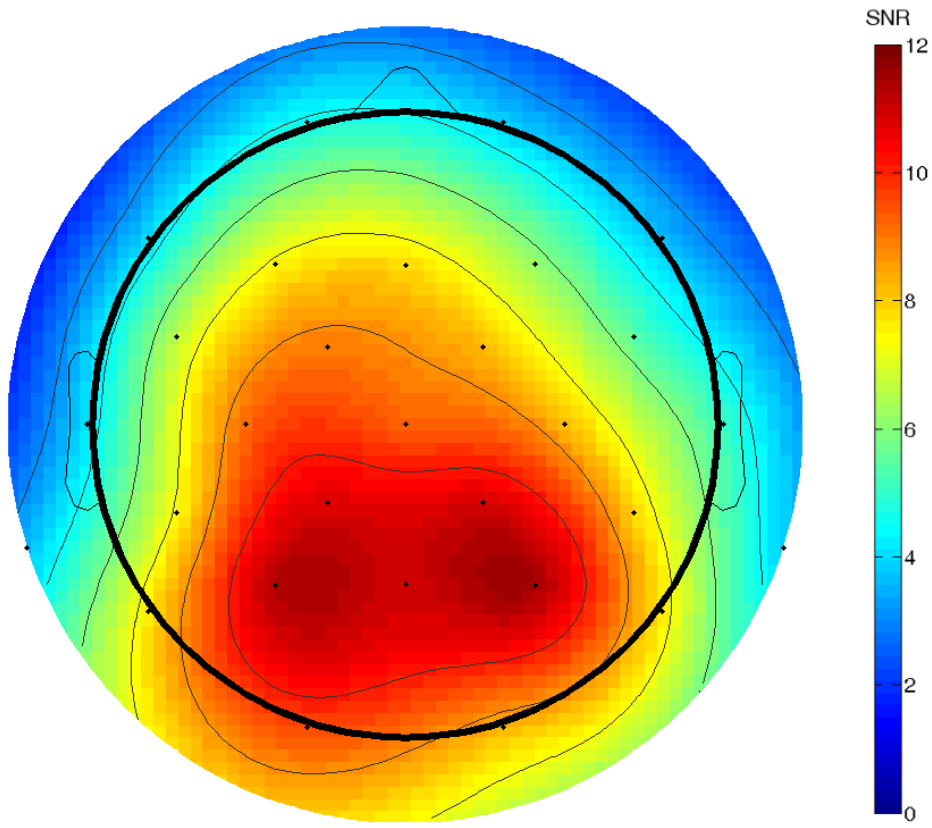
