Examination Test (MMSE). All patients obtained at baseline a pre-operative qEEG. Patients were cognitively re-evaluated after a median follow-up period of 24 months [range 6-20 months]. The qEEG was analyzed with respect to band power (delta, theta, alpha, beta); slowing of EEG was measured with peak EEG frequency. Statistical analysis was based on Spearman Rank Correlation Coefficient ($p < 0.05$ statistically significant).

Results: At baseline, PF correlated not significantly with MMS scores ($r = 0.37$, $p = 0.15$), but at FU there was a significant correlation with the change-score of MMSE ($r = 0.51$ $p < 0,05$).

Conclusions: In a group of PD patients treated with DBS the pre-operative qEEG seems to be a predictor of postoperative cognitive decline. The predictive value of qEEG with cognitive decline possibly may be stronger using a larger group of patients and applying a more comprehensive neuropsychological test battery.

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P75 Deep Brain Stimulation Does Not Modulate Sensorimotor Integration of Speech in Parkinson's Disease—B.H. Bahners [a,*], E. Florin [a], J. Rohrhuber [b], H. Krause [a], J. Hirschmann [a], R. van de Vijver [c], A. Schnitzler [a,d], M. Butz [a] ([a] Heinrich-Heine-Universität Düsseldorf, Institut für Klinische Neurowissenschaften und Medizinische Psychologie, Düsseldorf, Germany, [b] Robert Schumann Hochschule Düsseldorf, Institut für Musik und Medien, Düsseldorf, Germany, [c] Heinrich-Heine-Universität Düsseldorf, Institut für Sprache und Information, Düsseldorf, Germany, [d] Universitätsklinikum Düsseldorf, Klinik für Neurologie, Zentrum für Bewegungsstörungen und Neuromodulation, Düsseldorf, Germany)

Introduction: Deep brain stimulation (DBS) has significant effects on motor symptoms in Parkinson's disease (PD), but existing studies on the effect of DBS on speech are rather inconclusive. It is assumed that sensorimotor deficits strongly contribute to Parkinsonian speech pathology. The aim of the present study was to assess whether subthalamic DBS can modulate deficits in sensorimotor integration of speech.

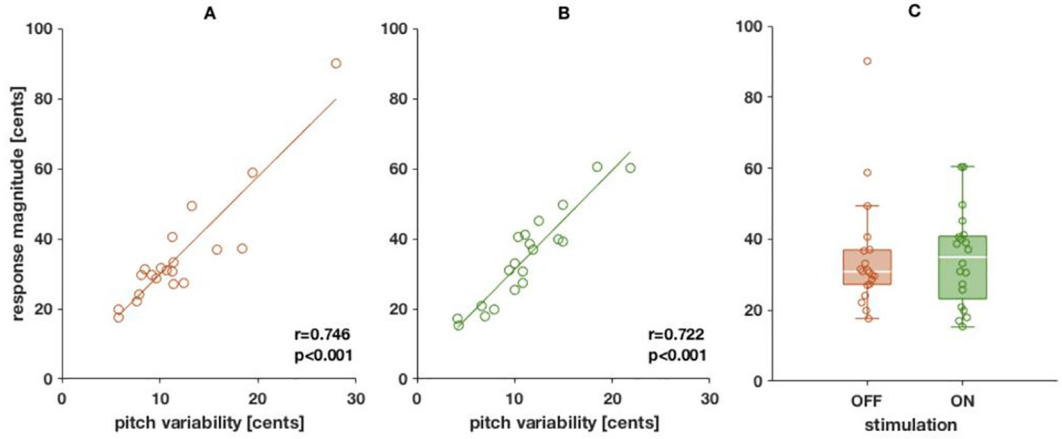

Figure 1: A, B Vocal response magnitudes correlate with pitch variability. A stimulation OFF, B stimulation ON. C distribution of vocal response magnitudes to pitch-shifted feedback in stimulation OFF and ON.

