SUPPLEMENTARY MATERIALS AND FIGURES

Name	Subjects	No. conditions	min/subject	Voxel size (mm)	Description
MDTB	24	62	320	3T, 3mm	Cognitive, motor, perceptual, social
Highres-MDTB	8	9	120	7T, 1.5mm	Cognitive, motor, perceptual, social
Nishimoto	6	103	162	3T, 2mm	Cognitive, motor, perceptual, social
IBC	12	208	822	3T, 1.5mm	Cognitive, motor, perceptual, social
WM	16	17	65	3T, 3mm	Motor and working memory task
Multi-demand	37	12	100	3T, 2mm	Executive Tasks
Somatotopic	8	6	96	1.8/2.4	Motor
HCP-Unrelated 100	100	none	60	3T, 2mm	Resting-state

Table 1. FMRI datasets used for the functional fusion. All datasets but the last are task-based. The last one refers to resting-state data from a subset of the HCP dataset.
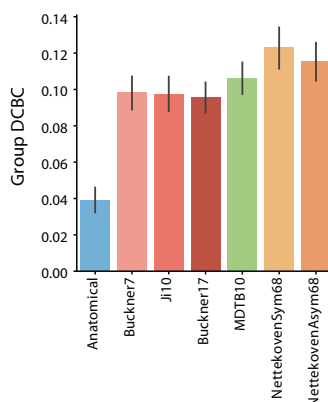

Figure S1. Fused atlas performance compared to existing atlasses. DCBC evluation of existing anatomical parcellation (Lobular: [5]), task-based parcellation (MDTB: [3], and resting-state parcellations (7 and 17 regions: [7]; 10 regions: [6]) averaged across all datasets.
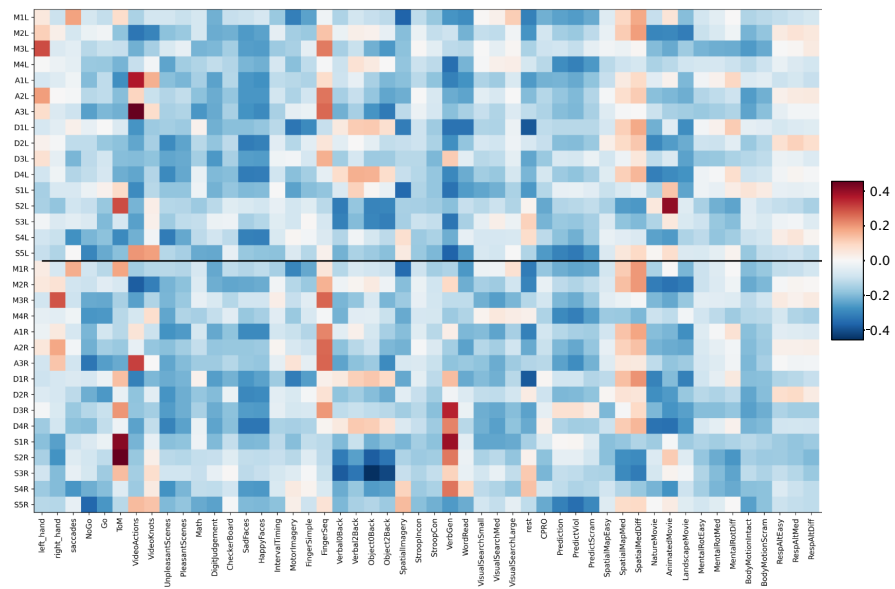
Figure S2. Functional profiles of regions in MDTB dataset. Average activity relative to the mean activity in all tasks in MDTB dataset corrected for motor features. Responses were estimated from subject-specific regions and averaged across subjects for visualization. To account for activation that can be explained by the motor aspects of each task, number of movements were used as covariates alongside regressors that coded for each condition separately. Movements were left hand presses, right hand presses and saccades per second.
