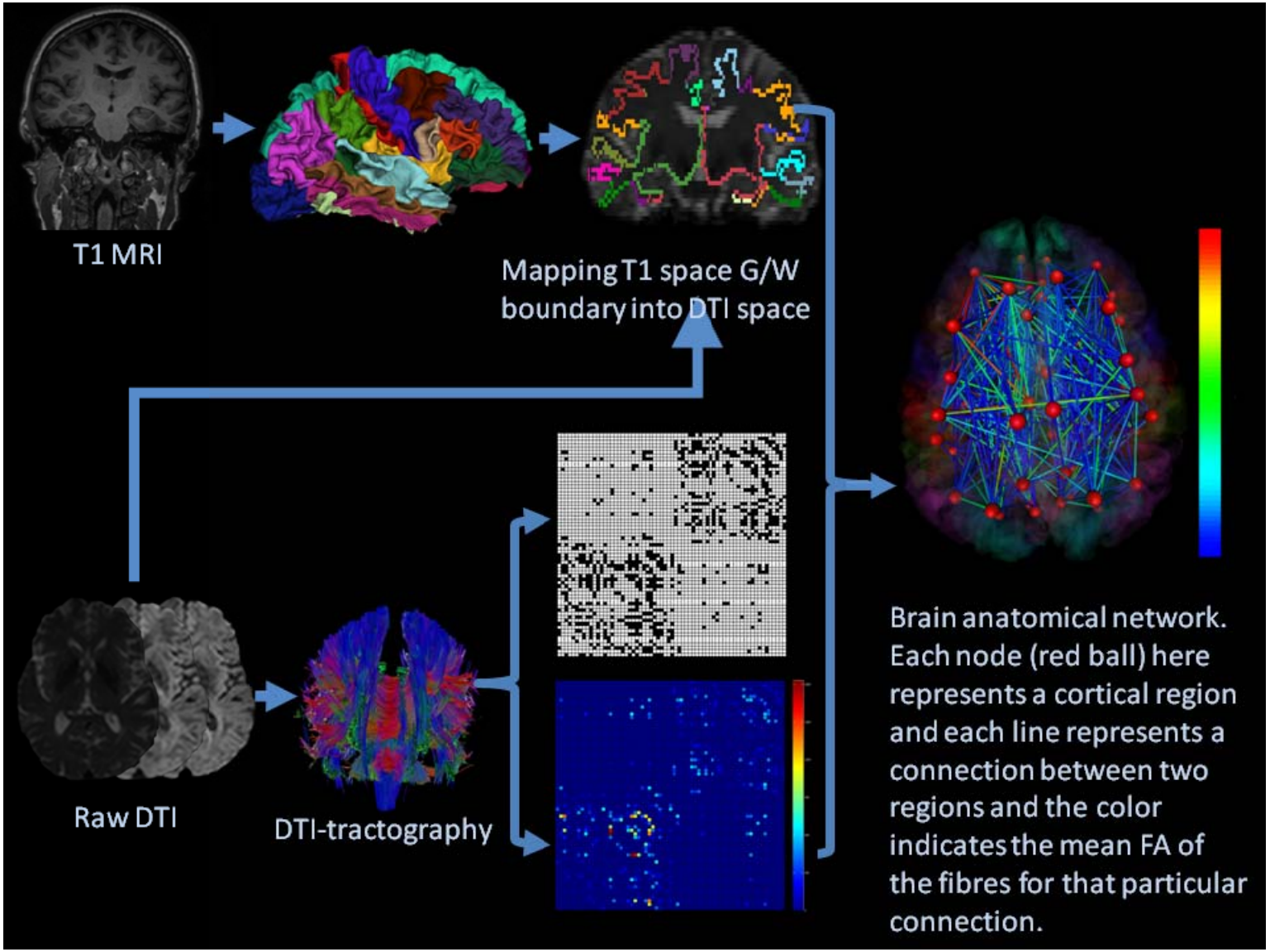
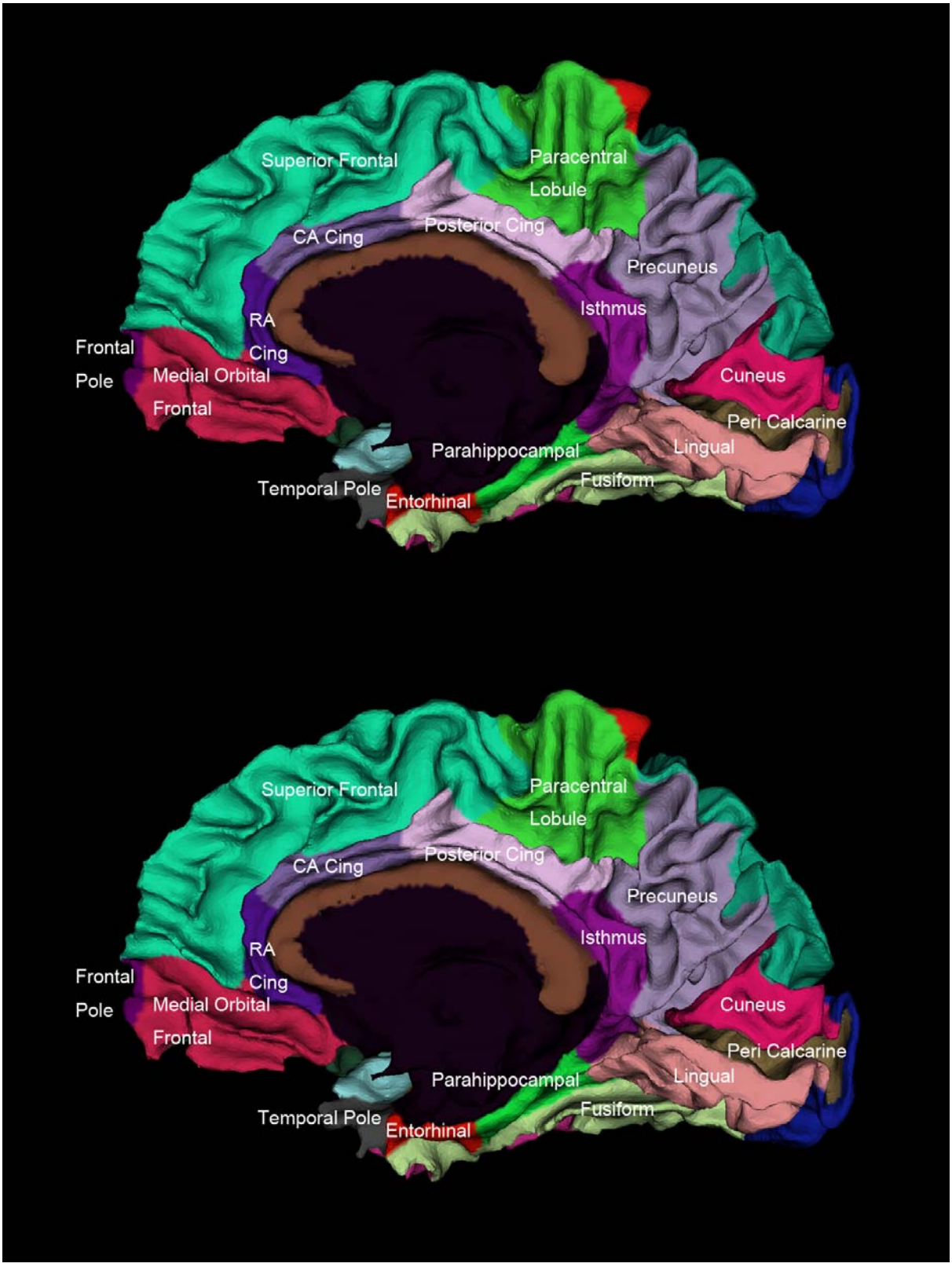
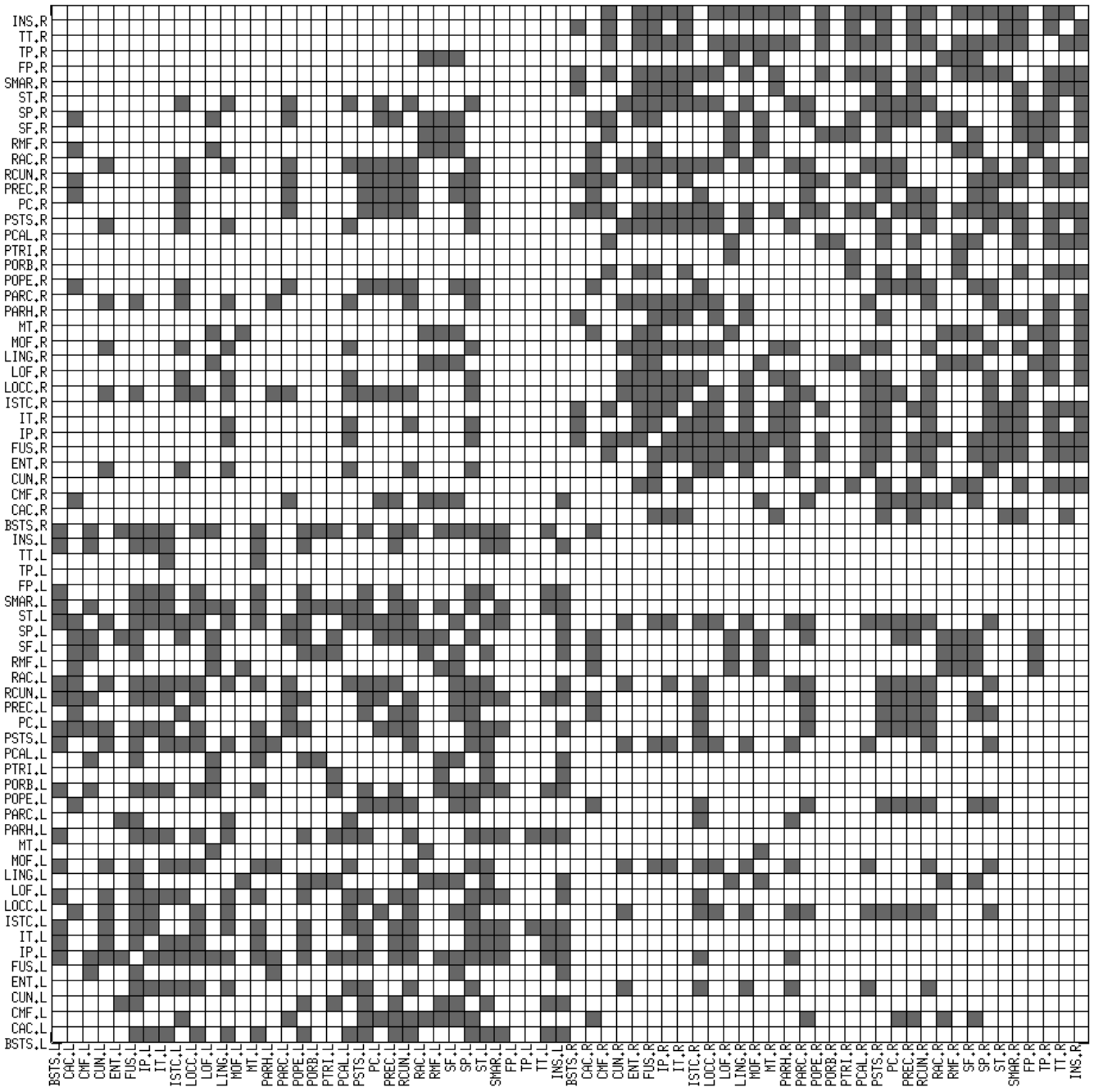