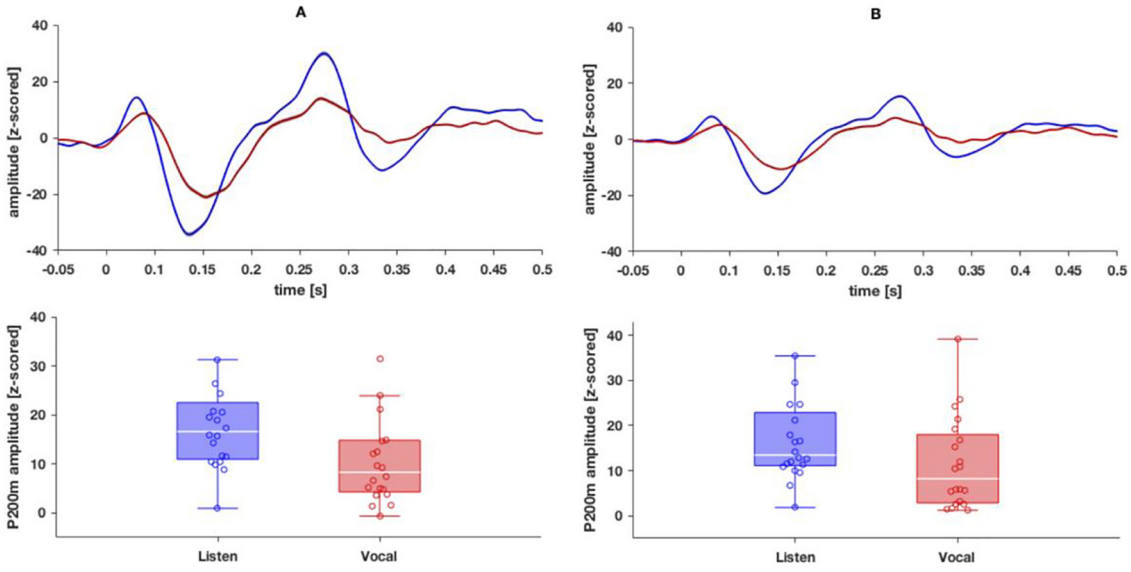

Figure 2: A, B Event related fields (ERF) time-locked to pitch-shifting onset. A Auditory cortex (AC), B Superior temporal gyrus (STG)

Patients & **Methods:** 20 PD patients (5 female, 15 male; 62.4 ± 6.7 years) with subthalamic DBS were exposed to pitch-shifted acoustic feedback during vowel vocalization and subsequent listening. Brain activity was measured OFF and ON stimulation using magnetoencephalography (MEG). Vocal responses and auditory evoked responses, which were time locked to the onset of pitch-shifted feedback, were examined.

Results: A positive correlation between frequency response magnitude and pitch variability was observed for both, stimulation OFF and ON (*Fig. 1AB;*OFF: $r = 0.746$, $p < 0.001$, ON: $r = 0.722$, $p < 0.001$). However, no differences of vocal responses to pitch-shifted feedback between the stimulation conditions were shown (*Fig. 1C;* $F(1,19) = 0.06$, $p = 0.809$). P200m amplitudes of event related fields (ERF) of the left auditory cortex (AC) and the superior temporal gyrus (STG) were significantly larger during listening when stimulation was ON (*Fig. 2A;* AC: $F(1,19) = 7.124$, $p = 0.015$; *Fig. 2B;* STG: $F(1,19) = 5.244$, $p = 0.034$).

Conclusion: Subthalamic DBS appears to have no substantial effect on vocal compensations, although it is thought that sensorimotor deficits contribute to strong vocal frequency responses in pitch perturbation experiments with PD patients. Thus, DBS seems to be limited in modulating sensorimotor integration of speech in PD.

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P76 Intra-individual variability of I-wave peaks – Preliminary results —L. Brich [a,*], B. Gleich [b], F. Schaff [a], V. Mall [a], N. Jung [a] ([a] Technische Universität München, Lehrstuhl für Sozialpädiatrie, München, Germany, [b] Technische Universität München, Munich School of BioEngineering, München, Germany)

Introduction: Transcranial magnetic stimulation (TMS) of primary motor cortex of the hand (M1-HAND) produces descending volleys with three main peaks, so called I-waves (I1-I3). Paired-pulse TMS targeting these individual I-wave latencies demonstrated an increase in corticospinal excitability. Facilitatory interaction between these I-waves can be studied non-invasively using a paired-pulse paradigm referred to as short-interval intracortical facilitation (SICF) with a considerable **inter**-individual variability. Here, we aimed to test whether SICF peaks measured in posterior-to-anterior (PA) and anterior-to-posterior (AP) directed currents in M1-HAND also demonstrate an **intra**-individual trial-to-trial variability.

