

Morpheme-specific neural representations in skilled adult readers: Evidence from fast periodic visual stimulation



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1. BACKGROUND

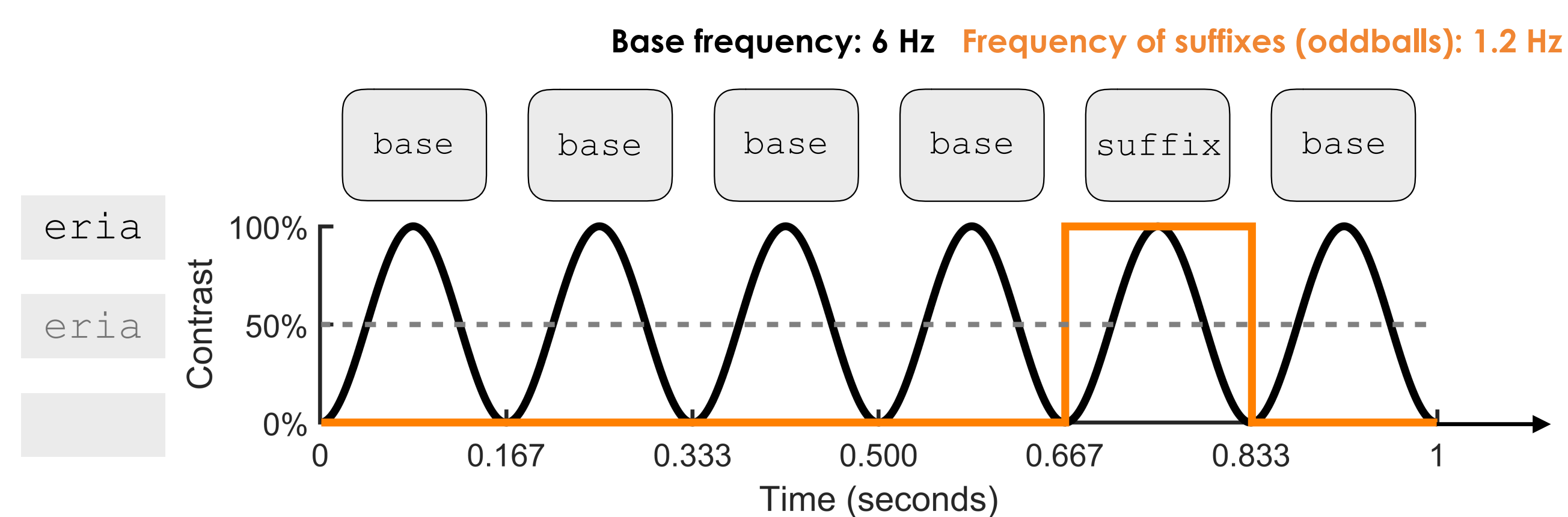
- Morphemes constitute the smallest meaning-bearing units of language that are combined to create complex words (e.g., *kindness* consists of the stem *kind* and the suffix *-ness*). Behavioural evidence suggests that morphologically complex written words are processed and represented via their constituent morphemes [1].
- However, the neural underpinnings of morphological processing remain poorly understood [2]. To date, there is no direct evidence for selective representation of sublexical morphemic units (e.g., suffixes) in the brain of skilled readers in the absence of lexical context.