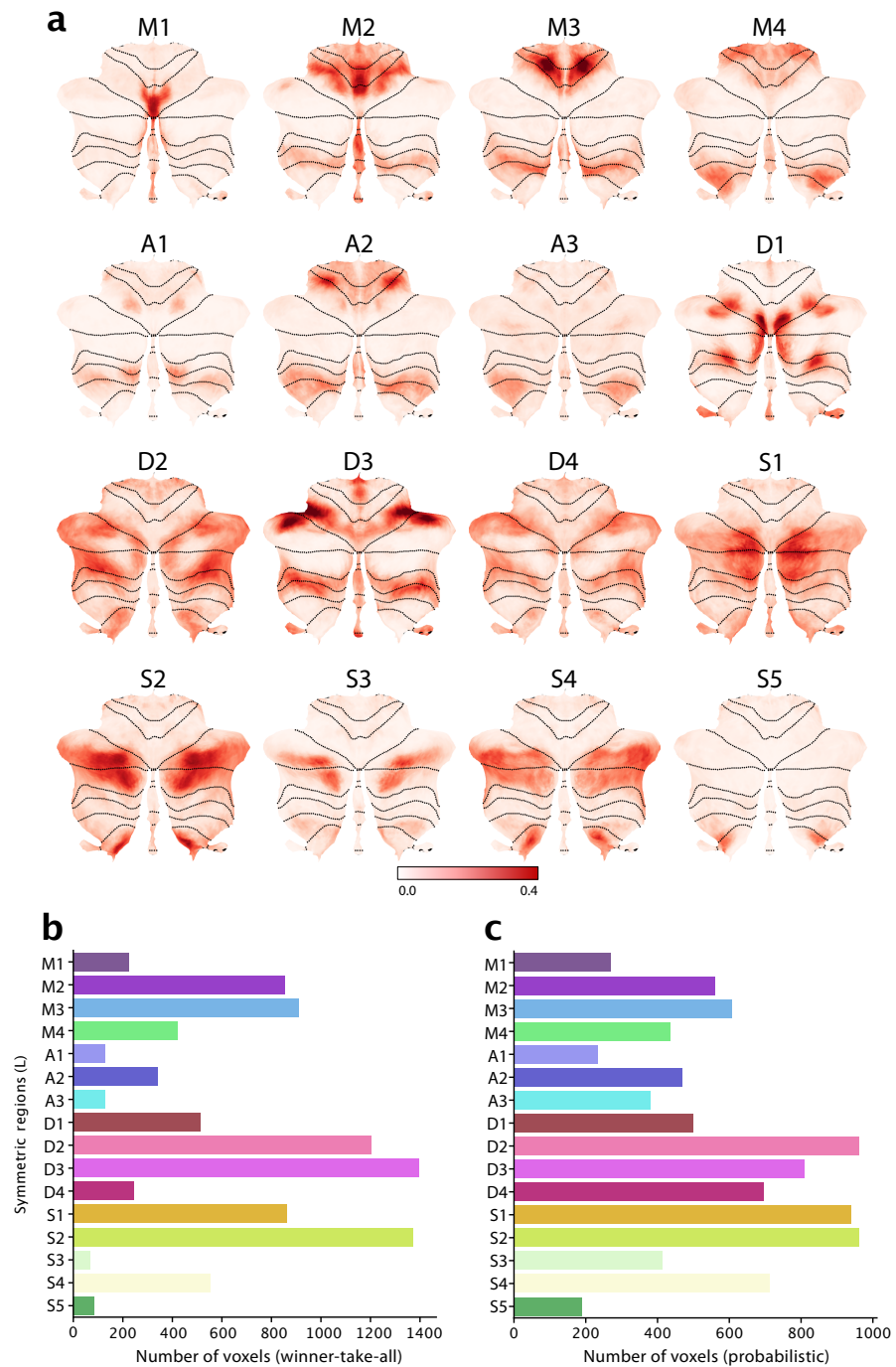
Figure S3. Probability maps and region size. **a**, Probability maps for each region displayed on the flat representation. **b**, Size estimate for each region in terms of the number of voxels ($2mm^3$) using winner-take-all assignment. **c**, Size estimate for each region in terms of the number of voxels ($2mm^3$) using probabilistic assignments.
