Attention and auditory perception in schizophrenia: an MEG link to auditory hallucinations.

Natalia Lapinskaya1, Pirazh Khorramshahi1, L. Elliot Hong2, Jonathan Z. Simon1
1University of Maryland, College Park 2University of Maryland, School of Medicine

Methods

Temporal Response Functions (TRFs)
• Speech envelope

MEG Recording
• 157 channel KIT/Eagle MEG Scanner; 1 kHz sampling frequency.
• Mixed into single channel, presented binaurally.

Auditory Hallucinations
• Evaluated with Auditory Perceptual Trait and State scale (APTS)
• “Tact” – symptoms over preceding week

Auditory Hallucinations
• 60s audiobook segments.
• Male/female narration.
• Counterbalanced for target gender.
• Mixed into single channel, presented binaurally.

Results

Attentional enhancement
• Difference between TRF.Attended and TRF.Unattended latency/amplitude measures of interest
• HC show greater enhancement than SZ, especially for latency.

Auditory Hallucinations
• Higher APTS-T score ~ greater latency enhancement for SZ

Discussion
• Enhancement is not contingent on diagnosis.
• Less enhancement for patients: impaired top-down control?
• Latency differs most between controls and patients: Right Ear Advantage diminished/absent in patients?
• Correlation with hallucinations?
• Perceptual hypervigilance enhances biases, producing a higher likelihood of accepting false signal as real ➔ more hallucinations.
• More vigilant ➔ more attentive ➔ greater enhancement?
• Control perceptual errors: weak patient-like trend

Background

Auditory hallucinations: a hallmark symptom of schizophrenia.

Mechanisms?
• Bottom-up: misprocessing of external input.
• Top-down: misattribution of internal content.
• Contributing factor: perceptual hypervigilance.

Attention and auditory perception: “cocktail party” paradigm
• Encoding discrete auditory objects within a complex environment.
• Perceptual enhancement of attended vs unattended stimuli.

Participants
• 22 patients with schizophrenia (SZ; 7 female)
• 27 healthy controls (HC; 8 female)
• Matched for age, handedness, smoking status.

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• Denoised by Time-Shift PCA (TSPCA).
• Denoising Source Separation (DSS) enhances response reliability over trials (D=6).

Temporal Response Functions (TRFs)
• Deconvolves neural activity evoked by continuous speech envelope, using envelope to model neural response.
• TRF components follow features of envelope at fixed latency: M100TRF

References