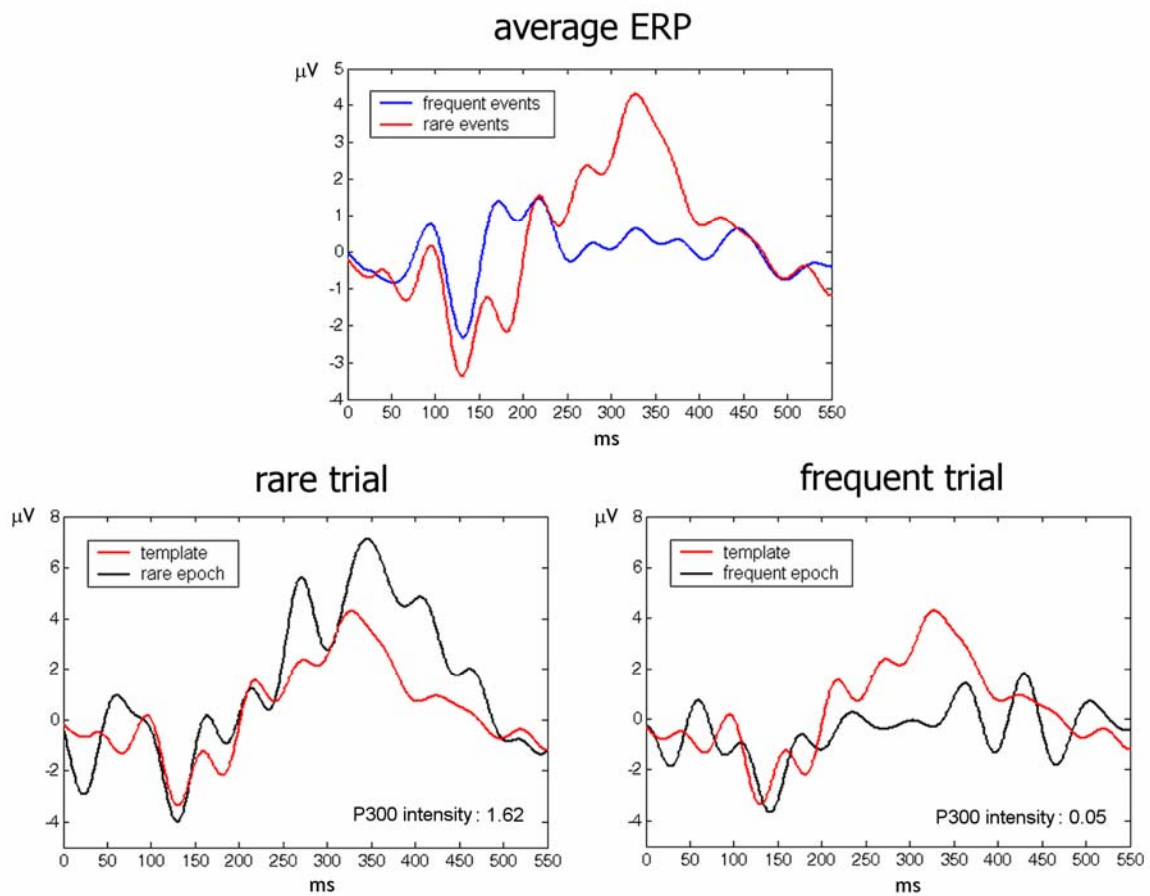