2. RESEARCH QUESTION

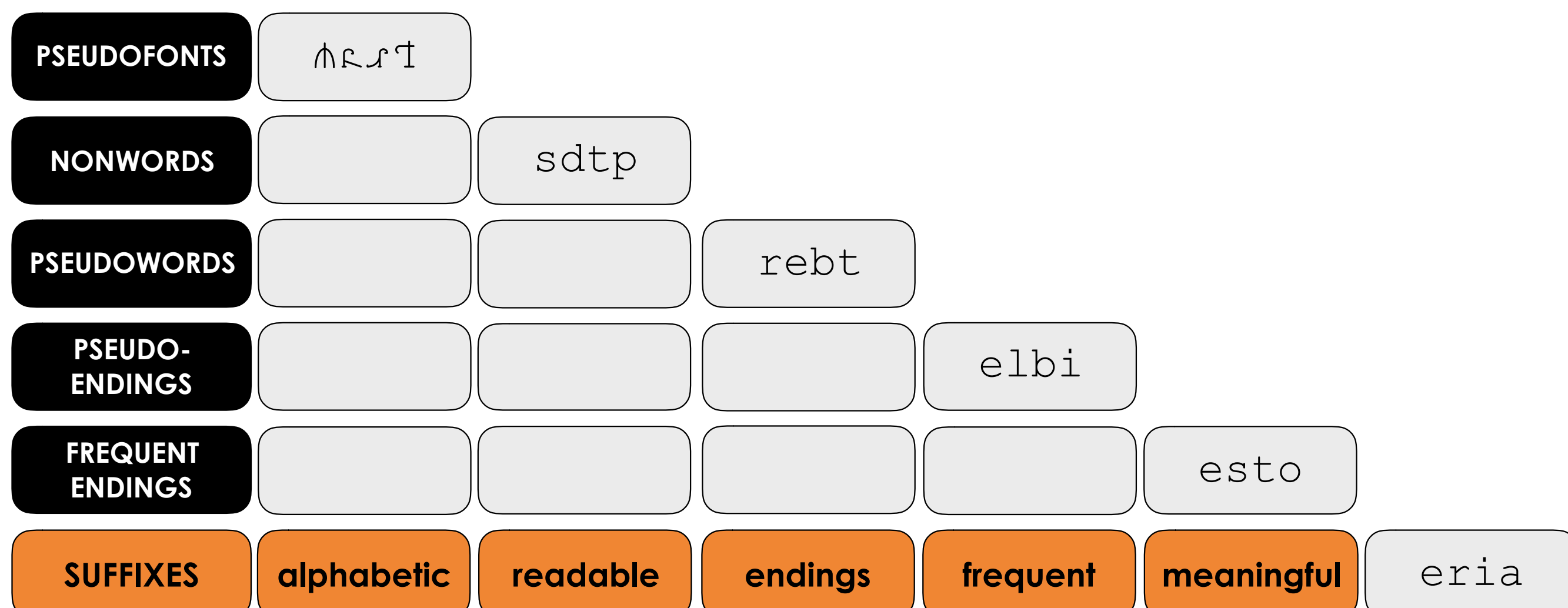
Are there selective neural representations of morphemes as meaningful independent sublexical units?

3. METHOD

- Fast periodic visual stimulation with an oddball paradigm & EEG recording [3]
- Stimulus presentation via sinusoidal contrast modulation



- 15 Italian suffixes (e.g., *eria*) periodically embedded in rapid streams of stimuli (N = 15 of each type) with increasing similarity to suffixes