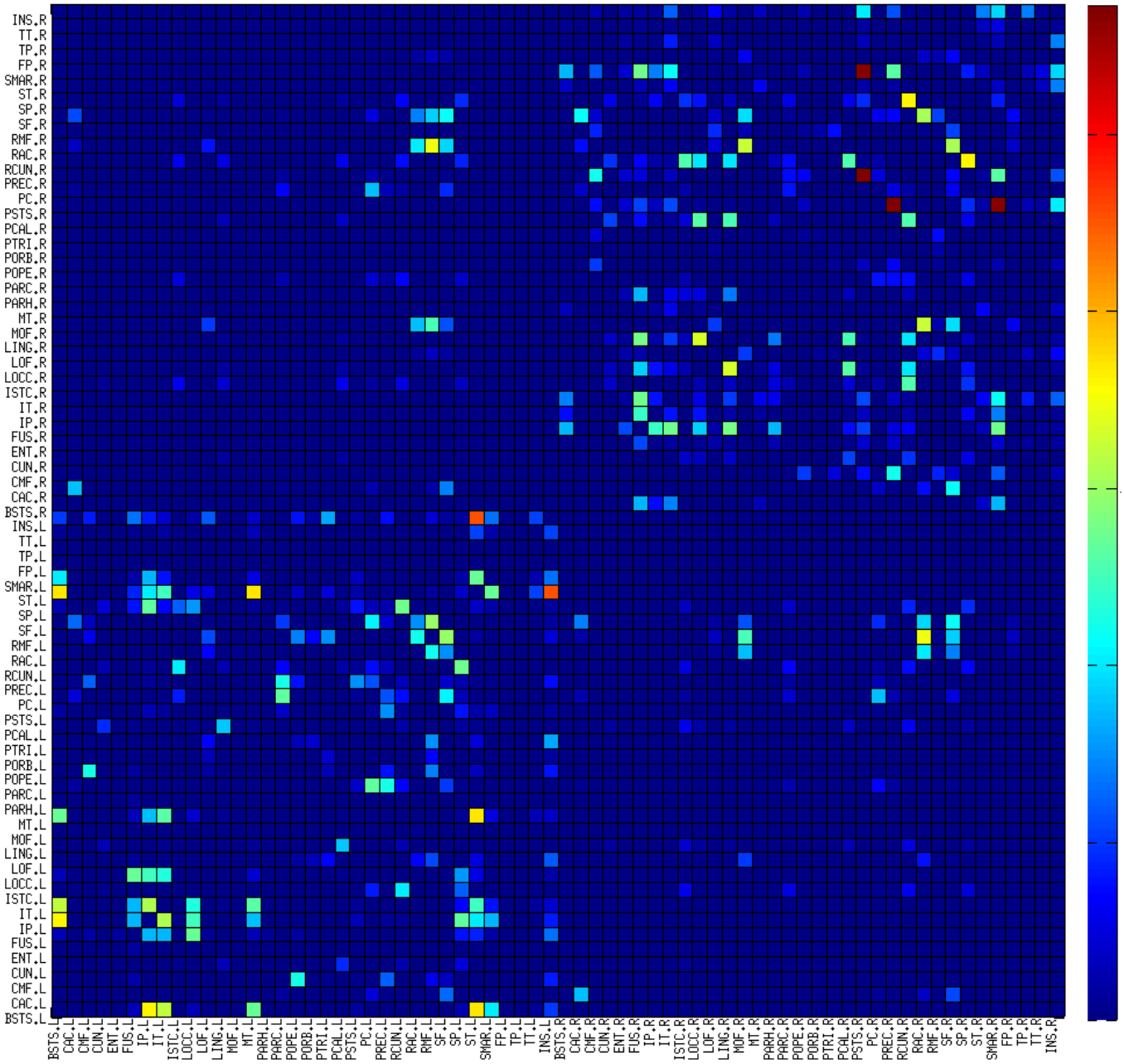
Supplementary Figure 1. Flow chart of constructing a DTI-based network. Both T1-weighted structural MRI and 32-directional diffusion tensor imaging (DTI) scans were acquired for each participant. Grey matter (GM), white matter (WM) and cerebrospinal fluid (CSF) were segmented, then the boundary of GM and WM was parcellated into 68 areas (34 in each hemisphere) and mapped into DTI space. The raw DTI was processed to obtain fiber-tractography for calculating the connection between cortical regions and the number of fibres that connect them. A binary and a weighted matrix were established. A graph (network) was then constructed using the information from the connectivity matrices. The topological properties of the network(s) were computed and compared between participants.