Supplementary Figure 1. Sequence of stimulus events in the visual oddball paradigm. Frequent (yellow disks) and rare (blue disks) events appeared in randomized order and with the probability of 80% and 20% respectively. The experiment lasted 8 minutes, with a stimulus duration of 200 ms and a fixed ITI of 2500 ms.

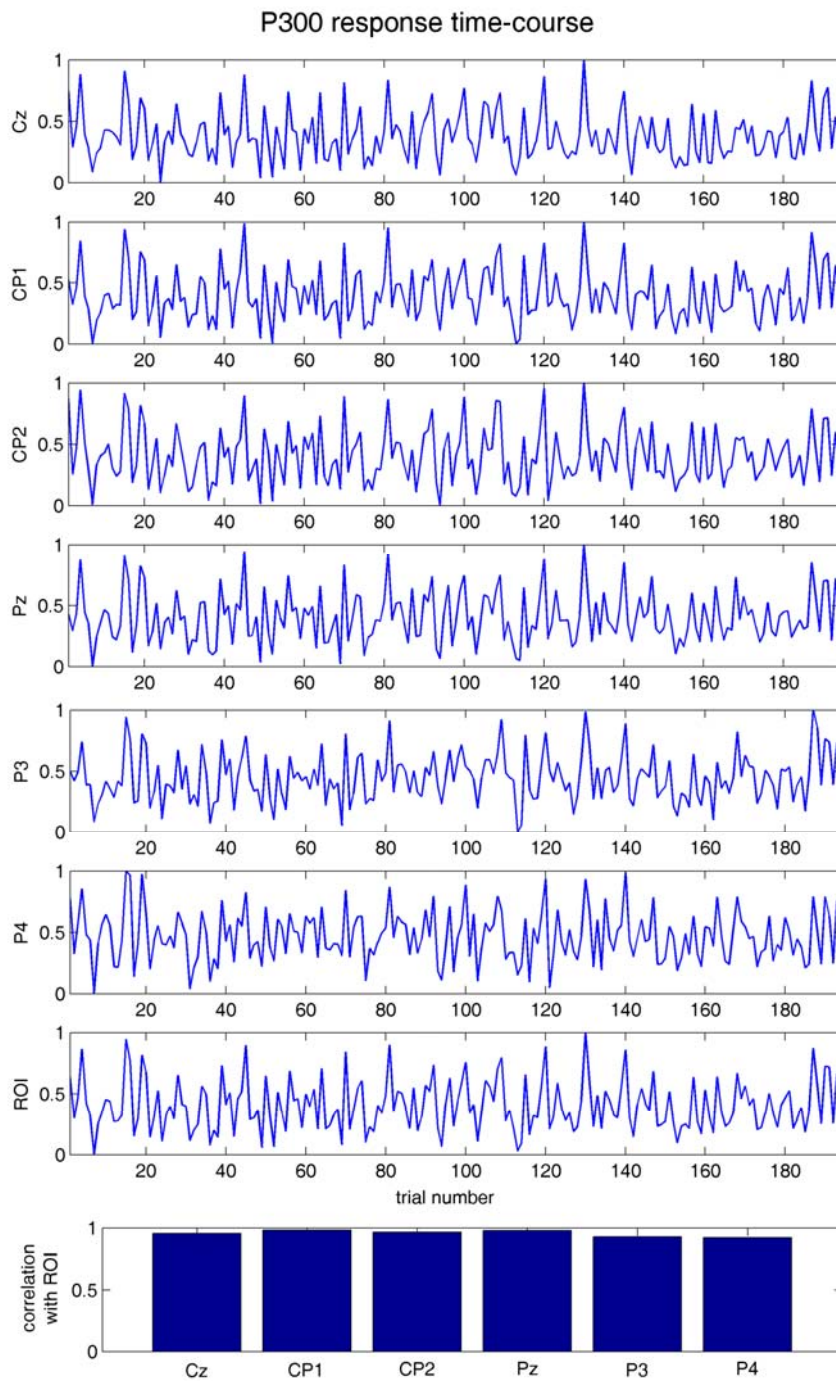
SNR spatial distribution



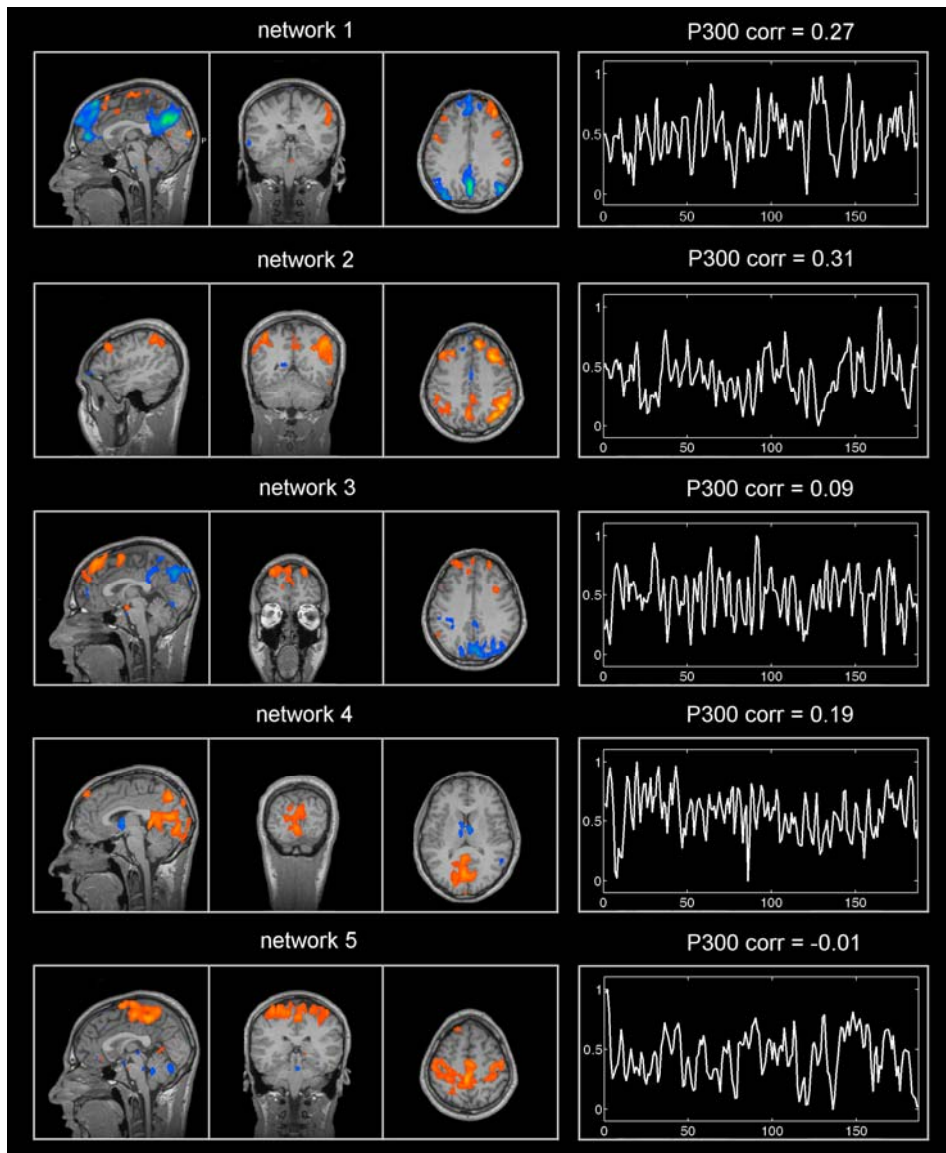
Supplementary Figure 2. Scalp distribution of the average ERP SNR, calculated across subjects (see Method section). The maximum SNR can be found over the centro-parietal areas, consistently with the P3b response.



