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## Supplementary Information for

Selective modulation of interhemispheric connectivity by transcranial alternating current stimulation influences binaural integration

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## Supplementary Figures and Table

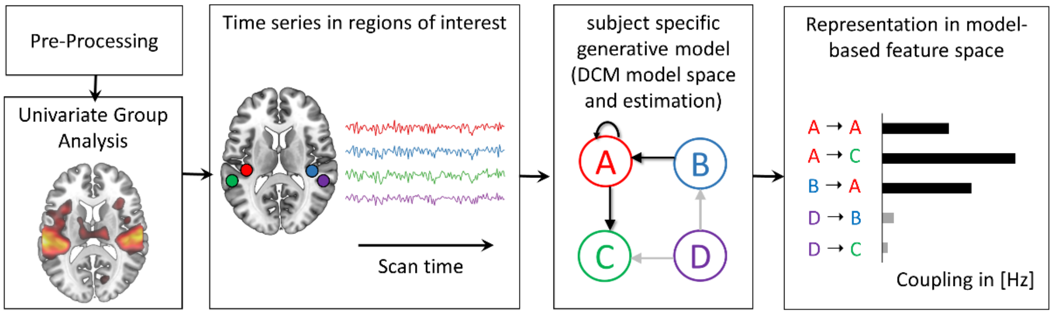


**Fig. S1. Conceptual overview of the effective connectivity analysis with dynamic causal modelling (DCM). First, fMRI data was preprocced. Second, regions of interest (ROIs) were defined based on univariate group-level analysis. Third, separately for each subject, BOLD time series were extracted for each ROI. Fourth, subject-specific time series were used to estimate the parameters of a generative model. Fifth, subjects were embedded in a generative score space in which each dimension represents a specific model parameter. This space implies a similarity metric under which any two subjects can be compared.**

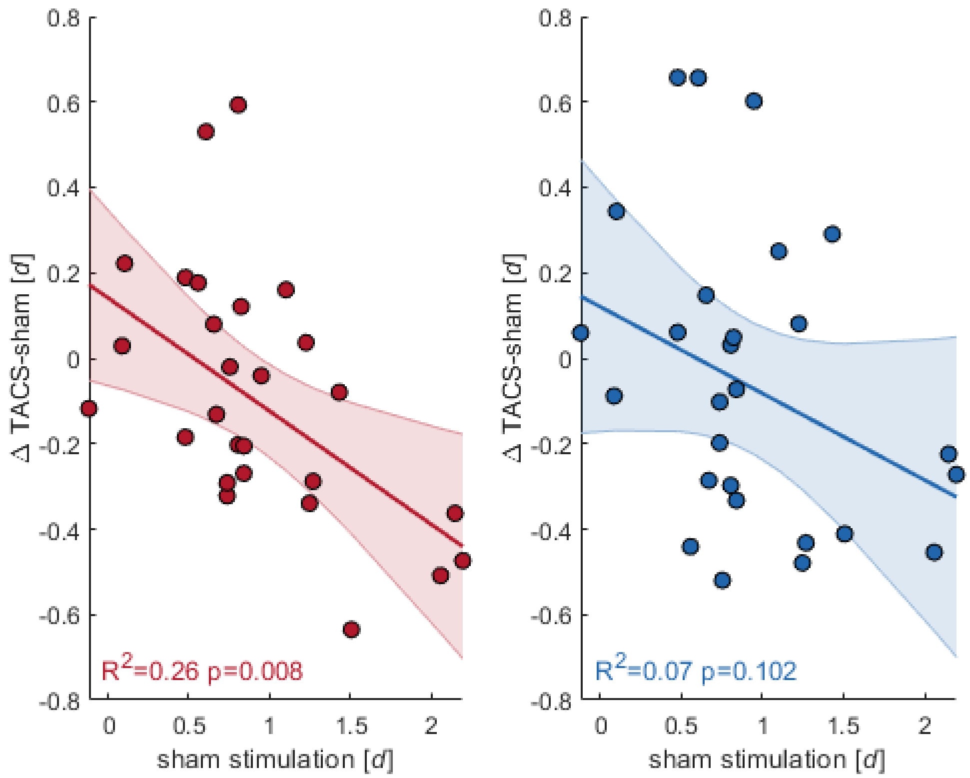


**Fig. S2. The regression of binaural integration during sham stimulation (*d*) and the TACS induced changes (Δ TACS – sham) in binaural integration during TACS 0° (red) and TACS 180° (blue).**