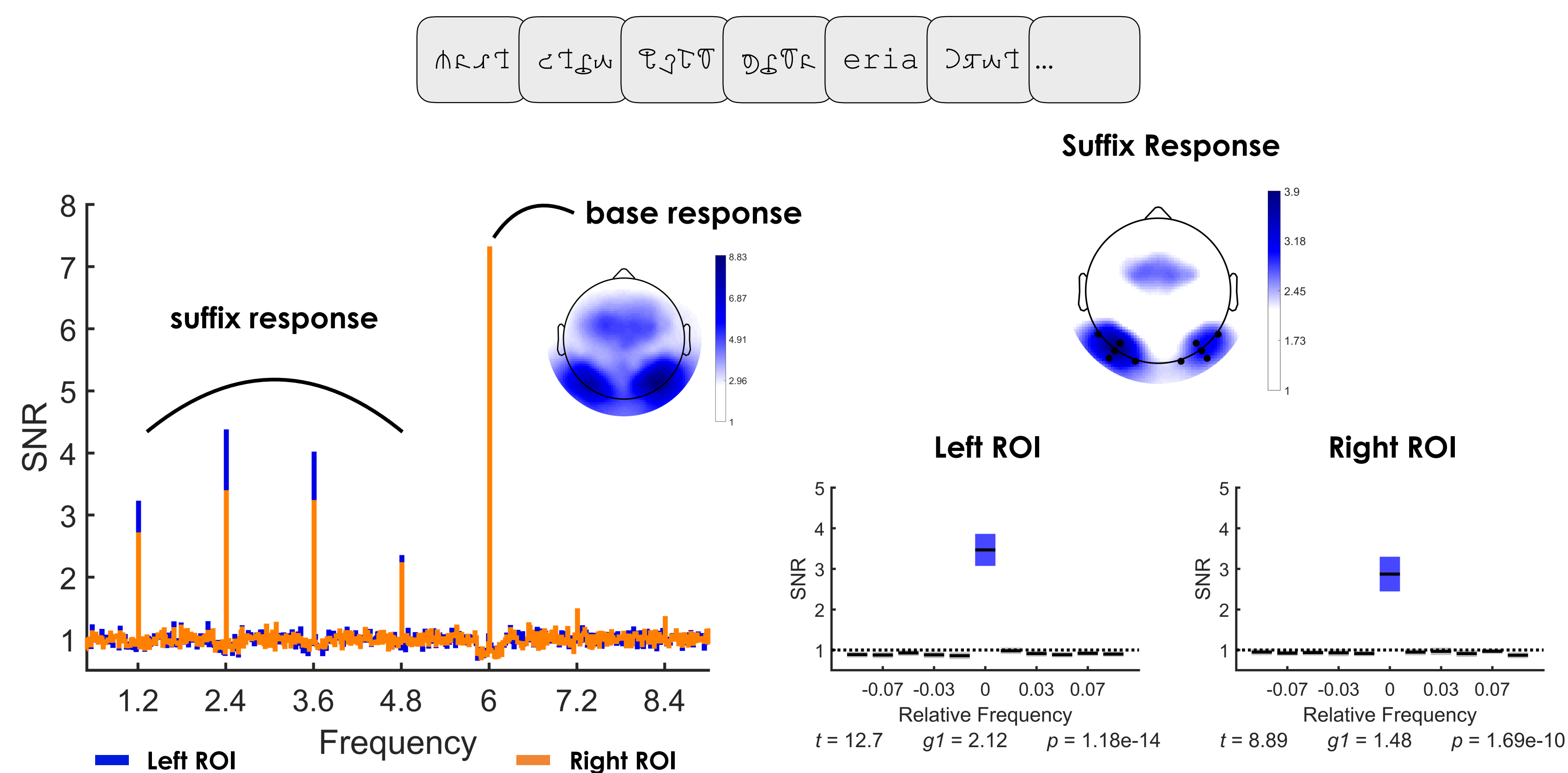
- Predictions: EEG response at suffix stimulation frequency and its harmonics if suffixes are discriminated from base stimuli. Discrimination responses across the conditions would reveal the particular suffix feature that is represented
- 36 Italian native speakers monitored a central fixation cross and responded to colour change
- Analysis: signal-to-noise ratio (SNR) in two pre-defined [3] left & right occipito-temporal regions of interest (ROI)

