Binaural Beat Stimulation Improves Stuttering Symptoms

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SUPPLEMENTARY FILE

Supplementary Table 1: EEG β-power values during the experiment, separately averaged for the electrodes of the left and right hemispheres. P-value for the Wilcoxon test of difference between the left and right hemispheres is provided.

Condition	Cohort	Left (µV2)	Right (µV2)	p-value
Baseline reading	AWS	43.5 ± 21.9	54.8 ± 21.9	0.74
After stimulation	AWS	71.1 ± 42.1	53.8 ± 42.8	0.19
Post effect	AWS	67.4 ± 66.8	48.2 ± 61.0	0.38
Baseline reading	controls	39.9 ± 29.3	31.1 ± 26.1	0.03*
After stimulation	controls	46.5 ± 36.6	53.5 ± 56.9	1
Post effect	controls	50.5 ± 64.1	28.6 ± 16.7	0.43
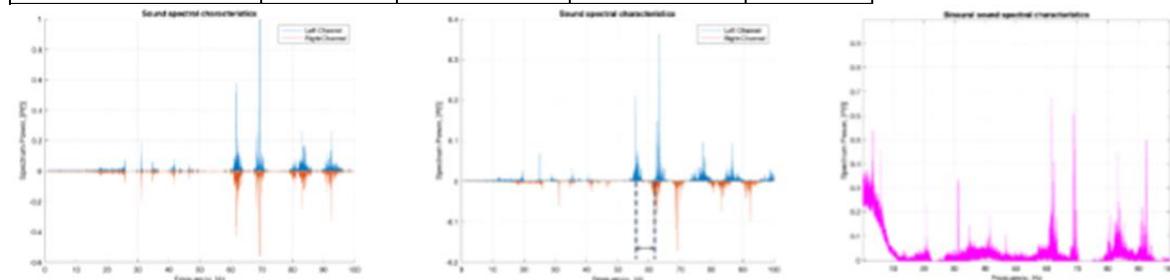
Supplementary Figure1: Spectral characteristics of auditory stimulus. A) Spectrum of an input signal; B) Spectrum of resulting signal with single target frequency (7 Hz) shift; C) Spectrum of output auditory stimulus as superposition of both channels with spectral components 3 Hz, 7 Hz and 21 Hz.
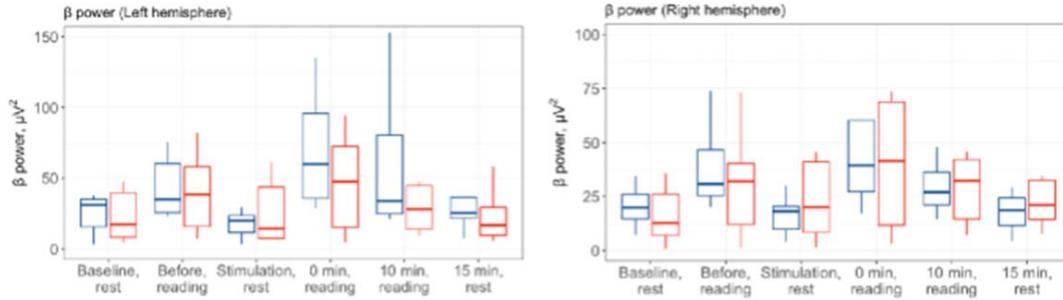
Supplementary Figure 2: Changes in β power during the experiment. A) β power spectrum for left hemisphere in both cohorts during all stages of experiment. B) β power spectrum for right hemisphere in both cohorts during all stages of experiment.