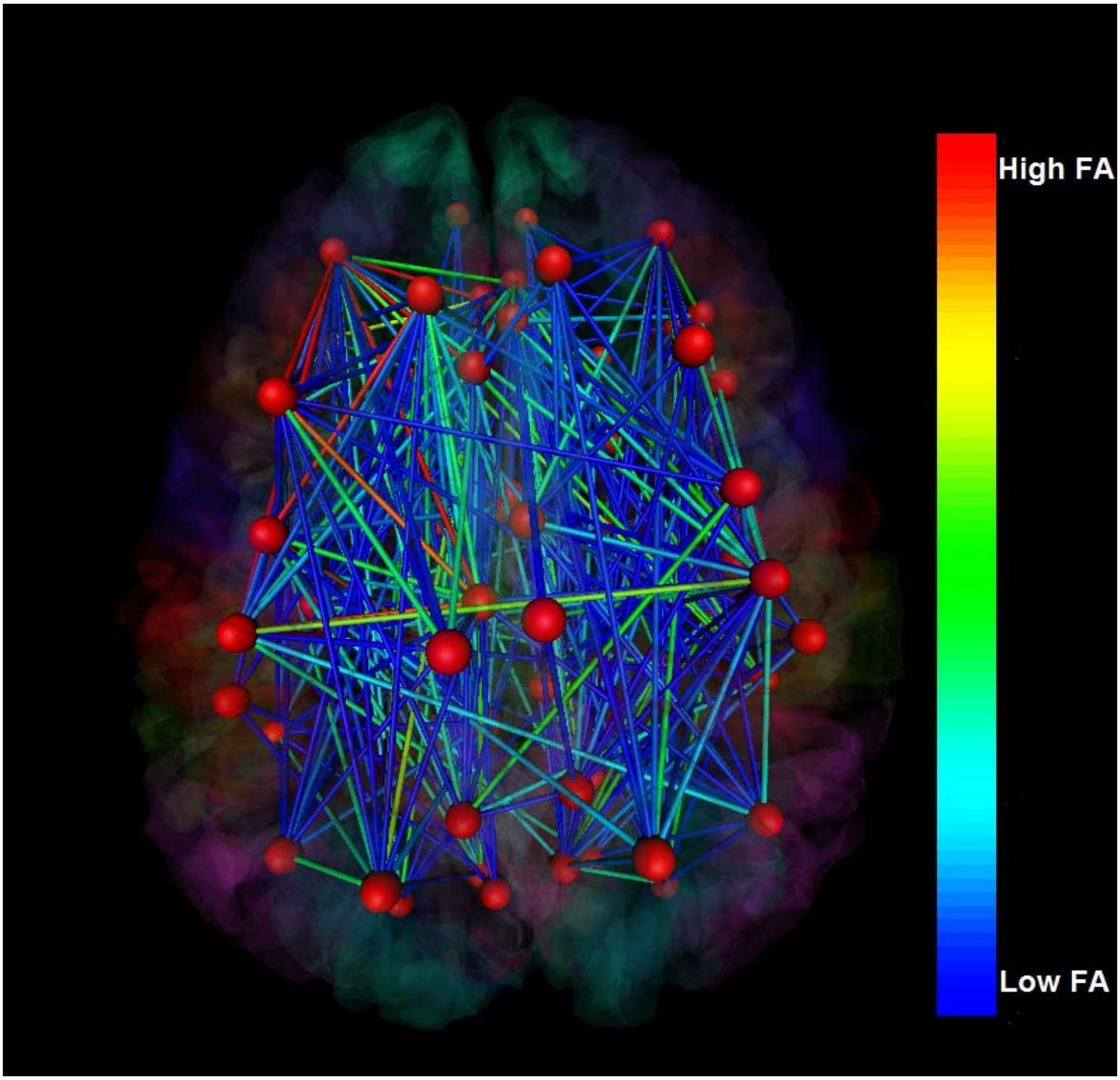
Supplementary Figure 2. After segmentation of grey matter and white matter of the cortex, we parcellated the boundary between the grey matter and white matter into 68 cortical regions (34 in each hemisphere, Transverse Temporal not visible here) as shown. These 68 cortical regions were represented as 68 nodes in the graph of the subject.



