Online supplemental material

Framing and Responsibility Modulate Brain Activities in Decision Escalation

Image Acquisition

Images were acquired with Siemens MAGNETOM skyra 3T MRI scanner. A single-shot T2*-weighted gradient-echo EPI sequence was used for fMRI scans. Thirty-five contiguous axial slices were acquired with a slice thickness of 3 mm to cover the whole brain. Other imaging parameters were repetition time (TR) = 2000 ms; echo time (TE) = 30ms; flip angle = 90º; field of view (FOV) = 192 x 192 mm; and matrix size = 64 x 64. The anatomical MRI was acquired with a T1-weighted, three-dimensional, gradient-echo pulse sequence. This sequence provides high-resolution (1 x 1 x 1 mm3) images of the entire brain. Preprocessing and general linear model (GLM) estimation were performed with SPM12 implemented in MATLAB. Functional images were corrected for slice acquisition time and for participant motion. Maps of contrast coefficients for regressors of interest were coregistered with structural maps, spatially normalized by warping to the Montreal Neurological Institute (MNI) space, and spatially smoothed to minimize effects of anatomical variability (FWHM = 8 mm). Contrasts of task conditions were examined by voxel-specific t-tests (SPM{t}) using data from all subjects. The t-statistics were subsequently transformed to Z statistics to create a statistical parametric map (SPM{z}) of the contrasts. The SPM{z}map was interpreted by referring to the probabilistic behavior of Gaussian random fields.

Statistical Analysis

Behavioral data. All analyses were performed with SPSS 24.0. Escalation and de-escalation decision times were compared with two tailed t-tests. Escalation decision was treated as a dummy variable, taking the value 0 and 1 to indicate de-escalation decision and escalation decision, respectively. Repeated Measures Analysis of Variance (RM-ANOVA) was employed to explore the effects of responsibility and framing conditions on decisions.

fMRI data. The design matrix consisted of four runs, each of which had nine regressors: 2 event-related regressors (Escalation Decision and De-Escalation Decision) to model activation during decision messages; 6 motion regressors using the parameters of the motion correction performed during preprocessing, and one regressor for the click motion. Two percent of decisions were omitted, because subjects failed to make a choice. Resulting statistical maps were corrected for multiple comparisons using cluster-wise false discovery rates (FDR), and thresholded at $p<0.001$ and cluster size > 153 voxels. Whole brain analysis was employed for testing H1 and H2. Spheres (radius=3mm) around pick activation points from the whole brain analysis were then used as Regions of Interest (ROI) for exploring whether these activations are modulated by responsibility and/or framing (i.e., for testing H3a-b and H4a-b.)