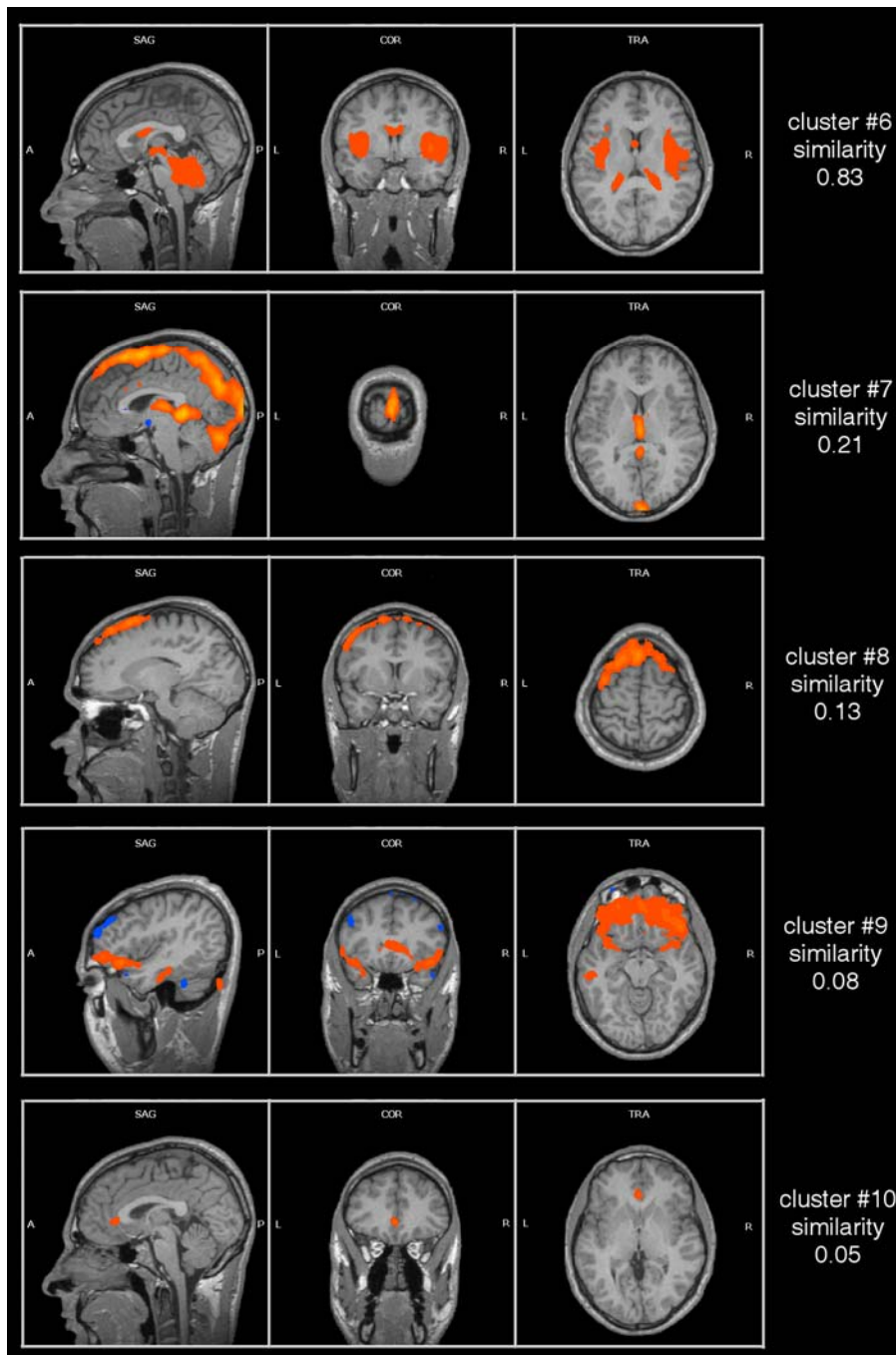
Supplementary Figure 3. The ERP related to the presentation of the target, is compared with two trials, corresponding to rare and frequent stimuli, respectively. The P300 response intensity, calculated using the rare-event ERP as a template (see Method section), is also shown for the two trials.