Material & **Methods:** We investigated SICF curves in healthy volunteers ($n = 6$) at two time points. Experimental sessions were separated by at least 1 week and performed with PA and AP directed currents in the brain. Paired-pulses with interstimulus intervals (ISI) ranging from 0.1 ms to 6 ms in steps of 0.1 ms ($n = 10$ stimuli per ISI) were applied over M1-HAND (M. abductor pollicis brevis) using a custom made device with biphasic pulse configuration (pulse duration: 160 μs). The figure-of-eight coil was held at the same position and angle from midline throughout the measurement. Stimulation intensity for SICF was adjusted to 105% of the individual resting motor threshold (RMT). Variability was calculated by use of the mean difference (MD) of the absolute value of the I1-peak, I2-peak and I3-peak, respectively.

Results: I-wave latencies (I1, I2 and I3) demonstrated an intra-individual variability (MD) in PA (I1: 0.26 ms ± 0.16; I2: 0.17 ms ± 0.12; I3: 0.49 ms ± 0.37) and AP (I1: 0.28 ms ± 0.20; I2: 0.10 ms ± 0.05; I3: 0.51 ms ± 0.36) directed currents in M1-HAND. Intra-individual differences ranged from 1.09 ms to 1.79 ms (I1), 2.51 ms to 2.95 ms (I2) and 4.42 ms to 5.50 ms (I3) in PA direction and from 0.76 ms to 1.81 ms (I1), 2.72 ms to 3.01 ms (I2) and 4.17 ms to 5.49 ms (I3) in AP direction.

Discussion: Our preliminary results demonstrate an intra-individual variability of I-wave latencies measured by biphasic SICF over M1-HAND in PA and AP directed currents. This may be of importance when considering individual stimulation techniques targeting I-wave periodicity to investigate changes in cortico-spinal excitability and for individual therapeutic stimulation in a clinical setting.

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P77 Brains on the Beat: Drumming Precision and Neural Entrainment to Musical Polyrhythm—S. Garofano [a,b], C. Bothe [a,c], G. Curio [a,b], G. Waterstraat [a,*] ([a] Charité Universitätsmedizin Berlin, Neurophysics Group, Department of Neurology, Campus Benjamin Franklin, Berlin, Germany, [b] Humboldt-Universität zu Berlin, Berlin School of Mind and Brain, Berlin, Germany, [c] Freie Universität Berlin, Department of Mathematics and Computer Science, Berlin, Germany)

Introduction: Neural entrainment is the process by which oscillatory activity of neuronal ensembles in sensory cortices achieve and maintain phase-lock to periodic exogenous stimuli. By aligning oscillations of excitation in sensory networks to the period of repeating stimuli, an organism enhances the accuracy of its perception and the ability to predict the future behavior of that stimulus. In the case of music, neural entrainment to the repeating pulse of beat and meter allows musicians, listeners and dancers to create an internal representation of that pulse, which guides perception and behavior so that a drumstick, a finger-snap or a hip-shake land precisely on the beat.

Subjects and Methods: The current study examined neural entrainment to musical polyrhythm through EEG captured as subjects ($N = 20$) listened to a polyrhythmic stimulus and, following a silent pause, struck a drum at a moment in time predicted for an acoustically omitted, cued component of the polyrhythm. Spatial filtering methods were adapted for the study, providing optimal signal-to-noise ratio and identification of entrained neural oscillations in EEG recordings.

Results: The predicted relationship between increased neural entrainment to polyrhythm frequencies and increased accuracy on the drumming task was confirmed, as was the predicted correlation between musical training and increased neural entrainment to the stimulus polyrhythm.

Discussion: The experimental paradigm presented here allowed for the successful identification of neural entrainment to a musical polyrhythm stimulus. As compared to previous analyses, greater detail and ecological validity was achieved by adapting established paradigms with a continuous measure of musical experience and a musical behavioral task. The chosen spatial filtering approach additionally enabled an analysis at the optimal signal-to-noise ratio. Altogether, the results of this study support the idea that entrained oscillations facilitate the prediction of future behavior of repeating rhythmic stimuli.

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