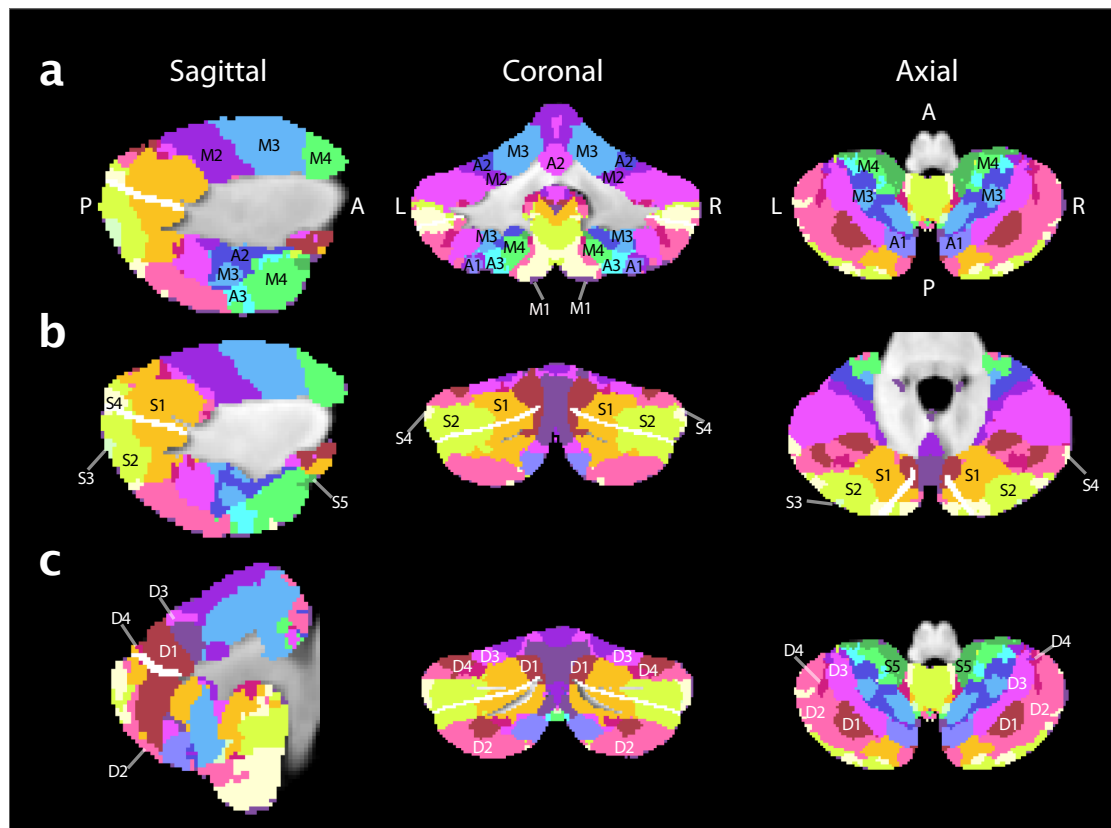
Figure S4. Atlas in volumetric space. Atlas shown at medium granularity (32 regions; 16 per hemisphere). Top row shows motor and action regions, middle row shows multi-demand regions and bottom row shows social-linguistic-spatial regions. Horizontal fissure is marked in white.