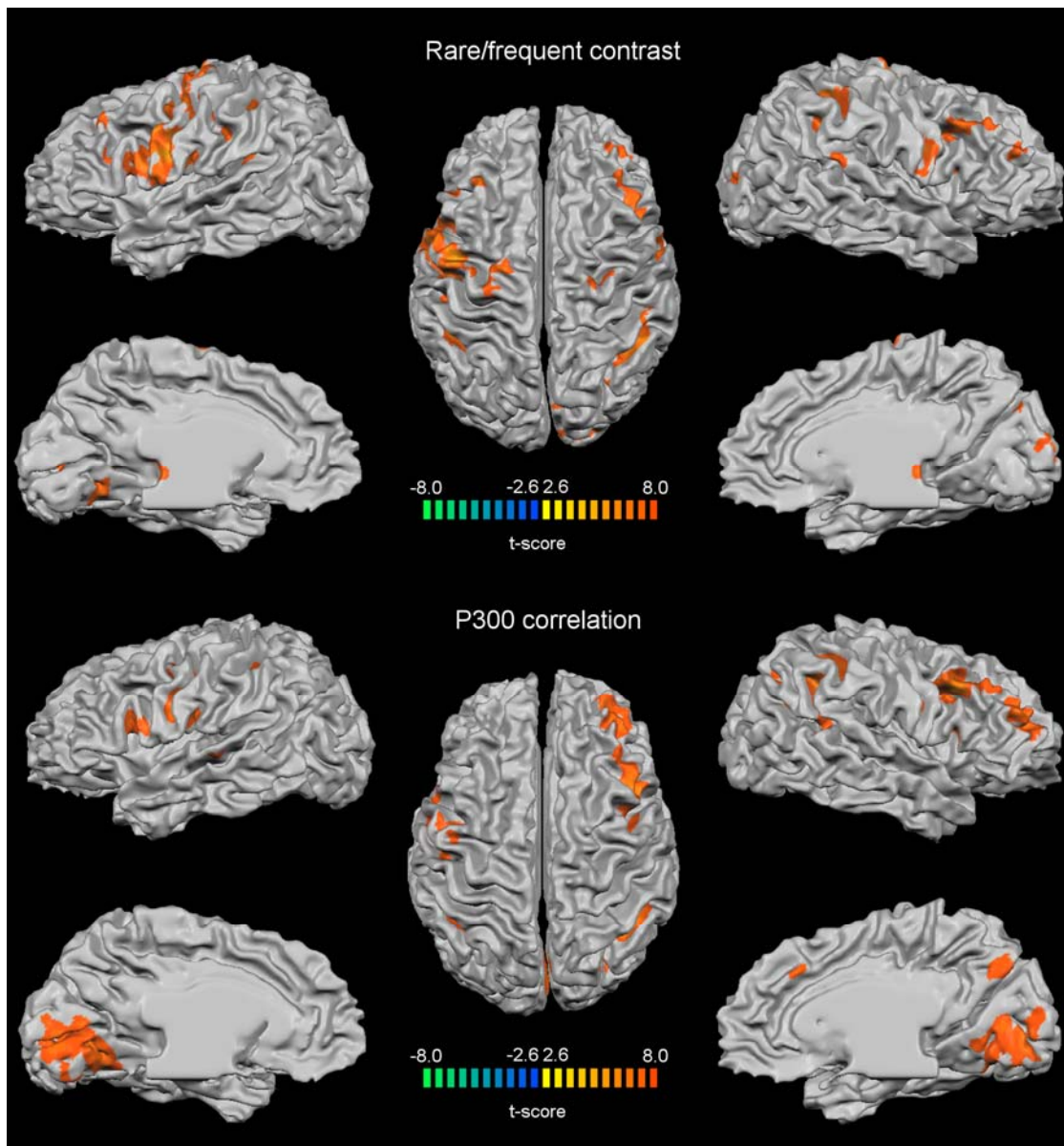
Supplementary Figure 4. P300 response time-courses, calculated at the electrodes within the scalp ROI showing higher SNR (electrodes Cz, CP1, CP2, Pz, P2, P4). The P300 response time-course for the whole scalp ROI is compared with each of the 6 constituting time-courses by means of the correlation coefficient.



Supplementary Figure 5. Five networks separated from a single fMRI dataset, that are consistently found across subjects. (Left panel) Sagittal, coronal and axial functional maps, shown on the subject's structural image transformed into Talairach space. (Right panel) IC time-courses, and the corresponding correlations with the P300 reference time-course.



Supplementary Figure 6. Example of 5 fMRI sogICA clusters that were excluded from subsequent analysis. For each of them, sagittal, coronal and axial maps are shown, along with the intra-cluster similarity index based on spatial correlation. The first four (clusters #6, #7, #8, #9) were classified as artifacts. Among them, clusters #6 and #7 showed an intra-cluster similarity comparable to or larger than the fMRI networks. Cluster # 10 was likely to include brain activity, but was considered unreliable on the basis of the similarity index. All the remaining clusters (from #11 to #30) showed lower intra-cluster similarity values.



Supplementary Figure 7. Sources of P300 activity revealed by fMRI activation maps. (Top panel) Activations resulting from group statistical maps of BOLD increase between rare and frequent events; (Bottom panel) Activations resulting from group statistical maps of BOLD correlation with the P300 reference time-course.

Supplementary Table 1. Peak foci of the brain areas that compose the ventral attention network. For each of them, the corresponding anatomical region and the Brodmann's area are provided, as well as the z-score. The brain areas that present positive and negative correlations with the P300 reference time-course are characterized by positive and negative z-scores respectively.