5. CONCLUSIONS

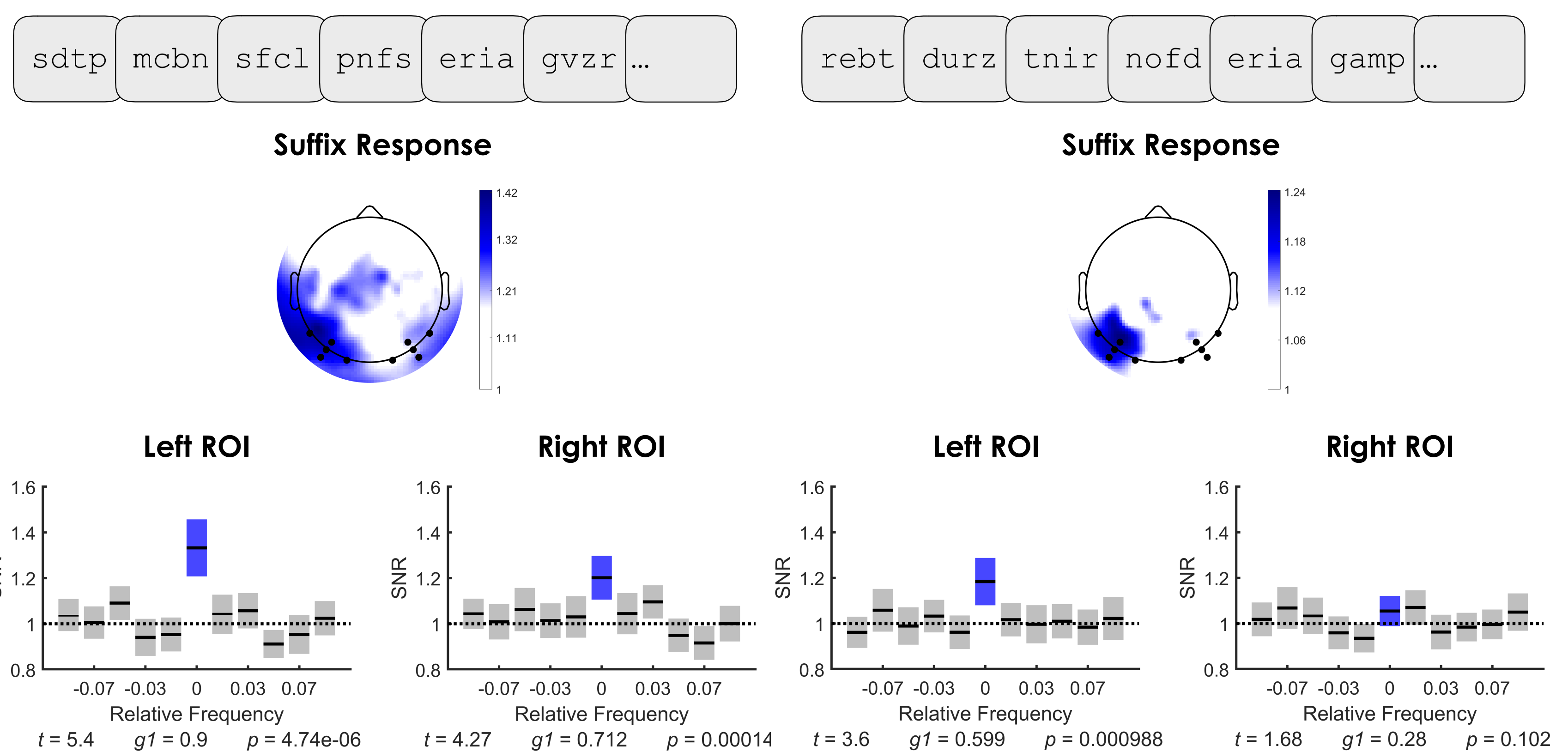
- Suffixes were successfully discriminated from all other types of visual stimuli in the left occipito-temporal ROI. Critically, the discrimination response between suffixes and frequency-matched non-morphological endings establishes its morpho-semantic nature.
- Current findings provide novel **evidence for the neural representation of morphemes as meaningful context-independent sublexical units**.
- The topography of the suffix discriminative response implicates the left ventral occipito-temporal cortex as the likely locus of morpheme representation.
- Future research with methods that afford higher source-based spatial resolution and functional connectivity analyses is needed to examine neuronal tuning to sublexical morphemes in this brain region.