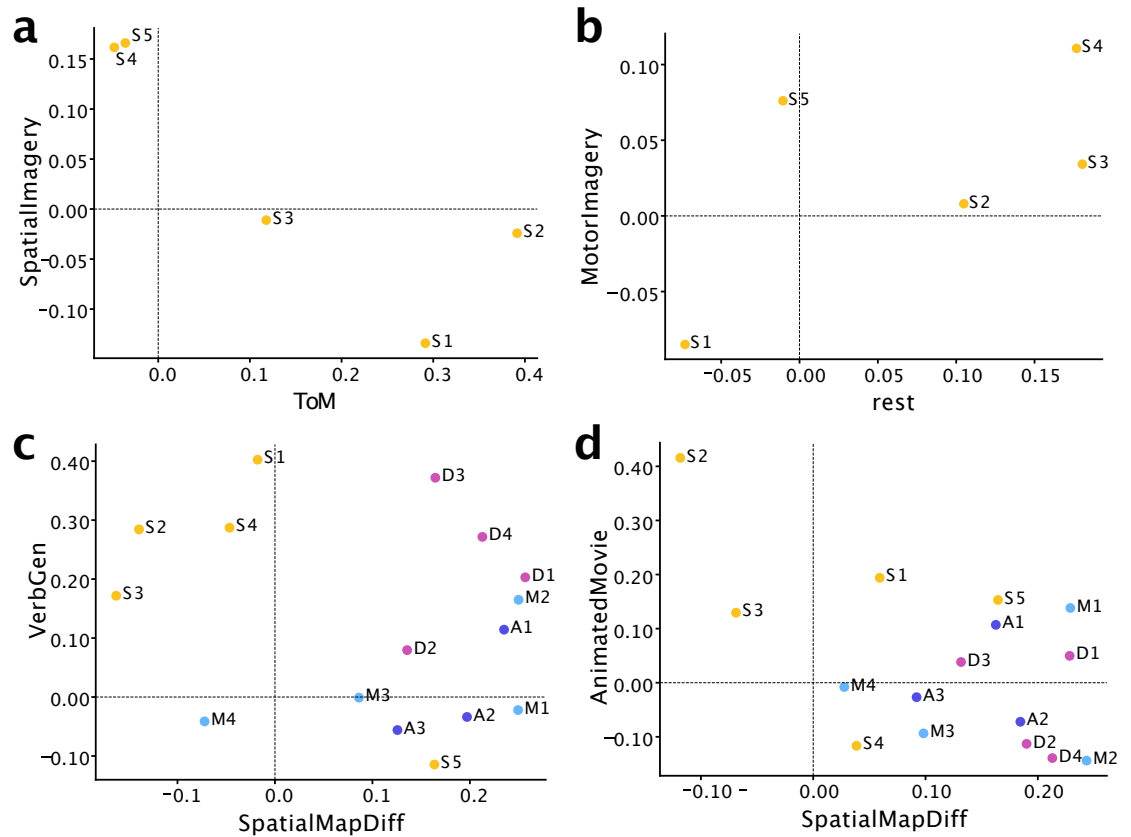
Figure S5. Regional differences in functional responses for selected tasks. **a-b**, Spatial imagery, theory-of-mind, motor imagery and rest separate social-linguistic-spatial (S1-5) regions. **c-d**, Verb generation, spatial map, and animated movie tasks seperate social-linguistic-spatial regions from other domains. For **c**, only the right regions are shown and for **d** only the left regions are shown. For the other panels the responses are shown averaged across hemispheres.
