.59$ ) than on shorter ( $M = 335$  ms,  $SE = 8.03$ ) SOA. Crucially, the two-way cue-target spatial congruency  $\times$  cue type interaction was also significant,  $F(1,32) = 11.448, p = .002, \eta_p^2 = .263$ , reflecting the fact that conservatives were more sensitive to arrow cues (congruent trials:  $M = 316$  ms,  $SE = 7.85$ ; incongruent trials:  $M = 327$  ms,  $SE = 8.47$ ) than to gaze cues (congruent trials:  $M = 322$  ms,  $SE = 8.50$ ; incongruent trials:  $M = 328$  ms,  $SE = 8.87$ ). The three-way cue-target spatial congruency  $\times$  cue type  $\times$  SOA interaction was also significant,  $F(1,32) = 7.025, p = .012, \eta_p^2 = .180$ . Two-tailed paired-samples  $t$  tests comparing congruent and incongruent trials at each SOA divided by cue indicated that at the shorter SOA, conservatives shifted their attention in response to both arrow,  $t(32) = 4.974, p < .001$ , and gaze,  $t(32) = 4.547, p < .001$ ,

whereas at the longer SOA, they shifted their attention in response to arrow,  $t(32) = 5.652, p < .001$ , but not in response to gaze,  $t(32) = .947, p = .351$ . BIC analyses showed that for the 200-ms SOA, the posterior probability supporting the hypothesis that gaze cueing and arrow cueing were present was  $p_{BIC}(H11D) = 0.998$  and  $p_{BIC}(H11D) = 0.999$ , respectively. In contrast, in the case of 700-ms SOA, the posterior probability favoring the hypothesis that gaze cueing was absent was  $p_{BIC}(H01D) = 0.784$ , and this represents “positive” evidence (see Masson 2011) for the conclusion that no gaze-cueing effect was present in conservatives. The posterior probability supporting the hypothesis that arrow cueing was present at 700-ms SOA was  $p_{BIC}(H11D) = 0.999$ .<sup>2</sup>

<sup>2</sup> The difference in the gaze-cueing effect (i.e., RTs incongruent–RTs congruent) displayed by conservatives and liberals at the 700-ms SOA was further analyzed through an independent sample  $t$  test. The difference in gaze-cueing between the two groups fell short of significance,  $t(66) = 1.713, p = .09$ . Indeed, there was an 8-ms effect in the case of liberals, whereas the effect only amounted to 2 ms in the case of conservatives.

## Discussion

During the last decade, research has shown important differences between people who support different political opinions. Indeed, conservatives and liberals not only have divergent ideas about social and economical issues but, interestingly, display more profound cognitive differences (e.g., Carraro et al. 2011; Castelli and Carraro 2011; Dodd et al. 2012; Jost and Amodio 2012; Oxley et al. 2008). For instance, as compared to liberals, conservatives show increased alertness responses to sudden events (Oxley et al. 2008) and their attention is more strongly grabbed by negative stimuli (Carraro et al. 2011). Dodd et al. (2011) showed that conservatives and liberals seem to differ also with regard to another important aspect, namely their attentional response to gaze. In particular, a consistent gaze-cuing effect was observed in liberals but not in conservatives.

The goal of the present study was twofold. Firstly, we wanted to address whether the pattern reported by Dodd et al. (2011) extended to a different social context. The second aim was to determine whether the lack of gaze cuing reported by Dodd et al. (2011) was suggestive of a general reduced response toward central cues or a gaze-specific phenomenon. To this purpose, we included also arrows, that is central cues that are known to be very effective in pushing attention and are often used as a term of comparison for eye gaze (e.g., Bayliss et al. 2005; Galfano et al. 2012; Kuhn and Kingstone 2009; Tipples 2002).

As for liberals, we found a generalized cuing effect for both gaze and arrow cues. In sharp contrast, conservatives showed a stronger cuing effect for arrows than for gaze cues. This pattern is important in that it shows that the reduced attentional response exhibited by conservatives, as compared to liberals, is specific for gaze stimuli. In addition, the present results suggest that the pattern reported by Dodd et al. (2011) extends to a different social context. Unlike Dodd et al. (2011), however, the magnitude of gaze cuing for conservatives was further modulated by SOA. Indeed, gaze cuing was absent at the 700-ms SOA only. This discrepancy with respect to Dodd et al. (2011)'s results was unexpected. If any, this finding seems to suggest that individual differences took some time to exert their influence, at least in our sample. Future research will have to include a denser and broader range of SOAs aimed at clarifying the temporal dynamics underlying the impact of political temperament on gaze cuing.

The observed dissociation between gaze cuing and arrow cuing in conservative people is theoretically relevant in that it allows to disentangle between different potential explanations. Indeed, the present findings do not support the view that conservatives have a generalized diminished

tendency to follow central cues that “push” attention. In contrast, our results are more in line with the idea that conservatives are specifically less responsive to stimuli acting as *social* external drives. This interpretation is consistent with the theoretical frame provided by Dodd et al. (2011), who suggested that conservatives are typically more individualistic, and, therefore, they may be less prone to being influenced by others. However, it is important to remark that the observed pattern should not be interpreted as assigning greater value to belonging to one or the other group, as identified as a function of political worldviews. Indeed, gaze cuing can be understood as a two-sided coin. On the one hand, it may be considered as an index of a desirable interpersonal sensitivity, but it might also be interpreted as indicating a less desirable suggestibility and vulnerability to the influence of others.

The present findings add to an increasing literature, suggesting that political temperament and affiliation can modulate attention toward social stimuli. For instance, it has recently been shown that when faces of real politicians are used as cue, conservatives and liberals are less influenced by gaze direction of their respective outgroup leaders (Liuzza et al. 2011, 2013). These results strongly emphasize the importance of political variables in shaping social attention.

To conclude, our results confirmed the presence of a reduced cuing effect in response to gaze but not in response to arrow cues among conservatives, whereas liberals showed a reliable cuing effect regardless of cue type. This is in line with and extends what observed by Dodd et al. (2011).

Although no significant gaze-cuing effect was detected among conservatives at the longer SOA, this does not rule out the possibility that with larger samples, a reliable, but smaller as compared to liberals, difference between congruent and incongruent trials could be detected. Future work is required to address the question of whether conservatives still show a reduced cuing effect also when other social cues (e.g., pointing gestures, head turns, etc.) that are known to produce robust attention shifts (e.g., Cazzato et al. 2012; Dalmaso et al. 2013) are used. Similarly, increasing the predictiveness of eye gaze—which was here uninformative as regards the target location—may lead to making the ideology-based differences in gaze cuing disappear. Any additional evidence in this regard would further clarify how the different views about the world held by conservatives and liberals also reflect into different social attention mechanisms.

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**Conflict of interest** None.

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