<i>Anatomical region</i>	<i>BA</i>	<i>z-score</i>	<i>Talairach coordinates</i>		
			<i>x</i>	<i>y</i>	<i>z</i>
<i>Frontal Lobes</i>					
Inferior frontal gyrus (L)	44	2.3	-53	12	5
Inferior frontal gyrus (R)	44	2.9	49	17	4
Middle frontal gyrus (L)	10	1.7	-36	46	28
Middle frontal gyrus (R)	10	2.8	39	34	34
Middle frontal gyrus (L)	6	0.8	-17	-4	62
Middle frontal gyrus (R)	6	1.4	28	-6	57
Medial frontal gyrus	6	1.7	3	-3	64
Supplementary motor area	6	2.0	1	1	49
<i>Parietal Lobes</i>					
Inferior parietal lobule (L)	40	1.9	-42	-52	44
Inferior parietal lobule (R)	40	2.5	43	-52	46
Superior parietal lobule (L)	7	1.9	-31	-60	46
Superior parietal lobule (R)	7	1.6	34	-63	45
Precuneus	7	-	-4	-70	45
<i>Temporal Lobes</i>					
Superior temporal gyrus (R)	22	1.6	55	-49	21
<i>Occipital Lobes</i>					
Cuneus	18	1.3	0	-79	-5
<i>Deep gray</i>					
Thalamus	-	1.0	-9	-8	10
<i>Frontal Lobes</i>					
Medial frontal gyrus	10	-5.1	0	53	11
Superior frontal gyrus (L)	8	-2.2	-15	34	52
Superior frontal gyrus (R)	8	-1.7	17	32	52
<i>Parietal Lobes</i>					
Posterior cingulate	30	-5.5	-1	-50	15
<i>Temporal Lobes</i>					
Inferior temporal gyrus (L)	21	-1.7	-58	-12	-14
Inferior temporal gyrus (R)	21	-2.4	55	-6	-11
Superior temporal gyrus (L)	22	-3.2	-49	-61	19
Superior temporal gyrus (R)	22	-2.6	50	-59	17
<i>Deep gray</i>					
Hippocampus (L)	-	0.8	-19	-20	-11
Hippocampus (R)	-	1.3	19	-19	-12

Supplementary Table 2. Peak foci of the brain areas that compose the dorsal attention network. For each of them, the corresponding anatomical region and the Brodmann's area are provided, as well as the z-score. The brain areas that present positive and negative correlations with the P300 reference time-course are characterized by positive and negative z-scores respectively.

<i>Anatomical region</i>	<i>BA</i>	<i>z-score</i>	<i>Talairach coordinates</i>		
			<i>x</i>	<i>y</i>	<i>z</i>
<i>Frontal Lobes</i>					
Middle frontal gyrus (L)	10	1.3	-37	52	10
Middle frontal gyrus (R)	10	2.5	42	49	6
Middle frontal gyrus (L)	8	1.7	-47	11	39
Middle frontal gyrus (R)	8	2.9	44	11	41
Superior frontal gyrus	8	2.9	3	27	50
<i>Parietal Lobes</i>					
Inferior parietal lobule (L)	7	2.3	-38	-58	43
Inferior parietal lobule (R)	7	3.7	36	-68	37
Posterior cingulate	31	2.0	3	-40	27
Precuneus	31	2.1	3	-70	34
<i>Frontal Lobes</i>					
Medial frontal gyrus	9	-1.5	-1	52	27
Middle frontal gyrus	8	-1.4	-30	38	33
Precentral gyrus (L)	4	-1.8	-55	-1	9
Precentral gyrus (R)	4	-1.5	58	-3	12
<i>Limbic lobe</i>					
Insula (L)	-	-1.3	-42	-1	7
Insula (R)	-	-1.4	44	-1	7
<i>Parietal Lobes</i>					
Paracentral lobule	31	-1.2	3	-8	46
Postcentral gyrus (L)	40	-0.9	-57	-26	25
Postcentral gyrus (R)	40	-1.1	56	-26	23

Supplementary Table 3. Brain sources of P300 activity resulting from group statistical maps (fixed-effect analysis, $p < 0.001$) of BOLD increase due to rare events and compared to frequent events. For each area, the coordinates in Talairach space of the peak foci and the corresponding t -score are provided, as well as the anatomical region and the Brodmann's area.

