INTRODUCTION

THE INFLUENCE OF GENETIC VARIATION ON THE TIME COURSE OF ANTERIOR CINGULATE ACTIVATION DURING CONFLICT AND ERROR DETECTION

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METHOD

Participants

Between right-handed normal adults (mean age = 27.5 years, SD = 6.2), range 20-36 years. 4 females participated this study.

Stimuli and task

For the fMRI task, stimuli consisted of a row of 5 visually presented horizontal black lines, with arrowpoints pointing leftward or rightward, against a gray background. The target was a leftward or rightward arrowhead at the center. This target was flanked on either side by two arrows in the same direction (congruent condition), or in the opposite direction (incongruent condition). The participants’ task is to identify the direction of the centrally presented arrow by pressing one key for the left direction and a second key for the right direction.

EEG acquisition

EEG was recorded from 128 scalp sites using the 128 channel Geodesic Sensor Net, all recordings were initially referenced to C2 during recording, and later digitally re-referenced using an average reference transformation. EEG was recorded using a 0.1 – 100 Hz bands passing.

Source analysis

For each subject, the dipole models were calculated. A target-oriented measure related to conflict was calculated by subtracting congruent from incongruent trials for which there was a correct response. Response locked potentials for correct and incorrect responses on incongruent trials were subtracted to calculate the ERN. These difference waves were submitted to the BESA (Brain Electric Source Analysis) for the source analysis. The analysis of the genes was guided by the location of activations in the previous fMRI study. Figure 2 shows the coordinates for the source modeling based on the fMRI study.

Genotyping analysis

Buccal swabs were obtained via buccal cell brush from consenting subjects. Yields range from 0.5 to 3 µg of DNA from each buccal sample. Yields range from 0.5 to 3 µg of DNA from each buccal sample. The overall results support our previous efforts to understand the influence of genes on the development of neural networks underlying attention. EEG can be used to supplement the cognitive tasks and fMRI methods that we have used previously to explore such questions and relate to the amount of activation of the executive network, as assessed by the ANT fMRI study, specifically the anterior cingulate gyrus. A similar analysis of the ERN revealed no relation between its amplitude in our ERP study and these same genes, suggesting that individual differences in conflict and error monitoring have at least partly different origins.

REFERENCES


Poster request
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