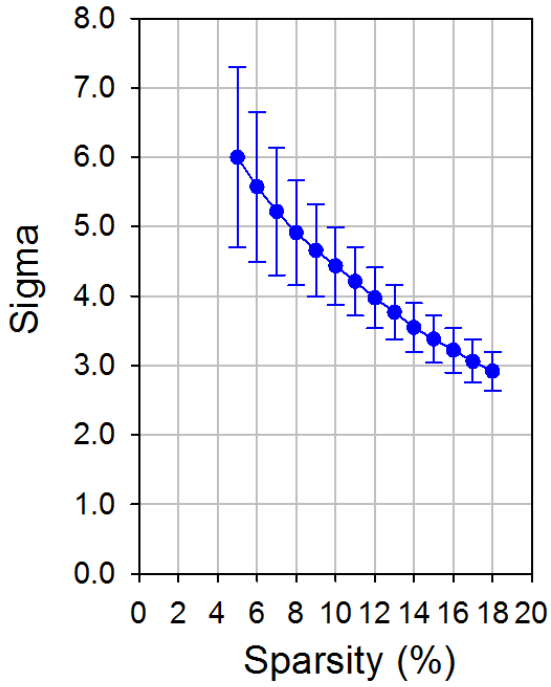
Supplementary Figure 3. Binary anatomical connection matrix. This is a binary matrix of a randomly chosen subject. We generated a binary matrix and a weighted matrix for each subject. Both vertical and horizontal axes are the cortical regions. If there is a fibre connecting two cortical areas, then a connection exists and the box is black, otherwise the box remains white (reverse to the normal representation of "binary" for clearer presentation). The abbreviations are extended in Supplementary Table 1. L = left hemisphere; R = right hemisphere.



Supplementary Figure 4: Weighted anatomical connection matrix. This is an FA value weighted matrix of the same randomly chosen subject as shown in Supplementary Figure 3. This matrix has the same skeleton as the binary matrix of Supplementary Figure 3, but each box has the value of average FA of all the fibres which connected the two cortical regions instead of one or zero in the binary matrix.



Supplementary Figure 5. Weighted anatomical network of a randomly selected participant. Each node represents a cortical region (34 in each hemisphere) and the edge between two nodes represents i) there is an anatomical connection (fibre-tracking) between the two cortical regions; and ii) the strength of the connection, which is the mean FA value of the fibres, and is color-coded.