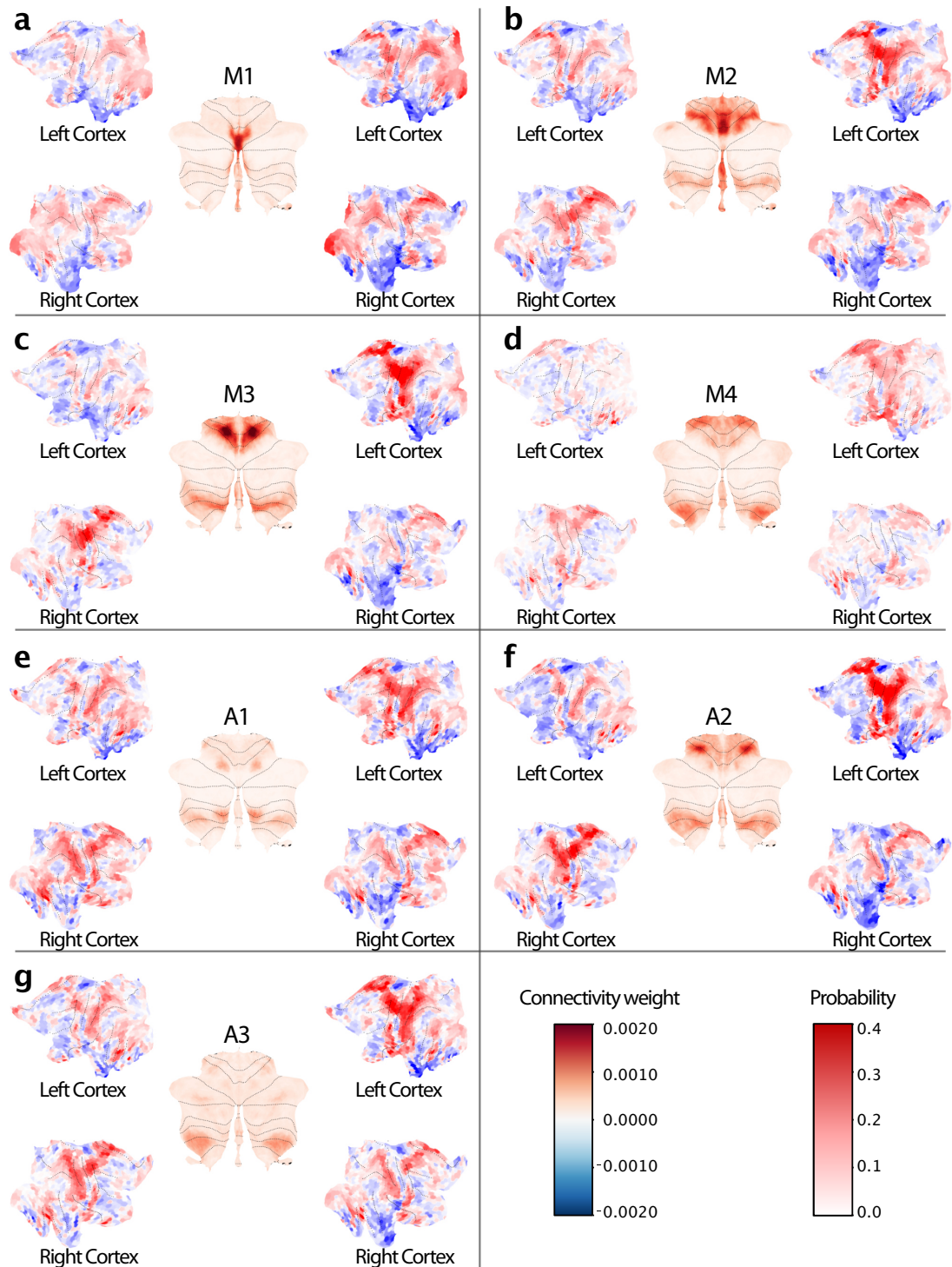
Figure S6. Cortico-cerebellar connectivity weights and probability maps. Parcel probability maps for motor (**a-d**) and action (**e-h**) regions are shown in the middle of each figure inset, surrounded by the cortical input weights for the left and right cerebellar parcel. Weights for the left cerebellar parcel are shown to the left of the probability map and for the right cerebellar parcel to the right of each probability map on the cortical flatmap. Motor regions include oculomotor vermis M1 (**a**), tongue and vermal region M2 (**b**), hand M3 (**c**)) and lower body M4 (**d**)) region. Action regions include spatial simulation regions A1 (**e**), classical action observation A2 (**f**) and motor imagery region A3 (**g**).