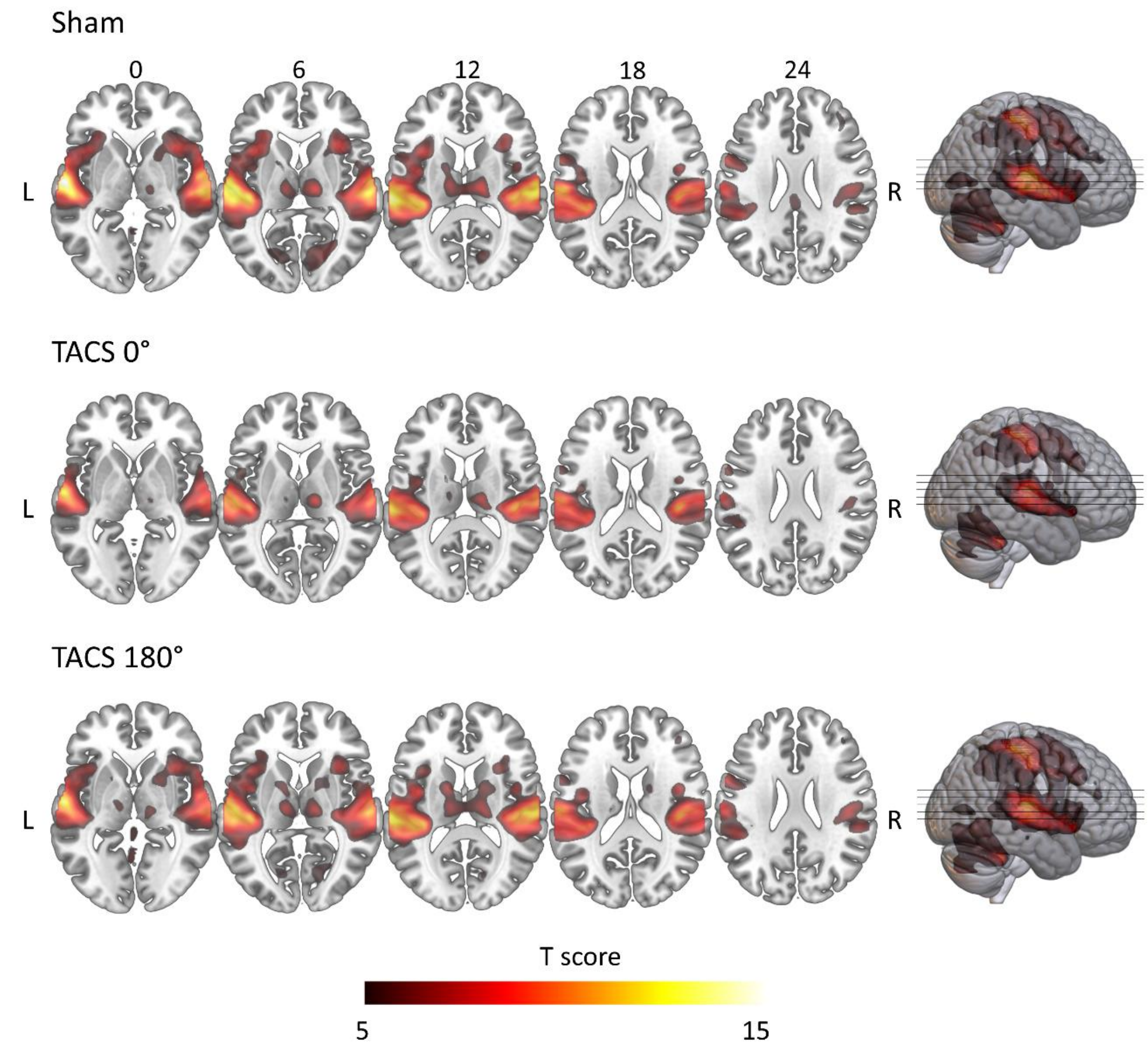


**Fig. S3. Activation maps for TACS conditions (TACS 0°;TACS 180°, sham) against baseline. Slice numbers refer to the position in z direction.**