Supplementary Figure 6. Small-world properties of the networks. The graph shows the changes in σ (mean σ of 342 subjects and the standard deviation) in the weighted neuroanatomical networks as a function of sparsity thresholds from 0.05-0.18 in comparison with the matched random networks, where $\sigma = \gamma / \lambda > 1$ and $\lambda = L_p^{real} / L_p^{rand}$ and $\gamma = C_p^{real} / C_p^{rand}$.

Cortical region abbreviations	Cortical region full names		Lobe
ENT	Entorhinal cortex	Medial aspect	**Temporal**
PARH	Parahippocampal gyrus		
TP	Temporal pole		
FUS	Fusiform gyrus		
ST	Superior temporal gyrus	Lateral aspect	
MT	Middle temporal gyrus		
IT	Inferior temporal gyrus		
TT	Transverse temporal cortex		
BSTS	Banks superior temporal sulcus		
SF	Superior frontal gyrus		**Frontal**
RMF	Rostral middle frontal gyrus	Middle frontal gyrus	
CMF	Caudal middle frontal gyrus		
POPE	Pars opercularis	Inferior frontal gyrus	
PTRI	Pars triangularis		
PORB	Pars orbitalis		
LOF	Lateral orbital frontal cortex	Orbito-frontal cortex	
MOF	Medial orbital frontal cortex		
FP	Frontal pole		
PREC	Precentral gyrus		
PARC	Paracentral lobule		
PSTS	Postcentral gyrus		**Parietal**
SMAR	Supramarginal gyrus		
SP	Superior parietal cortex		
IP	Inferior parietal cortex		
PCUN	Precuneus cortex		
LING	Lingual gyrus		**Occipital**
PCAL	Pericalcarine cortex		
CUN	Cuneus cortex		
LOCC	Lateral occipital cortex		
RAC	Rostral anterior cingulate cortex		**Cingulate cortex**
CAC	Caudal anterior cingulate cortex		
PC	Posterior-cingulate cortex		
ISTC	Isthmus-cingulate cortex		
INS	Insular cortex		**Insular cortex**

Supplementary Table 1. Abbreviations for cortical regions.

Sparsity values (number of edges) in each graph	**Processing speed**				**Visuospatial**				**Executive**				**Language**				**Memory**			
	N	β	T	p	N	β	T	p	N	β	T	p	N	β	T	p	N	β	T	p
0.18 (410)	331	.226	4.349	**.000**	333	.157	2.951	**.003**	327	.069	1.288	.199	338	.044	.821	.412	341	-.001	-.022	.983
0.17 (387)	331	.221	4.238	**.000**	333	.173	3.272	**.001**	327	.070	1.309	.192	338	.039	.735	.463	341	-.013	-.264	.792
0.16 (364)	331	.208	3.980	**.000**	333	.176	3.316	**.001**	327	.072	1.345	.180	338	.039	.729	.466	341	-.007	-.138	.890
0.15 (341)	331	.211	4.049	**.000**	333	.188	3.565	**.000**	327	.074	1.378	.169	338	.031	.579	.563	341	-.021	-.434	.665
0.14 (319)	331	.209	3.987	**.000**	333	.192	3.619	**.000**	327	.068	1.269	.205	338	.029	.538	.591	341	-.035	-.701	.484
0.13 (296)	331	.211	4.000	**.000**	333	.179	3.345	**.001**	327	.092	1.715	.087	338	.022	.402	.688	341	-.029	-.584	.560
0.12 (273)	331	.231	4.390	**.000**	333	.179	3.337	**.001**	327	.104	1.924	.055	338	.026	.481	.631	341	-.033	-.668	.505
0.11 (251)	331	.230	4.408	**.000**	333	.184	3.469	**.001**	327	.047	.885	.377	338	.047	.885	.377	341	-.031	-.633	.527
0.10 (228)	331	.224	4.275	**.000**	333	.180	3.390	**.001**	327	.110	2.054	**.041**	338	.029	.547	.585	341	-.022	-.446	.656
0.09 (205)	331	.230	4.415	**.000**	333	.193	3.649	**.000**	327	.119	2.229	**.026**	338	.061	1.133	.258	341	.007	.146	.884
0.08 (182)	331	.189	3.583	**.000**	333	.191	3.600	**.000**	327	.110	2.051	**.041**	338	.040	.749	.454	341	.005	.104	.917
0.07 (159)	331	.173	3.257	**.001**	333	.167	3.122	**.002**	327	.091	1.698	.091	338	.025	.461	.645	341	-.002	-.048	.962
0.06 (137)	331	.173	3.262	**.001**	333	.131	2.440	**.015**	327	.078	1.442	.150	338	.026	.487	.626	341	-.033	-.673	.501
0.05 (114)	331	.169	3.240	**.001**	333	.117	2.226	**.027**	327	**.047**	.889	.375	338	.052	.982	.327	341	-.029	-.588	.557

Supplementary Table 2. Regression analyses, under various sparisty values, for the prediction of cognitive domain scores from weighted global network efficiency. In all analyses, participants' age, sex and years of education were included in the models as control variables, N=number of subjects, β=standardized regression coefficient, T = T-value for regression coefficient and p = significance of the regression coefficient (the p values are in bold face when < 0.05).