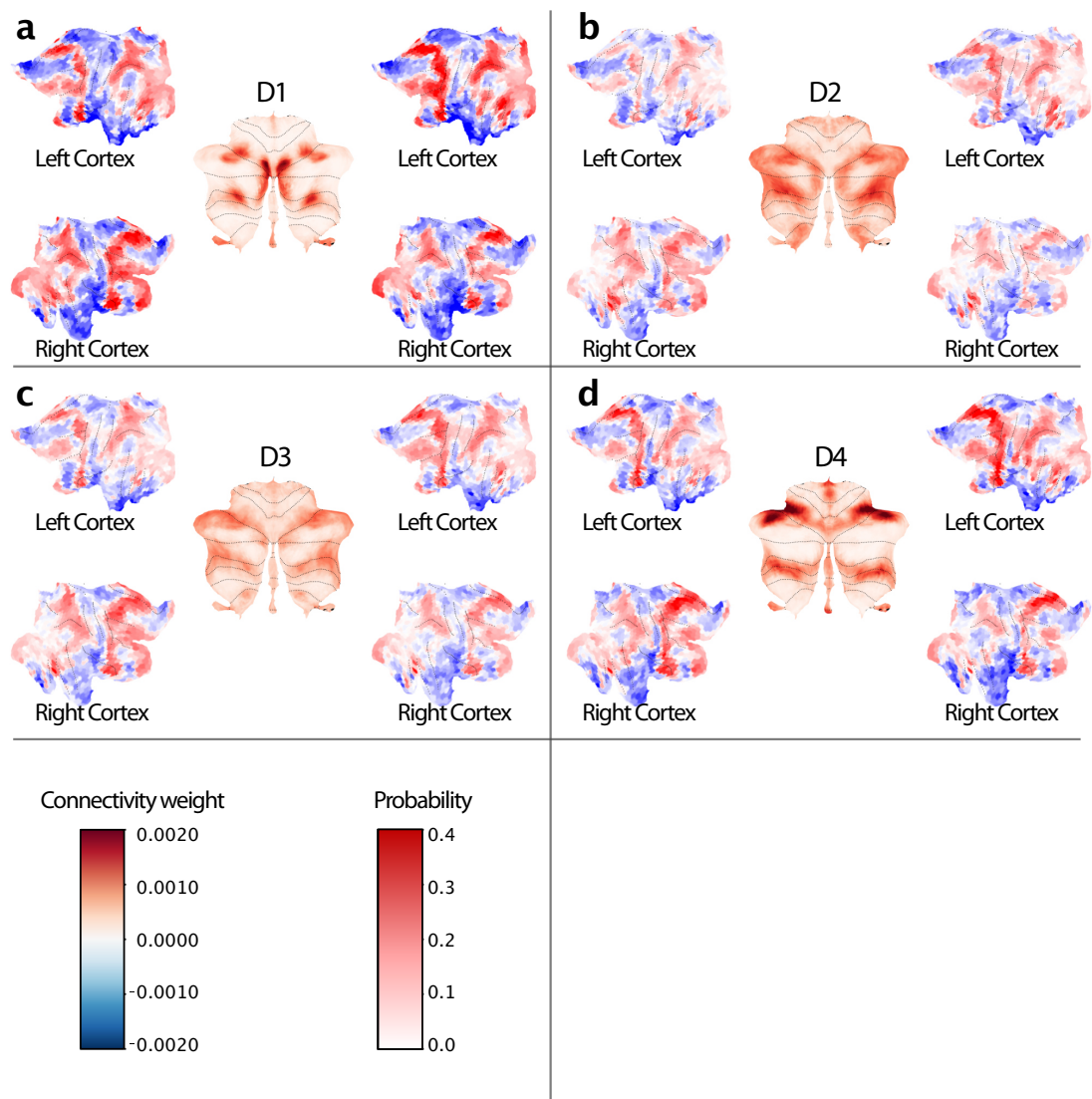
Figure S7. Cortico-cerebellar connectivity weights and probability maps for demand. Parcel probability maps for multiple demand (**a-d**) and social-linguistic-spatial (**e-h**) regions are shown in the middle of each figure inset, surrounded by the cortical input weights for the left and right cerebellar parcel. Weights for the left cerebellar parcel are shown to the left of the probability map and for the right cerebellar parcel to the right of each probability map on the cortical flatmap. Demand regions include spatial working memory region (**a**), recall regions (**b**), difficulty-related (**c**)) and n-back region (**d**)) region.