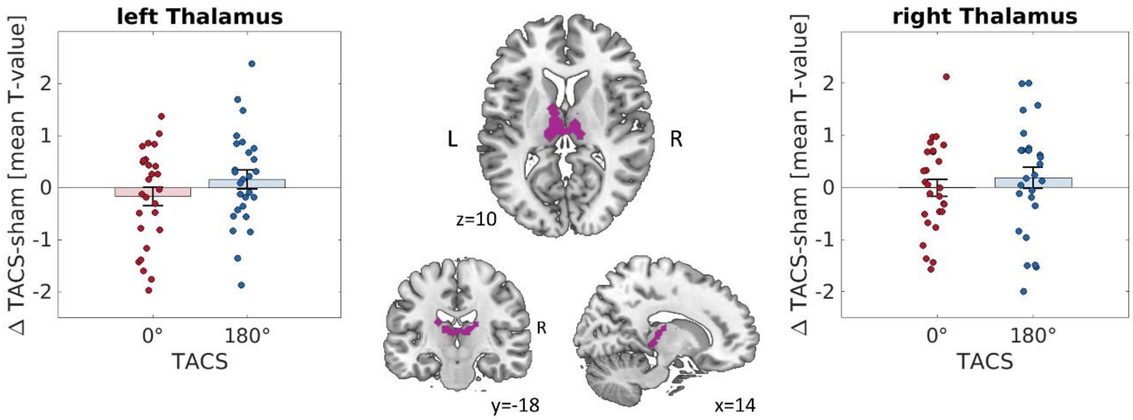


**Fig. S4. TACS stimulation does not modulate activity in the thalamus. In the center, overview of the regions of interest (ROIs) from all participants that were used for the ROI analysis. The ROIs were defined based on an anatomical mask of the temporal thalamus (1). Individual activation peaks within the anatomical mask were identified based on the contrast (all auditory stimuli > baseline). Individual ROI masks (spheres with a radius of 4mm) were centered on individual activation peaks to extract the mean difference in the BOLD signal between TACS (TACS 0°; TACS 180°) and sham stimulation. In the periphery, participants' mean activation within the ROI is shown for each stimulation condition (TACS 0°, TACS 180°) relative to sham. Dots represent the data points of single participants. Bars and error bars represent mean ± SEM across participants. We found no main effect of TACS stimulation (TACS 0°: -0.09 ± 0.13; TACS 180°: 0.23 ± 0.16, mean ± SEM, repeated measures ANOVA, $F(1,26) = 1.251$, $p=.274$, effect size: $\eta_p^2=.05$) indicating that the BOLD signal in the thalamus was not modulated by TACS. An additional Bayesian repeated measures ANOVA of the thalamic data corroborated this result showing that the model including the main effect TACS ($BF_{10}=0.681$) was no more likely than the null model.**

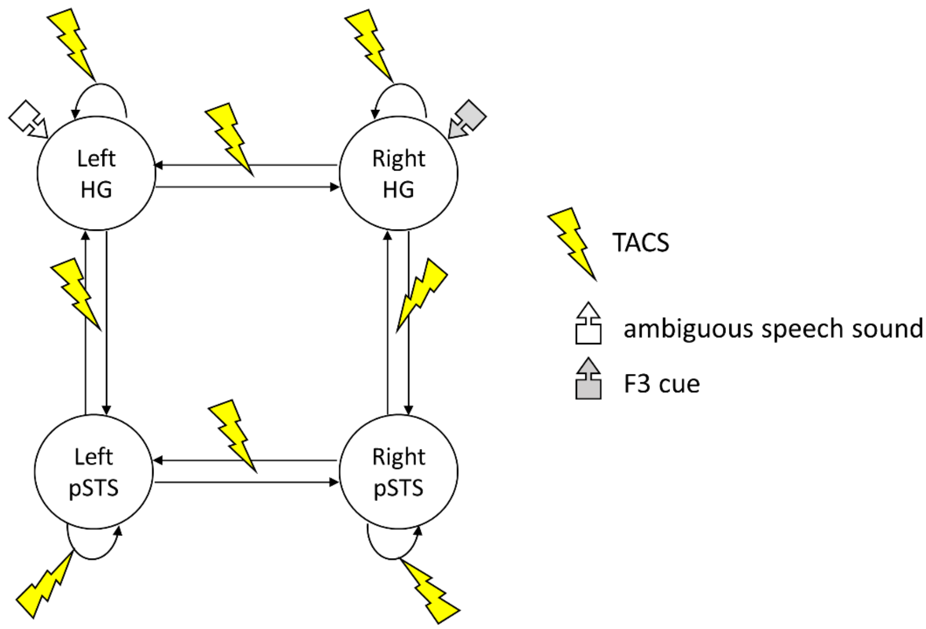


**Fig. S5. DCM nodes and fixed connections (A-matrix). The lighting illustrates the TACS induced modulations of self-, intra- and interhemispheric connections (B-matrix). Driving input for the duration of stimulus presentation is set to primary auditory cortex (Heschl's gyrus, HG): Note, different driving inputs were modelled for each hemisphere. Areas in the left hemisphere (RE) receive the ambiguous speech sound as input. Areas in the right hemisphere (LE) receive the F3 cue as input.**

**Table S1: Functional imaging analysis, peak activations from the ROIs identified by the contrast "all auditory stimuli > baseline".**

| | Coordinates | | | |
|---|---|---|---|---|
| | x | y | z | T score |
| Left posteriomedial Heschl's gyrus (A1) | -38 | -26 | 6 | 12.93 |
| Right posteriomedial Heschl's gyrus (A1) | 40 | -24 | 16 | 16.66 |
| Left pSTS | -51 | -40 | 10 | 9.12 |
| Right pSTS | 48 | -40 | 10 | 5.26 |

Coordinates are in MNI space.

**SI Reference**

1. S. B. Eickhoff, *et al.*, Assignment of functional activations to probabilistic cytoarchitectonic areas revisited. *Neuroimage* **36**, 511–521 (2007).