Lobe		Cortical areas	Left hemisphere		Right hemisphere	
			cor	p	cor	p
Temporal	Medial aspect	Entorhinal cortex	-.087	.111	-.141	**.009**
		Parahippocampal gyrus	-.168	**.002**	-.185	**.001**
		Temporal pole	-.028	.607	-.107	**.048**
		Fusiform gyrus	-.192	**.000**	-.224	**.000**
	Lateral aspect	Superior temporal gyrus	-.200	**.000**	-.118	**.030**
		Middle temporal gyrus	-.147	**.007**	-.080	.143
		Inferior temporal gyrus	-.260	**.000**	-.215	**.000**
		Transverse temporal cortex	-.137	**.012**	-.176	**.001**
		Banks superior temporal sulcus	-.094	.082	-.128	**.018**
Frontal		Superior frontal gyrus	-.188	**.000**	-.255	**.000**
	Middle frontal gyrus	Rostral middle frontal gyrus	-.252	**.000**	-.165	**.002**
		Caudal middle frontal gyrus	-.191	**.000**	-.202	**.000**
	Inferior frontal gyrus	Pars opercularis	-.214	**.000**	-.183	**.001**
		Pars triangularis	-.206	**.000**	-.082	.130
		Pars orbitalis	-.193	**.000**	-.086	.112
	Orbito-frontal cortex	Lateral orbital frontal cortex	-.271	**.000**	-.191	**.000**
		Medial orbital frontal cortex	-.158	**.004**	-.241	**.000**
		Frontal pole	-.071	.189	-.129	**.018**
		Precentral gyrus	-.180	**.001**	-.224	**.000**
		Paracentral lobule	-.157	**.004**	-.122	**.025**
Parietal		Postcentral gyrus	-.218	**.000**	-.219	**.000**
		Supramarginal gyrus	-.222	**.000**	-.178	**.001**
		Superior parietal cortex	-.238	**.000**	-.178	**.001**
		Inferior parietal cortex	-.142	**.009**	-.165	**.002**
		Precuneus cortex	-.212	**.000**	-.151	**.005**
Occipital		Lingual gyrus	-.230	**.000**	-.267	**.000**
		Pericalcarine cortex	-.176	**.001**	-.099	.068
		Cuneus cortex	-.214	**.000**	-.077	.156
		Lateral occipital cortex	-.162	**.003**	-.192	**.000**
Cingulate cortex		Rostral anterior cingulate cortex	-.149	**.006**	-.224	**.000**
		Caudal anterior cingulate cortex	-.275	**.000**	-.245	**.000**
		Posterior-cingulate cortex	-.227	**.000**	-.207	**.000**
		Isthmus-cingulate cortex	-.218	**.000**	-.184	**.001**
Insular Cortex		Insular cortex	-.230	**.000**	-.205	**.000**

Supplementary Table 3: Age vs. regional efficiency for FA-value weighted networks in the 68 cortical areas (34 in each hemisphere). Partial correlation analysis was carried out by controlling for sex and years of education. To correct for multiple comparisons we used False Discovery Rate (FDR). A new threshold of 0.032 was established using FDR and the cortical areas that survived this new threshold were highlighted and underlined (The p values are in bold face when < 0.05). cor – correlation coefficients.

Lobe		Cortical areas	Left hemisphere		Right hemisphere	
			cor	p	cor	p
Temporal	Medial aspect	Entorhinal cortex	.044	.435	.153	**.006**
		Parahippocampal gyrus	.215	**.000**	.137	**.014**
		Temporal pole	.068	.225	.213	**.000**
		Fusiform gyrus	.220	**.000**	.251	**.000**
	Lateral aspect	Superior temporal gyrus	.229	**.000**	.228	**.000**
		Middle temporal gyrus	.204	**.000**	.197	**.000**
		Inferior temporal gyrus	.346	**.000**	.252	**.000**
		Transverse temporal cortex	.231	**.000**	.144	**.010**
		Banks superior temporal sulcus	.122	**.029**	.151	**.007**
Frontal		Superior frontal gyrus	.239	**.000**	.262	**.000**
	Middle frontal gyrus	Rostral middle frontal gyrus	.250	**.000**	.133	**.017**
		Caudal middle frontal gyrus	.143	**.010**	.192	**.001**
	Inferior frontal gyrus	Pars opercularis	.156	**.005**	.154	**.006**
		Pars triangularis	.190	**.001**	.187	**.001**
		Pars orbitalis	.132	**.018**	.103	.064
	Orbito-frontal cortex	Lateral orbital frontal cortex	.267	**.000**	.161	**.004**
		Medial orbital frontal cortex	.117	**.036**	.167	**.003**
		Frontal pole	-.014	.806	.194	**.000**
		Precentral gyrus	.262	**.000**	.272	**.000**
		Paracentral lobule	.219	**.000**	.216	**.000**
Parietal		Postcentral gyrus	.237	**.000**	.184	**.001**
		Supramarginal gyrus	.219	**.000**	.151	**.007**
		Superior parietal cortex	.254	**.000**	.245	**.000**
		Inferior parietal cortex	.149	**.007**	.110	**.048**
		Precuneus cortex	.279	**.000**	.203	**.000**
Occipital		Lingual gyrus	.223	**.000**	.144	**.010**
		Pericalcarine cortex	.249	**.000**	.187	**.001**
		Cuneus cortex	.228	**.000**	.172	**.002**
		Lateral occipital cortex	.293	**.000**	.289	**.000**
Cingulate cortex		Rostral anterior cingulate cortex	.147	**.008**	.184	**.001**
		Caudal anterior cingulate cortex	.171	**.002**	.201	**.000**
		Posterior-cingulate cortex	.243	**.000**	.239	**.000**
		Isthmus-cingulate cortex	.222	**.000**	.244	**.000**
Insular Cortex		Insular cortex	.227	**.000**	.211	**.000**

Supplementary Table 4: Processing speed vs. regional efficiency for FA-value weighted networks in the 68 cortical areas (34 in each hemisphere). Partial correlation analysis was carried out by controlling for age, sex and years of education. To correct for multiple comparisons we used False Discovery Rate (FDR). A new threshold of 0.0363 was established using FDR and the cortical areas that survived this new threshold were highlighted and underlined (the p values are in bold face when < 0.05). cor – correlation coefficients.