4. RESULTS

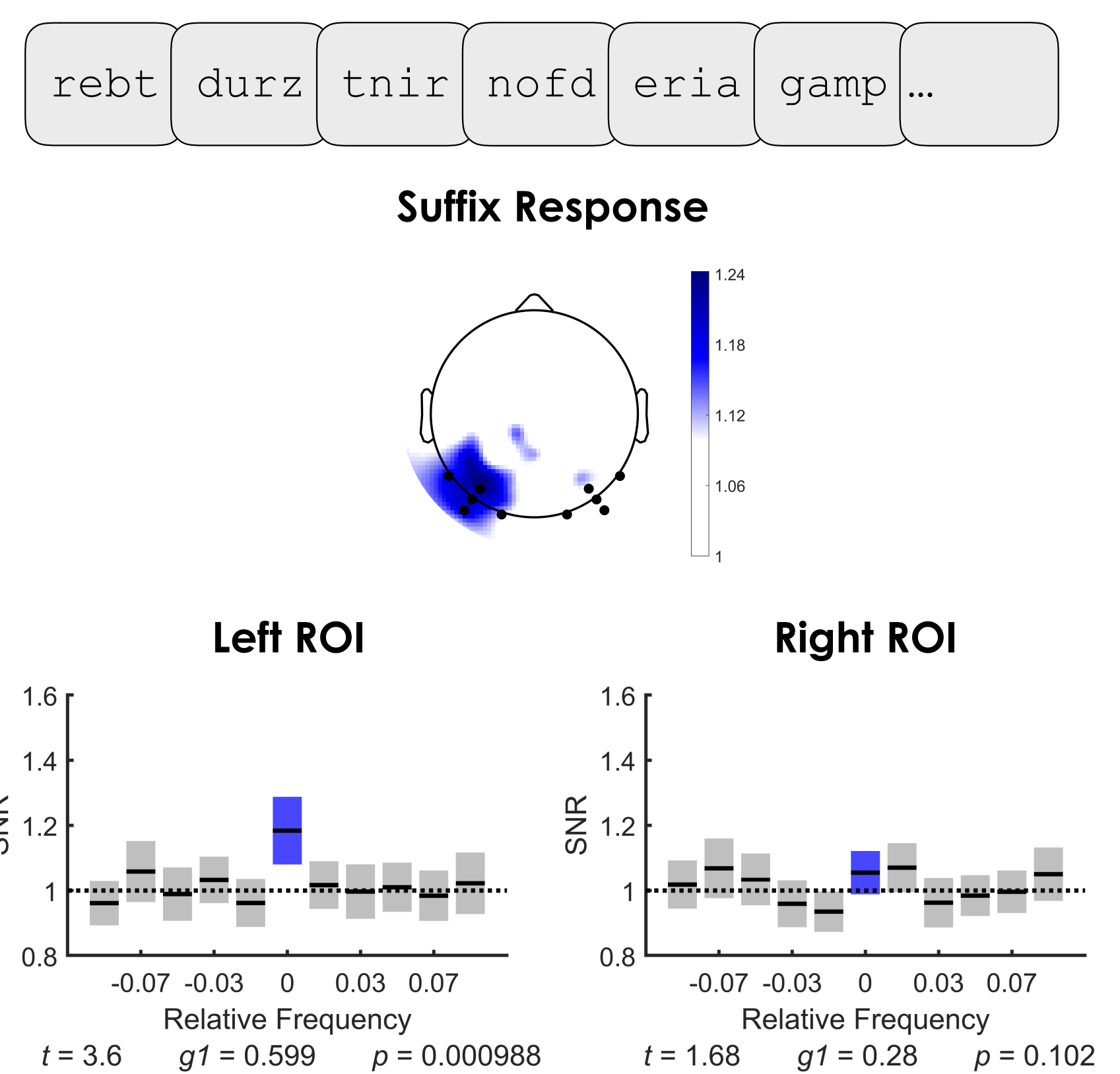
Suffixes in PSEUDOFONTS



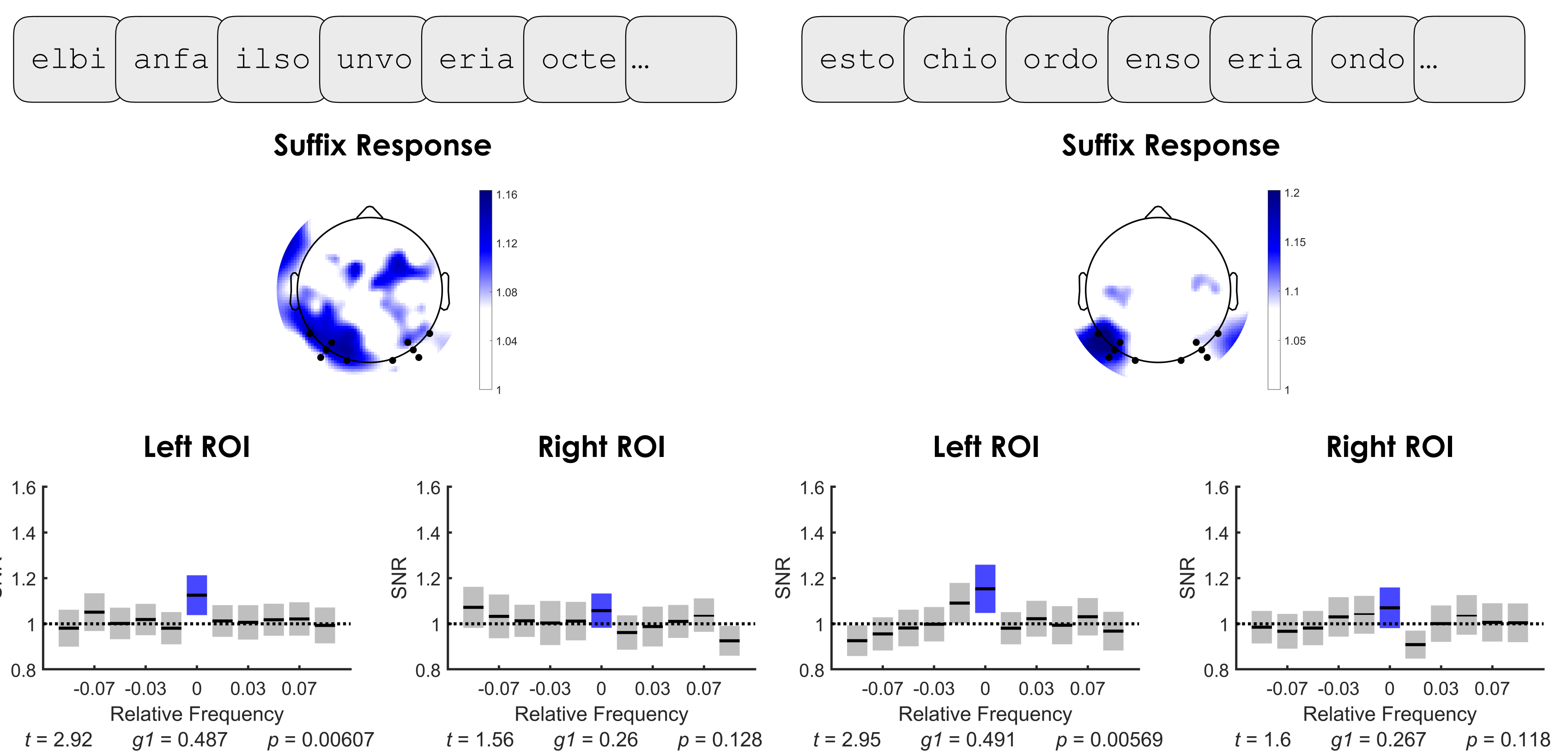
Suffixes in NONWORDS



