

Neurocognitive Correlates of Liberalism and Conservatism

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Procedure

Upon arrival to the laboratory, participants provided their informed consent and were prepared for physiological recording. The participant was seated in a dimly-lit, sound-proofed room in a comfortable chair, approximately one meter from a computer monitor. The experimenter explained that, following baseline recordings, the participant would complete a simple computer task. Experimenters were blind to participants' political attitudes.

Political attitudes questionnaire. A measure of political attitudes was embedded in a larger set of personality and attitudes surveys completed at the every beginning of the experimental session. Participants completed these questionnaires in private. Participants were instructed to not make any identifying marks on the questionnaires and, upon completion, to place the questionnaires into a large envelope. These questionnaires remained in these envelopes until the completion of the study, at which time they were entered into a computer database.

The critical political orientation item asked participants to indicate their political orientation on a scale ranging from *Extremely Liberal* (−5) to *Extremely Conservative* (+5), with *neutral* corresponding to 0. This single item has been shown to provide a valid and reliable measure of political orientation that is very strongly predictive of intended and actual behavior (e.g., voting decisions).^{1,2}

EEG recording. Participants were fitted with a stretch-lycra cap, and EEG was collected from 29 scalp sites using Ag/AgCl electrodes positioned according to the 10-10 system. These sites included midline, frontal, parietal, temporal, and occipital locations. The active reference electrode was placed on the left earlobe, and a ground electrode was placed on the forehead. EEG was also collected from the right earlobe for offline rereferencing. Vertical and horizontal

electrooculogram (EOG) was collected to permit the reduction of artifact due to eye movements. Electro-Gel (Eaton, OH) was used as the conductive medium, and impedances were below 5k Ω at each scalp site (below 10k Ω at EOG sites). EEG was recorded through a 0.1 – 100 bandpass filter and digitized at 500 Hz using a 32-channel Synamps amplifier (Neuroscan Labs, El Paso, TX). Offline, EEG was manually scored to remove portions of data containing eye or muscle movement, and rereferenced to the average earlobe.

Go/No-Go task. On each trial of the Go/No-Go task, either the letter “M” or “W” was presented in the center of a computer monitor screen, following Nieuwenhuis et al.³ Half of the participants were instructed to make a “Go” response when they saw “M” but to make no response when they saw “W”; the remaining participants completed a version in which “W” was the Go stimulus and “M” was the No-Go stimulus; assignment to either version of the task was random. Responses were registered on a computer keyboard placed in the participants’ laps. Each trial began with a fixation point, presented for 500 ms. The target then appeared for 100 ms, followed by a blank screen. Participants were instructed to respond within 500 ms of target onset. A “Too slow!” warning message appeared after responses that exceeded this deadline, and “Incorrect” feedback was given after erroneous responses.

The task consisted of 500 trials, of which 80% consisted of the Go stimulus and 20% consisted of the No-Go stimulus. As in past research, the high frequency of Go stimuli induced a prepotent “Go” response, enhancing the difficulty of successfully inhibiting a response on No-Go trials. Participants received a two-minute break halfway through the task, which took approximately 15 minutes to complete. Following completion of the task, participants were debriefed, thanked, paid or awarded credit, and dismissed.

Preliminary analyses of task behavior revealed that participants made a significantly higher percentage of errors on No-Go trials ($M = 39\%$, $SD = .16$) than on Go trials ($M = 0.01\%$,

$SD = 0.02$), $t(42) = 15.33$, $P < 0.001$, indicating that the Go/No-Go task was successful in eliciting a habitual response pattern that was difficult to inhibit.

ERP processing

ERN. Frequencies below 1 Hz and above 15 Hz were digitally filtered (96 dB, zero-phase shift). An 800 ms response-locked epoch of EEG signal, centered on the time of response within each trial, was selected for each artifact-free trial. Baseline correction procedures subtracted the average voltage occurring from 400 ms to 50 ms prior to response from the entire epoch. Epochs associated with incorrect responses on No-Go trials and correct responses on Go trials were averaged within their respective trial types. The ERN was scored as the peak negative deflection occurring between -50 and 150 ms, relative to response onset, at the frontocentral scalp site (Fcz), as in previous research.³ The ERN component refers to the average amplitude associated with incorrect “Go” responses on “No-Go” trials.

N2. Frequencies below 1 Hz and above 15 Hz were digitally filtered (96 dB, zero-phase shift). A 1000 ms epoch of EEG signal, beginning 200 ms prior to target onset, was selected for each artifact-free trial. Baseline correction procedures subtracted the average voltage occurring 100 to 200 ms relative to target onset within each epoch from the entire epoch. Epochs associated with correct and incorrect responses on No-Go trials were averaged within their respective trial types. The N2 was scored as the peak negative deflection occurring between 200 and 400 ms, relative to target onset, at the vertex site (Cz), where it is typically maximal. The *No-Go N2* component refers to the average N2 amplitude associated with correct “No-Go” responses.

Source localization. Source localization analyses were conducted using SOURCE (Neuroscan Labs, El Paso, TX) dipole modeling software (see ref #4). A *single equivalent current dipole* model was estimated from the peak of the ERP wave, for both the ERN (reported

in the main text) and the N2 (Fig. 1). As in Van Veen and Carter (2002), we estimated the source from the peak maximum of the difference waveform, in which the waveform for the correct Go responses was subtracted, point by point, from the critical No–Go waveform, for each subject.⁵ Difference waveforms were then averaged across subjects for localization analyses.

A single-dipole model of the ERN peak (44 ms post-response) identified a source in the dorsal region of the ACC (Mean Global Field Power [MGFP] = 4.66 μ V; PAN coordinates [mm]: $x = -1.0$, $y = 35.7$, $z = 88.2$; dipole strength = 167.8 nAm), which accounted for 90.3 % of the variance of the signal (see Fig. in main text). A single dipole model of the N2 peak (270 ms post-stimulus) identified a source in the same region of the ACC (MGFP = 2.36 μ V; PAN coordinates [mm]: $x = 4.1$, $y = 38.8$, $z = 88.7$; dipole strength = 83.22 nAm), which accounted for 91.4 % of the variance of the signal.

References

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Figure 1. Source localization results for the No-Go N2 component. (a) Dipole modeling analyses placed the source of the No-Go N2 component in the dorsal ACC, near the ACC source identified for the ERN component reported in the main text. (b) Scalp distribution corroborates maximal deflection at the vertex.