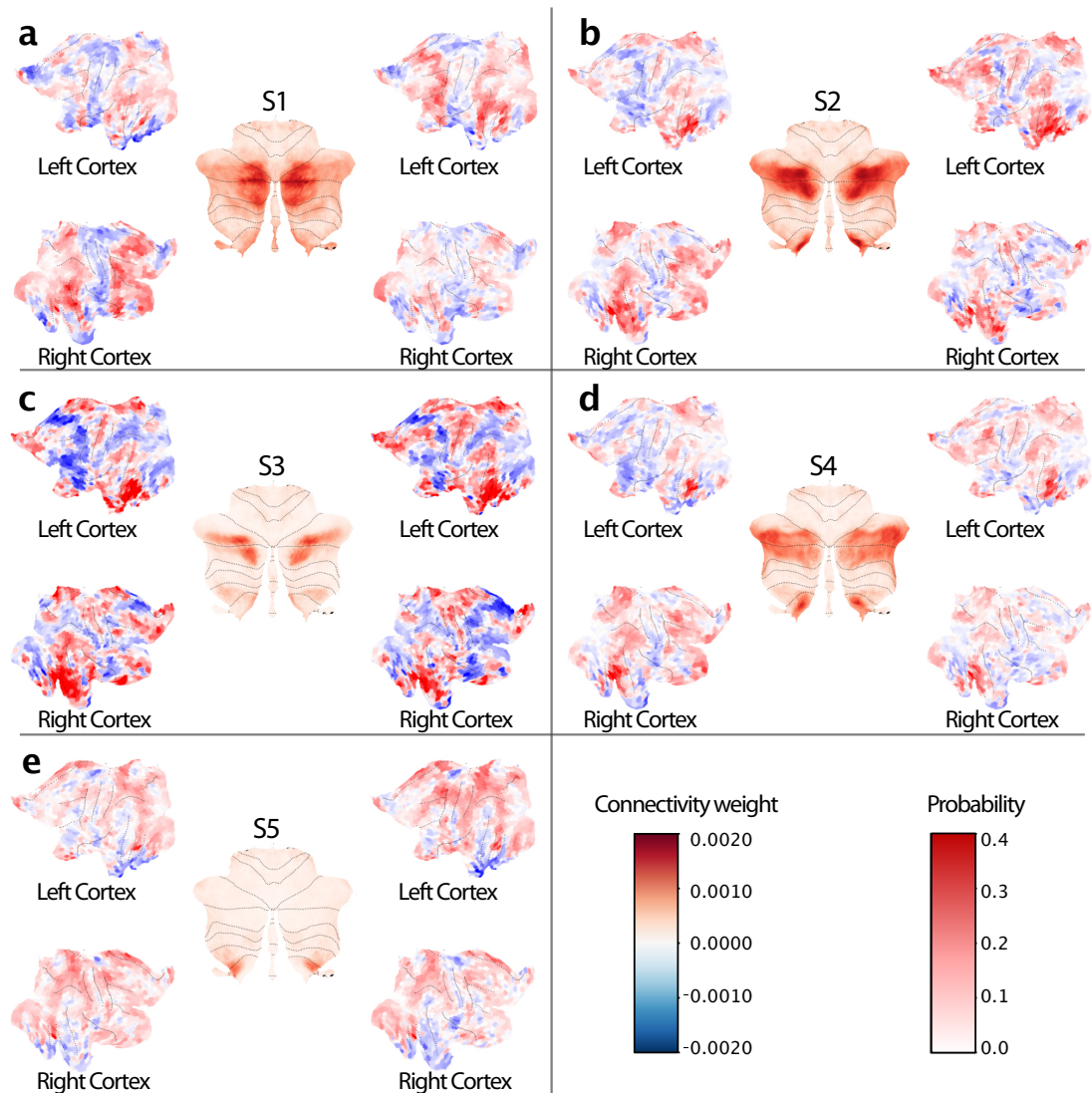
Figure S8. Cortico-cerebellar connectivity weights and probability maps for social-linguistic-spatial regions. Parcel probability maps for multiple demand (**a-d**) and social-linguistic-spatial (**e-h**) regions are shown in the middle of each figure inset, surrounded by the cortical input weights for the left and right cerebellar parcel. Weights for the left cerebellar parcel are shown to the left of the probability map and for the right cerebellar parcel to the right of each probability map on the cortical flatmap.social-linguistic-spatial regions include linguistic region S1 (**a**), social region S2 (**b**), rest region S3 (**c**), self-projection region S4 (**d**) and scene construction region S5
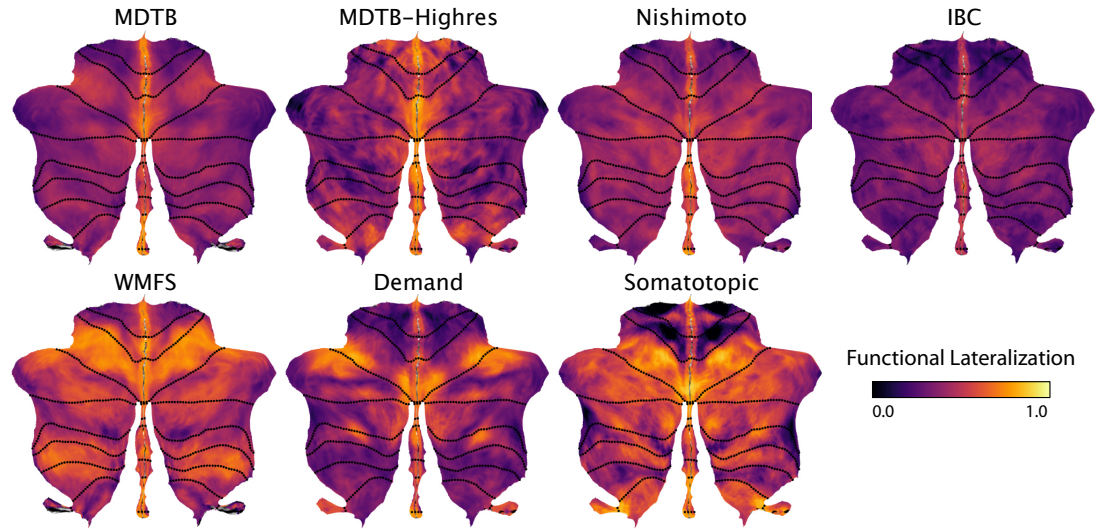