<i>Anatomical region</i>	<i>BA</i>	<i>t-score</i>	<i>Talairach coordinates</i>		
			<i>x</i>	<i>y</i>	<i>z</i>
<i>Frontal Lobes</i>					
Middle frontal gyrus (R)	10	3.67	37	44	24
Middle frontal gyrus (L)	8	4.41	-30	30	38
Middle frontal gyrus (R)	8	3.85	37	29	38
Medial frontal gyrus	6	3.98	-1	-9	61
Superior frontal gyrus (L)	6	3.89	-27	-17	61
Superior frontal gyrus (R)	6	3.38	27	-14	57
Precentral gyrus (L)	6	5.89	-54	-3	26
Precentral gyrus (R)	6	4.39	56	-2	26
Supplementary motor area	6	3.25	1	0	49
<i>Parietal Lobes</i>					
Inferior parietal lobule (L)	40	3.85	-40	-52	41
Inferior parietal lobule (R)	40	4.07	43	-52	41
Superior parietal lobule (L)	7	3.21	-39	-63	42
Superior parietal lobule (R)	7	3.43	36	-63	43
Precuneus	31	3.59	10	-74	39
<i>Temporal Lobes</i>					
Middle temporal gyrus (L)	21	2.71	-61	-41	4
Middle temporal gyrus (R)	21	3.12	57	-50	7
<i>Occipital Lobes</i>					
Cuneus	18	4.06	-7	-75	3
<i>Deep gray</i>					
Midbrain	-	3.66	-2	-34	2
Thalamus	-	3.18	1	-16	15
<i>Cerebellum</i>					
Medial cerebellum	-	4.01	-1	-75	-24
Lateral cerebellum (L)	-	4.65	-33	-64	-28
Lateral cerebellum (R)	-	4.86	33	-56	-27

Supplementary Table 4. Brain sources of P300 activity resulting from group statistical maps (fixed-effect analysis, $p < 0.001$) of BOLD correlation with the P300 reference time-course. For each area, the coordinates in Talairach space of the peak foci and the corresponding t -score are provided, as well as the anatomical region and the Brodmann's area.

<i>Anatomical region</i>	<i>BA</i>	<i>t-score</i>	<i>Talairach coordinates</i>		
			<i>x</i>	<i>y</i>	<i>z</i>
<i>Frontal Lobes</i>					
Middle frontal gyrus (L)	9	3.13	-27	31	37
Middle frontal gyrus (R)	44	3.67	42	13	36
Superior frontal gyrus (R)	46	3.52	33	48	19
Superior frontal gyrus (R)	6	3.41	27	-13	62
Precentral gyrus (L)	4	3.65	-46	-8	31
Precentral gyrus (R)	4	3.18	38	-6	40
Anterior cingulate	8	3.49	2	28	36
Supplementary motor area	6	3.17	6	-1	61
<i>Parietal Lobes</i>					
Postcentral gyrus (L)	3	3.93	-52	-8	24
Inferior parietal lobule (L)	40	3.72	-37	-48	37
Inferior parietal lobule (R)	40	5.27	37	-54	40
Precuneus	7	3.82	8	-71	40
<i>Temporal Lobes</i>					
Middle temporal gyrus (R)	21	3.54	52	-45	22
<i>Occipital Lobes</i>					
Cuneus	18	3.51	-4	-68	2
<i>Limbic Lobe</i>					
Insula (L)	-	3.22	-45	13	16
Insula (R)	-	3.67	41	14	16
Putamen (R)	-	3.28	24	1	-1
<i>Cerebellum</i>					
Medial cerebellum	-	3.72	-6	-72	-23
Lateral cerebellum (L)	-	3.88	-39	-55	-26
Lateral cerebellum (R)	-	3.28	42	-54	-25