NEURAL SENSITIVITY TO SPEECH DISTRIBUTIONAL INFORMATION UNDERLIES STATISTICAL LEARNING

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BACKGROUND
Human minds are apt to detect and extract statistical regularities from the environment (Saffran et al., 1996; Conway & Christiansen, 2005). The ability to rapidly learn and extract information embedded in the inputs, known as statistical learning (SL), is foundational for language development (Newport & Aslin, 2004). There are two types of information encoded by learners in numerous SL tasks:

- **Conditional**: frequency of adjacent or non-adjacent elements co-occurring.

- **Distributional**: bare frequency of occurrence of exemplars.

The current study seeks to understand the neural processes underlying speech distributional information and how it relates to the online learning of conditional SL.

METHODS
PARTICIPANTS. Twenty-seven right-handed, native English-speaking adults (Mage=20.70, SD=2.99, range [18.1—34.6], 8 males).

**Neural processes supporting Distributional Information**

**GLOBAL = MEMORY TRACE**

**LOCAL = ADAPTATION**

EEG ANALYSIS
**RECORDING** 24-channel mobile EEG system (SMARTING, mBrainTrain, Belgrade, Serbia) at a sampling rate of 500 Hz.

**PRE-PROCESSING** high-pass filtered at 0.1 Hz, low-pass filtered at 30 Hz, and re-referenced to the mastoids. ICA was used to remove eye/muscle movement components.

**STATISTICS**
- cluster-based permutation test within the Mass Univariate Toolbox
- linear slope of the reaction time (RT) across trials was calculated, where negative RT slope indicates acceleration of response

EEG RESULTS

**Deviants vs. Standards:**
- a) early (22-180 ms)
- b) late negativity (324-500 ms)

**Local & global interaction**

**Behavioral correlation**
Greater sensitivity to global (p) correlated with faster RT slope across conditional SL task

CONCLUSIONS

**Least frequent deviants = too salient overall**

- Global and local probabilistic information masks each other when stimuli are perceived as very rare oddballs (e.g., long and rare)

- Conditional SL is associated with sensitivity to global (p)

- May be related to an individual's ability to maintain or update memory trace

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