Lobe		Cortical areas	Left hemisphere		Right hemisphere	
			cor	p	cor	p
Temporal	Medial aspect	Entorhinal cortex	.043	.446	.120	**.031**
		Parahippocampal gyrus	.115	**.038**	.052	.350
		Temporal pole	.027	.634	.086	.124
		Fusiform gyrus	.047	.399	.106	.057
	Lateral aspect	Superior temporal gyrus	.074	.184	.164	**.003**
		Middle temporal gyrus	.050	.372	.158	**.004**
		Inferior temporal gyrus	.108	.052	.124	**.026**
		Transverse temporal cortex	.075	.179	.143	**.010**
		Banks superior temporal sulcus	.081	.146	.106	.056
Frontal		Superior frontal gyrus	.145	**.009**	.188	**.001**
	Middle frontal gyrus	Rostral middle frontal gyrus	.197	**.000**	.125	**.025**
		Caudal middle frontal gyrus	.053	.338	.107	.054
	Inferior frontal gyrus	Pars opercularis	.080	.149	.072	.196
		Pars triangularis	.116	**.038**	.114	**.041**
		Pars orbitalis	.147	**.008**	.106	.056
	Orbito-frontal cortex	Lateral orbital frontal cortex	.199	**.000**	.125	**.025**
		Medial orbital frontal cortex	.131	**.018**	.124	**.026**
		Frontal pole	-.014	.803	.147	**.008**
		Precentral gyrus	.086	.123	.160	**.004**
		Paracentral lobule	.144	**.009**	.146	**.009**
Parietal		Postcentral gyrus	.138	**.013**	.099	.075
		Supramarginal gyrus	.086	.123	.093	.094
		Superior parietal cortex	.164	**.003**	.125	**.025**
		Inferior parietal cortex	.051	.363	-.012	.836
		Precuneus cortex	.097	.081	.136	**.015**
Occipital		Lingual gyrus	.107	.055	.086	.122
		Pericalcarine cortex	.130	**.019**	.123	**.027**
		Cuneus cortex	.098	.080	.161	**.004**
		Lateral occipital cortex	.123	**.027**	.138	**.013**
Cingulate cortex		Rostral anterior cingulate cortex	.127	**.022**	.180	**.001**
		Caudal anterior cingulate cortex	.195	**.000**	.174	**.002**
		Posterior-cingulate cortex	.170	**.002**	.146	**.009**
		Isthmus-cingulate cortex	.086	.122	.141	**.011**
Insular Cortex		Insular cortex	.148	**.008**	.118	**.034**

Supplementary Table 5: Visuospatial vs. regional efficiency for FA-value weighted networks in the 68 cortical areas (34 in each hemisphere). Partial correlation analysis was carried out by controlling for age, sex and years of education. To correct for multiple comparisons we used False Discovery Rate (FDR). A new threshold of 0.0190 was established using FDR and the cortical areas that survived this new threshold were highlighted and underlined (the p values are in bold face when < 0.05). cor – correlation coefficients.

Lobe		Cortical areas	Left hemisphere		Right hemisphere	
			cor	p	cor	p
Temporal	Medial aspect	Entorhinal cortex	.081	.148	.078	.162
		Parahippocampal gyrus	.125	**.025**	.125	**.025**
		Temporal pole	-.025	.659	.108	.053
		Fusiform gyrus	.140	**.012**	.082	.143
	Lateral aspect	Superior temporal gyrus	.140	**.012**	.174	**.002**
		Middle temporal gyrus	.117	**.036**	.130	**.019**
		Inferior temporal gyrus	.137	**.014**	.103	.065
		Transverse temporal cortex	.099	.076	.108	.053
		Banks superior temporal sulcus	.124	**.026**	.114	**.041**
Frontal		Superior frontal gyrus	.171	**.002**	.185	**.002**
	Middle frontal gyrus	Rostral middle frontal gyrus	.083	.137	-.012	.836
		Caudal middle frontal gyrus	.181	**.001**	.124	**.025**
	Inferior frontal gyrus	Pars opercularis	.137	**.014**	.096	.085
		Pars triangularis	.085	.126	.078	.163
		Pars orbitalis	.101	.070	.064	.248
	Orbito-frontal cortex	Lateral orbital frontal cortex	.111	**.046**	.027	.622
		Medial orbital frontal cortex	.016	.778	.056	.316
		Frontal pole	-.134	**.016**	.065	.241
		Precentral gyrus	.130	**.020**	.170	**.002**
		Paracentral lobule	.092	.098	.140	**.012**
Parietal		Postcentral gyrus	.140	**.012**	.072	.198
		Supramarginal gyrus	.079	.157	.104	.062
		Superior parietal cortex	.179	**.001**	.143	**.011**
		Inferior parietal cortex	.123	**.028**	.084	.133
		Precuneus cortex	.181	**.001**	.069	.217
Occipital		Lingual gyrus	.121	**.030**	.080	.151
		Pericalcarine cortex	.120	**.031**	.063	.257
		Cuneus cortex	.136	**.014**	.107	.054
		Lateral occipital cortex	.094	.099	.108	.053
Cingulate cortex		Rostral anterior cingulate cortex	-.007	.907	.051	.359
		Caudal anterior cingulate cortex	.075	.181	.092	.097
		Posterior-cingulate cortex	.209	**.000**	.191	**.001**
		Isthmus-cingulate cortex	.072	.197	.132	**.018**
Insular Cortex		Insular cortex	.116	**.037**	.089	.111

Supplementary Table 6: Executive function vs. regional efficiency for FA-value weighted networks in the 68 cortical areas (34 in each hemisphere). Partial correlation analysis was carried out by controlling for age, sex and years of education. To correct for multiple comparisons we used False Discovery Rate (FDR). A new threshold of 0.0025 was established using FDR and the cortical areas that survived this new threshold were highlighted and underlined (the p values are in bold face when < 0.05). cor – correlation coefficients.