Figure S9. Individual functional lateralization for each dataset. Functional lateralization calculated as the correlations of the functional responses of anatomically corresponding voxel of the left and right hemisphere. Functional lateralization was averaged across subjects within each dataset.
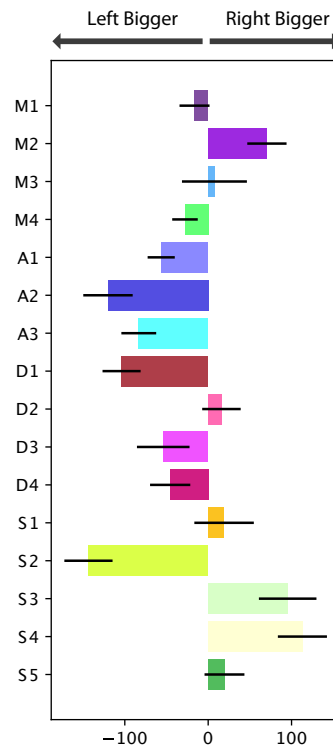

Figure S10. Size difference between left and right region pairs of the asymmetric atlas. Regions were estimated in individual subjects using the asymmetric atlas version. The size difference was calculated as number of voxels ($2mm^3$) in right parcel minus number of voxels in left parcel for each individual. Bars show average size difference across individuals and error bars indicate standard error of the mean.