Supplementary Material

Methods

Participant instructions for the experimental task

Version 1:

"For this task, you are going to use your index and middle fingers to respond with the button pad. During the task, you will see an "X" in the center of the screen. Two of the lines of the "X" will become darker to form an arrow, which will give you information about the target that will then appear. There are two types of cues that will tell you different things about the upcoming target. If the arrow is pointing to the left or the right, this will tell you where (on which side), but will not tell you anything about when the box could appear. If the arrow is pointing up or down, this will tell you nothing about where the box will appear, but when the box will appear. After the arrow cue appears, a box will appear either to the left or the right, with a break in the top or the bottom of the box. If the break is located at the bottom of the box, respond with your index finger. If the break is located at the top of the box, respond with your middle finger."

Version 2:

"For this task, you are going to use your index and middle fingers to respond with the button pad. During the task, you will see an "X" in the center of the screen. Two of the lines of the "X" will become darker to form an arrow, which will give you information about the target that will then appear. There are two types of cues that will tell you different things about the upcoming target. If the arrow is pointing up or down, this will tell you where the target will appear (on which side), but will not tell you anything about when the box could appear. If the arrow is pointing to the left or right, this will tell you nothing about where, but when the box will appear. After the arrow cue appears, a box will appear either to the top or the bottom, with a break in the left or the right of the box. If the break is located on

the left side of the box, respond with your index finger. If the break is located in the right side of the box, respond with your middle finger."

Structural MRI acquisition

T1-weighed structural MRI were acquired for coregistration with the MEG data. Three different scanners were used for collection of these MRIs, however, these images were only used for coregistration with MEG data, spatial normalization of functional MEG images into standardized space, and visualization of results. Therefore, minor differences in MRI acquisition and image quality would not be expected to affect our MEG results. In addition, all of our relevant analyses were within-subjects, which mitigates concerns about any results being driven by a systematic bias between acquisition parameters. Four participants were collected on a Philips Achieva 3T X-series scanner (Philips Healthcare) with an eight-channel head coil using a 3D fast field echo sequence with the following parameters: TE = 3.70 ms, TR = 8.09 ms, field of view (FOV) =240 mm; slice thickness = 1 mm with no gap, and in-plane resolution = 1.0 × 1.0 mm. Eighteen images were acquired using a Siemens Skyra 3T scanner (Siemens Medical Solutions) with a 32-channel head coil and a MP-RAGE sequence with the following parameters: TR = 2400 ms; TE =1.94 ms; flip angle = 8°; FOV = 256 mm; slice thickness =1 mm (no gap), and voxel size = 1 × 1 × 1 mm. Eleven participants' images were collected using a Siemens Prisma 3T scanner (Siemens Medical Solutions) with a 32-channel head coil and a MP-RAGE sequence with the following parameters: TR: 2300 ms; TE = 2.98 ms; flip angle = 9°; FOV = 256 mm; slice thickness = 1.00 mm; voxel size = 1 × 1 × 1 mm. Lastly, MRIs for six directed attention participants were not acquired, and their data was fitted to age and sex matched MRIs using the scalp surface points in BESA MRI (Version 2.0), prior to source-space analysis. Importantly, coregistering to individual structural MRIs and to a template MRI have been shown to yield similar results (Holliday et al., 2003). These data were aligned in parallel to the anterior and posterior commissures and transformed into standardized space.