Lobe		Cortical areas	Left hemisphere		Right hemisphere	
			cor	p	cor	p
Temporal	Medial aspect	Entorhinal cortex	.053	.341	.033	.551
		Parahippocampal gyrus	.080	.151	.104	.061
		Temporal pole	-.034	.541	.028	.616
		Fusiform gyrus	.071	.202	.086	.121
	Lateral aspect	Superior temporal gyrus	-.019	.730	.092	.098
		Middle temporal gyrus	.000	.998	.072	.196
		Inferior temporal gyrus	.044	.435	.080	.154
		Transverse temporal cortex	.061	.274	-.021	.712
		Banks superior temporal sulcus	.080	.152	.084	.134
Frontal		Superior frontal gyrus	.041	.464	.080	.152
	Middle frontal gyrus	Rostral middle frontal gyrus	.062	.267	.001	.990
		Caudal middle frontal gyrus	.066	.238	.121	**.030**
	Inferior frontal gyrus	Pars opercularis	.110	**.049**	.073	.194
		Pars triangularis	.102	.067	-.026	.647
		Pars orbitalis	.058	.297	.031	.574
	Orbito-frontal cortex	Lateral orbital frontal cortex	.099	.076	.040	.469
		Medial orbital frontal cortex	.041	.466	.087	.118
		Frontal pole	-.083	.138	.059	.287
		Precentral gyrus	.082	.143	.126	**.023**
		Paracentral lobule	-.043	.439	.127	**.022**
Parietal		Postcentral gyrus	.102	.067	.067	.230
		Supramarginal gyrus	.074	.187	.071	.206
		Superior parietal cortex	.153	**.006**	.080	.153
		Inferior parietal cortex	.090	.106	.066	.239
		Precuneus cortex	.038	.491	.057	.304
Occipital		Lingual gyrus	.061	.278	.131	**.018**
		Pericalcarine cortex	.063	.257	.110	**.049**
		Cuneus cortex	.095	.089	.054	.335
		Lateral occipital cortex	.149	**.007**	.075	.179
Cingulate cortex		Rostral anterior cingulate cortex	.027	.629	.087	.118
		Caudal anterior cingulate cortex	.066	.239	.071	.203
		Posterior-cingulate cortex	.026	.646	.048	.394
		Isthmus-cingulate cortex	.022	.690	.104	.061
Insular Cortex		Insular cortex	.096	.085	.042	.457

Supplementary Table S7: Language vs. regional efficiency for FA-value weighted networks in the 68 cortical areas (34 in each hemisphere). Partial correlation analysis was carried out by controlling for age, sex and years of education. No significant correlation was found after correcting for multiple comparisons using False Discovery Rate (FDR) (The p values are in bold face when < 0.05). cor – correlation coefficients.

Lobe		Cortical areas	Left hemisphere		Right hemisphere	
			cor	p	cor	p
Temporal	Medial aspect	Entorhinal cortex	-.019	.739	-.006	.912
		Parahippocampal gyrus	.044	.433	.037	.509
		Temporal pole	.005	.924	-.012	.835
		Fusiform gyrus	.011	.847	-.038	.498
	Lateral aspect	Superior temporal gyrus	.019	.737	.004	.943
		Middle temporal gyrus	-.001	.991	-.024	.666
		Inferior temporal gyrus	.041	.465	.043	.443
		Transverse temporal cortex	.056	.314	-.064	.252
		Banks superior temporal sulcus	.085	.126	-.003	.963
Frontal		Superior frontal gyrus	-.061	.278	.051	.365
	Middle frontal gyrus	Rostral middle frontal gyrus	.041	.462	-.013	.814
		Caudal middle frontal gyrus	-.004	.940	-.050	.370
	Inferior frontal gyrus	Pars opercularis	.006	.914	-.011	.849
		Pars triangularis	.064	.255	-.026	.637
		Pars orbitalis	.027	.624	.028	.614
	Orbito-frontal cortex	Lateral orbital frontal cortex	.037	.513	-.004	.946
		Medial orbital frontal cortex	-.009	.877	.029	.601
		Frontal pole	-.004	.945	.029	.607
		Precentral gyrus	-.046	.411	.024	.672
		Paracentral lobule	-.006	.909	.105	.058
Parietal		Postcentral gyrus	.031	.576	-.055	.327
		Supramarginal gyrus	-.008	.879	-.006	.918
		Superior parietal cortex	.032	.571	-.065	.244
		Inferior parietal cortex	.087	.117	.013	.809
		Precuneus cortex	-.036	.519	-.035	.528
Occipital		Lingual gyrus	-.044	.427	.035	.526
		Pericalcarine cortex	.028	.618	.008	.892
		Cuneus cortex	.004	.947	.028	.622
		Lateral occipital cortex	.077	.168	.024	.673
Cingulate cortex		Rostral anterior cingulate cortex	-.003	.951	.001	.989
		Caudal anterior cingulate cortex	.002	.972	-.041	.462
		Posterior-cingulate cortex	-.021	.711	.005	.936
		Isthmus-cingulate cortex	-.051	.361	.002	.966
Insular Cortex		Insular cortex	.009	.874	-.086	.122

Supplementary Table 8: Memory vs. regional efficiency for FA-value weighted networks in the 68 cortical areas (34 in each hemisphere). Partial correlation analysis was carried out by controlling for age, sex and years of education. No correlation was found between memory domain and regional cortical connectivity. cor – correlation coefficients.