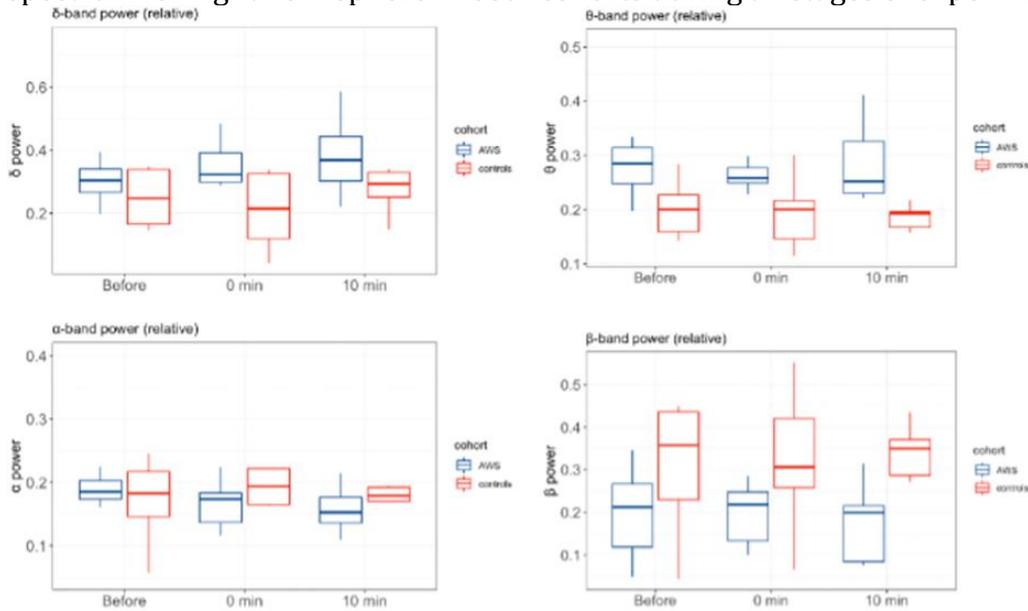
Supplementary Figure 3: Changes in relative power averaged across all electrodes for different frequency bands (α, β, δ and θ) for reading tasks before, after and 10 minutes after binaural beats stimulation.
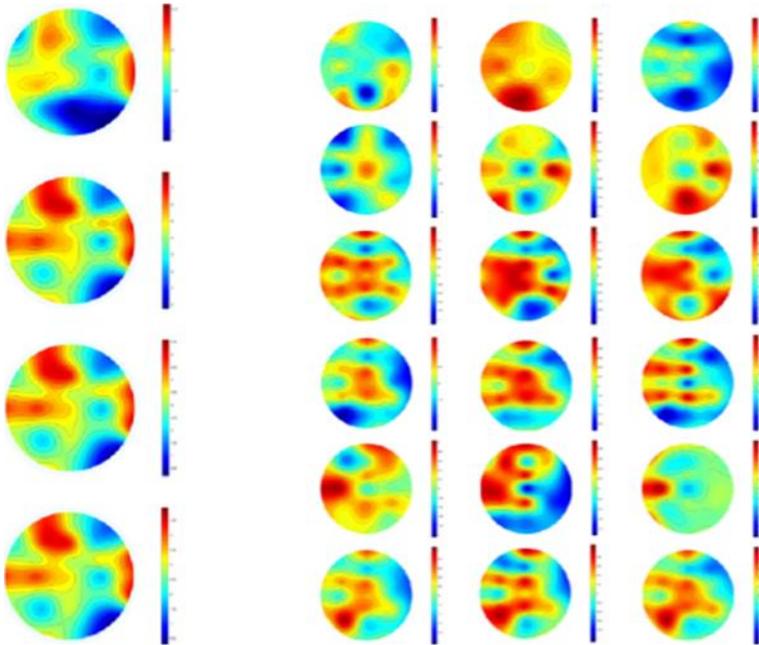
Supplementary Figure 4: Time-resolve topography of -power during binaural beats stimulation. A) From the top to bottom figures shown exposures of brain activity after 5, 60, 120 and 250 sec of stimulation beginning, respectively; B) Topography of β-power in reading experiments of each AWS (baseline, 0 min and 10 minutes after).
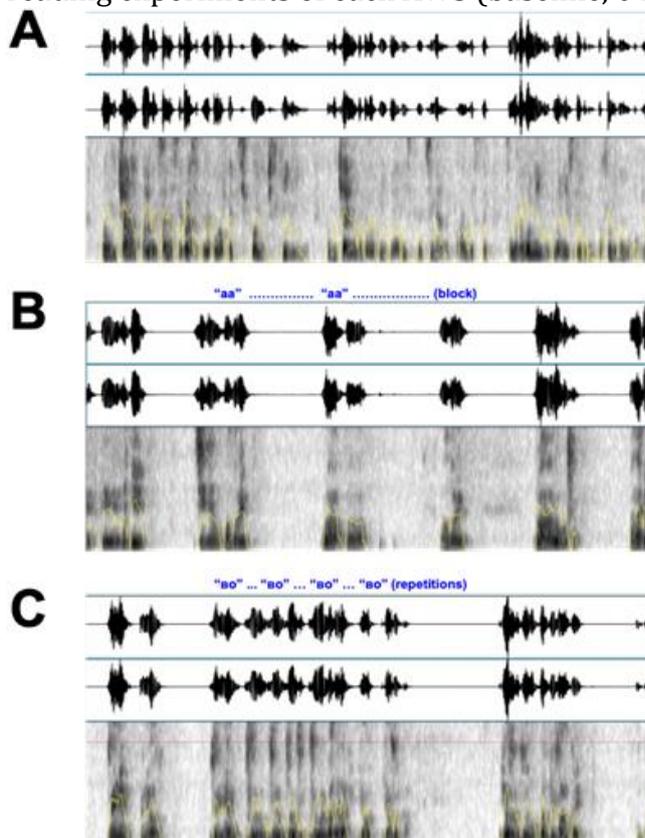
Supplementary Figure 5: Snippets of the raw speech signals. A) Raw signal and spectral characteristics of fluent speech; B) Speech with blocking episode; C) Repetitions episode.
