Symbolic vs. Gradient Phonemes

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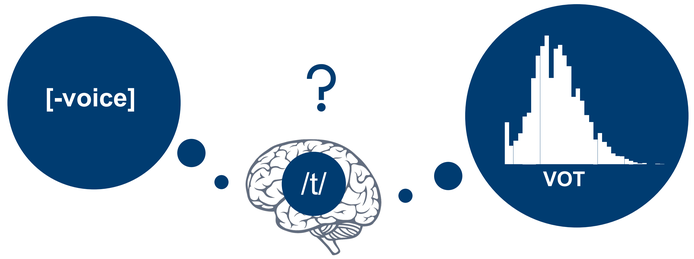
Summary

Question: Does a phoneme representation contain phonetic information?
Main Finding: Yes.

Background: Competing views

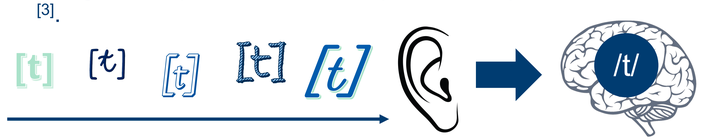
Phoneme is symbolic.
(e.g., Substance-free Phonology [1])

Phoneme is gradient.
(e.g., Stochastic phonology [2])

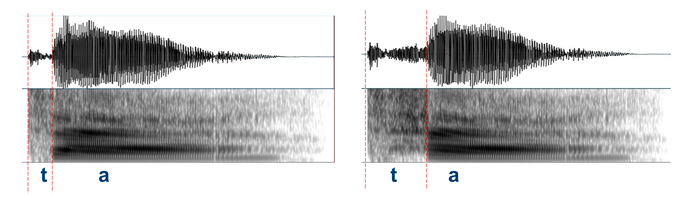


How to test them?

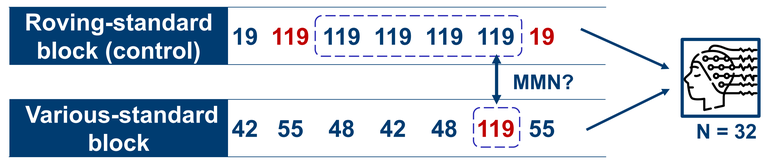
- MMN reflects a difference between a deviant and the memory trace of standards.
- The "various-standard" oddball paradigm: Varying standards belonging to the same category elicits a categorical representation.
  - When standards are [ta]s with different VOTs, the elicited categorical representation is the phoneme representation /t/ [3].



Stimuli: [ta] with different VOTs [4]

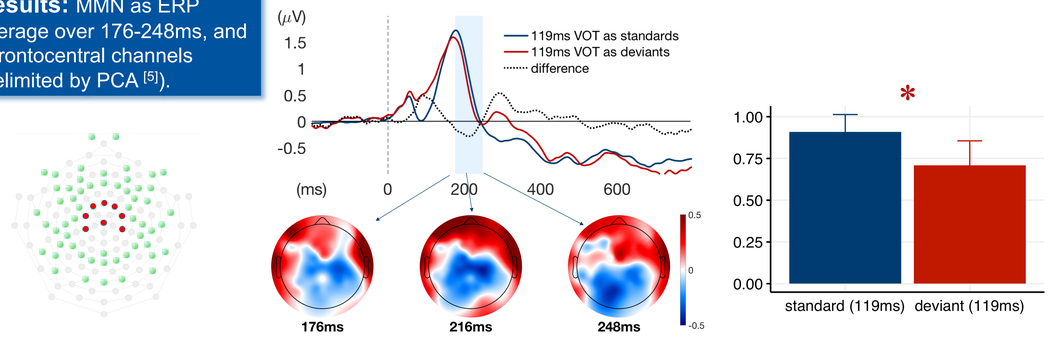


Experiment 1



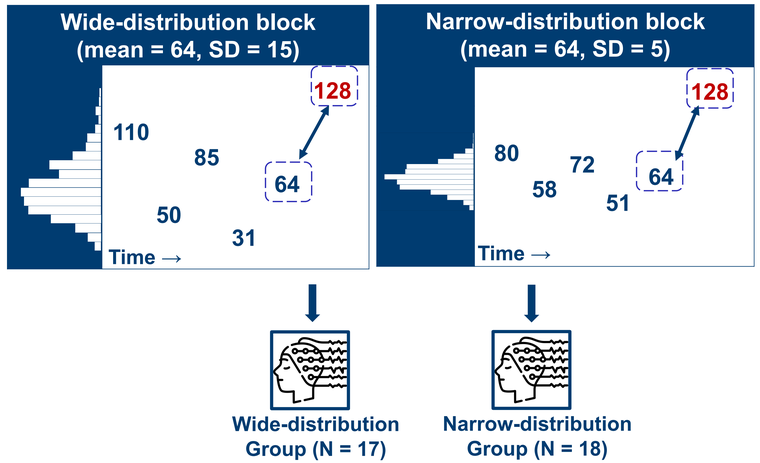
Predictions

Results: MMN as ERP average over 176-248ms, and 8 frontocentral channels (delimited by PCA [5]).



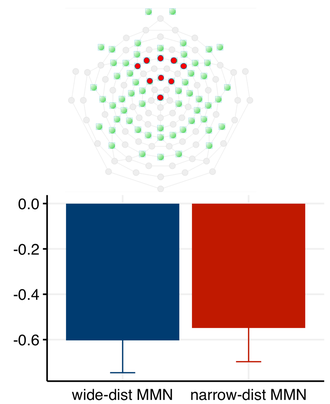
- **Interpretation:** Within-category MMN in various-standard block ⇒ sensitivity to phonetic details when a phoneme representation is enforced ⇒ The phoneme representation must contain phonetic information.
- **Alternative:** The various-standard MMN is due to detecting an outlier in the **statistical summary** of presented VOTs [6].
- **Exp 2:** Dose MMN size depend on the variability of the presented VOT?

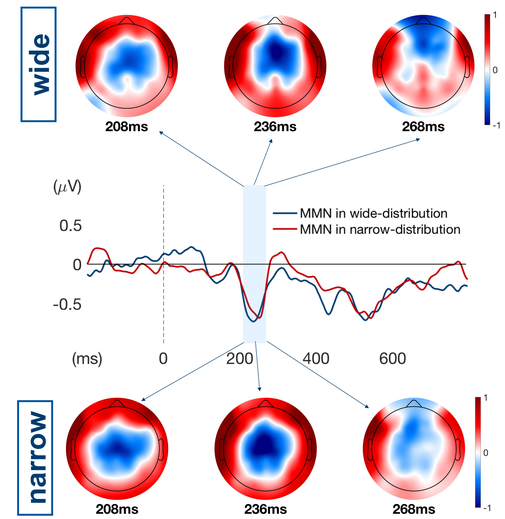
Experiment 2



Predictions

Results: MMN as ERP average over 208-268ms, and 9 frontocentral channels (delimited by PCA).





- **Interpretation:** No difference in MMN size ⇒ The within-category MMN in Exp 1 is due to phonetic information.
- **Alternative:** Ceiling effect, perceptual warping?
- **Follow-up:** Will there still be MMN if standards have an atypical VOT and deviants a typical VOT?