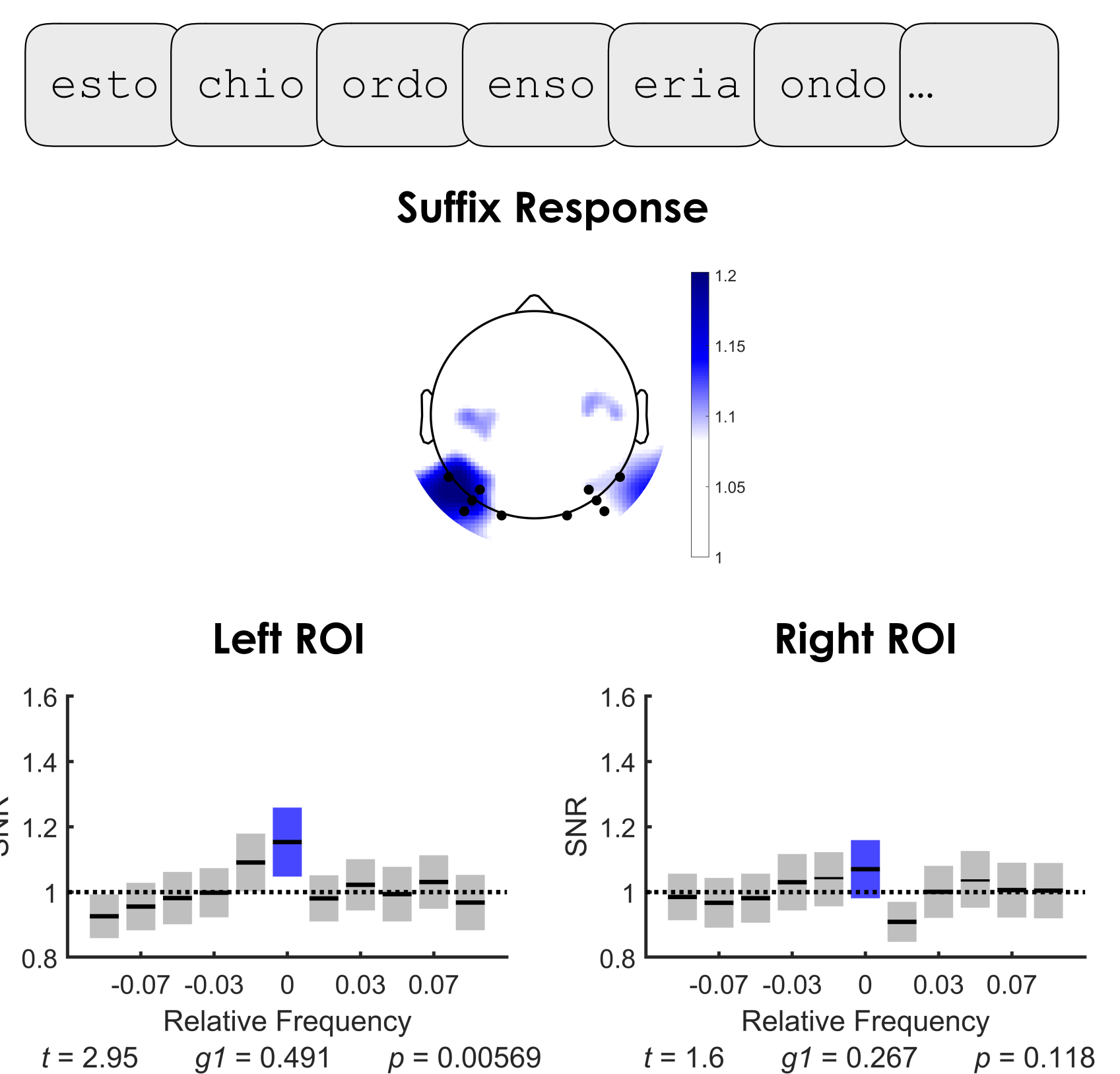
Suffixes in PSEUDOWORDS



Suffixes in PSEUDO-ENDINGS



Suffixes in FREQUENT ENDINGS



Relative Frequency: averaged suffix harmonic response centred on 0 & neighbouring frequency bins

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