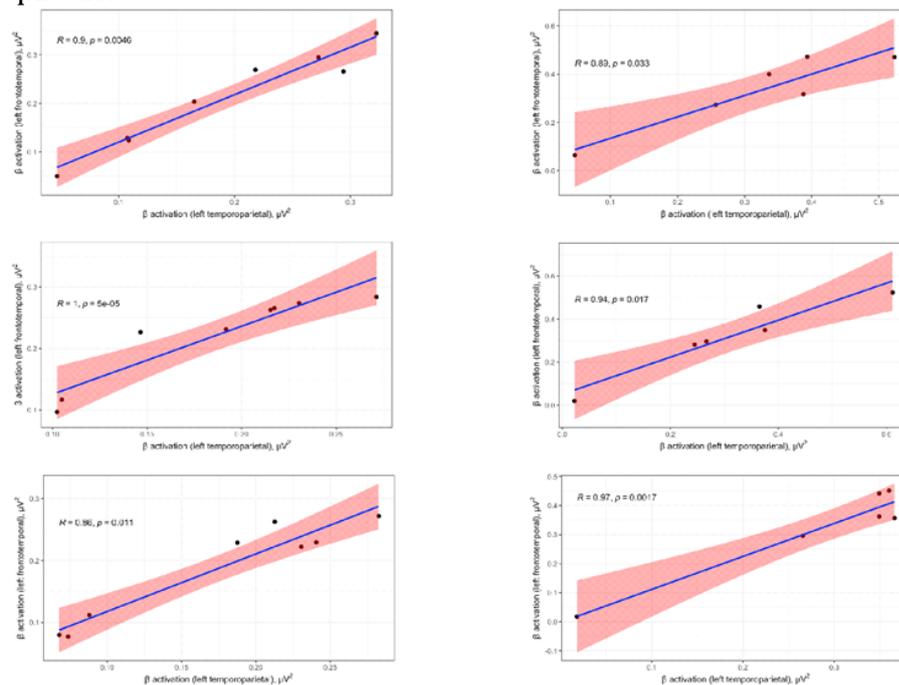
Supplementary Figure 6: Cross-sectional correlation between normalized activity the left temporoparietal (LTP) projection and left frontotemporal (LFT) are in AWS. a)

Controls; b)Before (top), immediately after the stimulation (middle), and 10 minutes later (bottom).
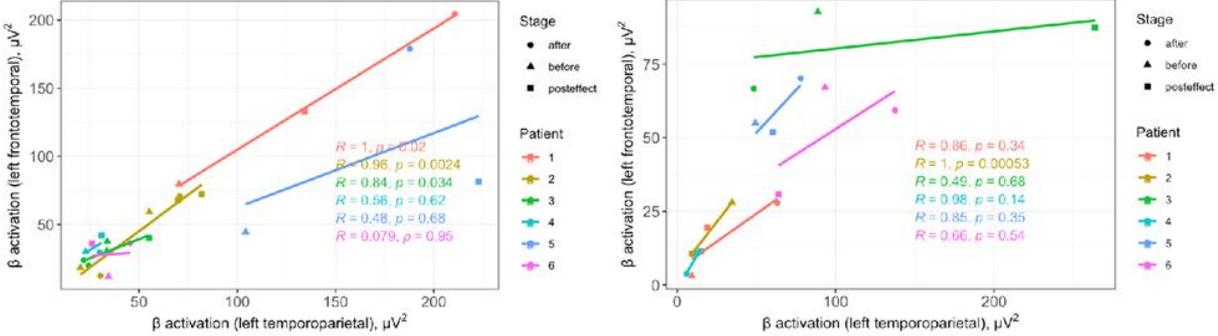
Supplementary Figure 7: Cross-sectional correlation between activity the left temporoparietal (LTP) junction and left frontotemporal (LFT) area in AWS. A) Controls; B) For each AWS participant.