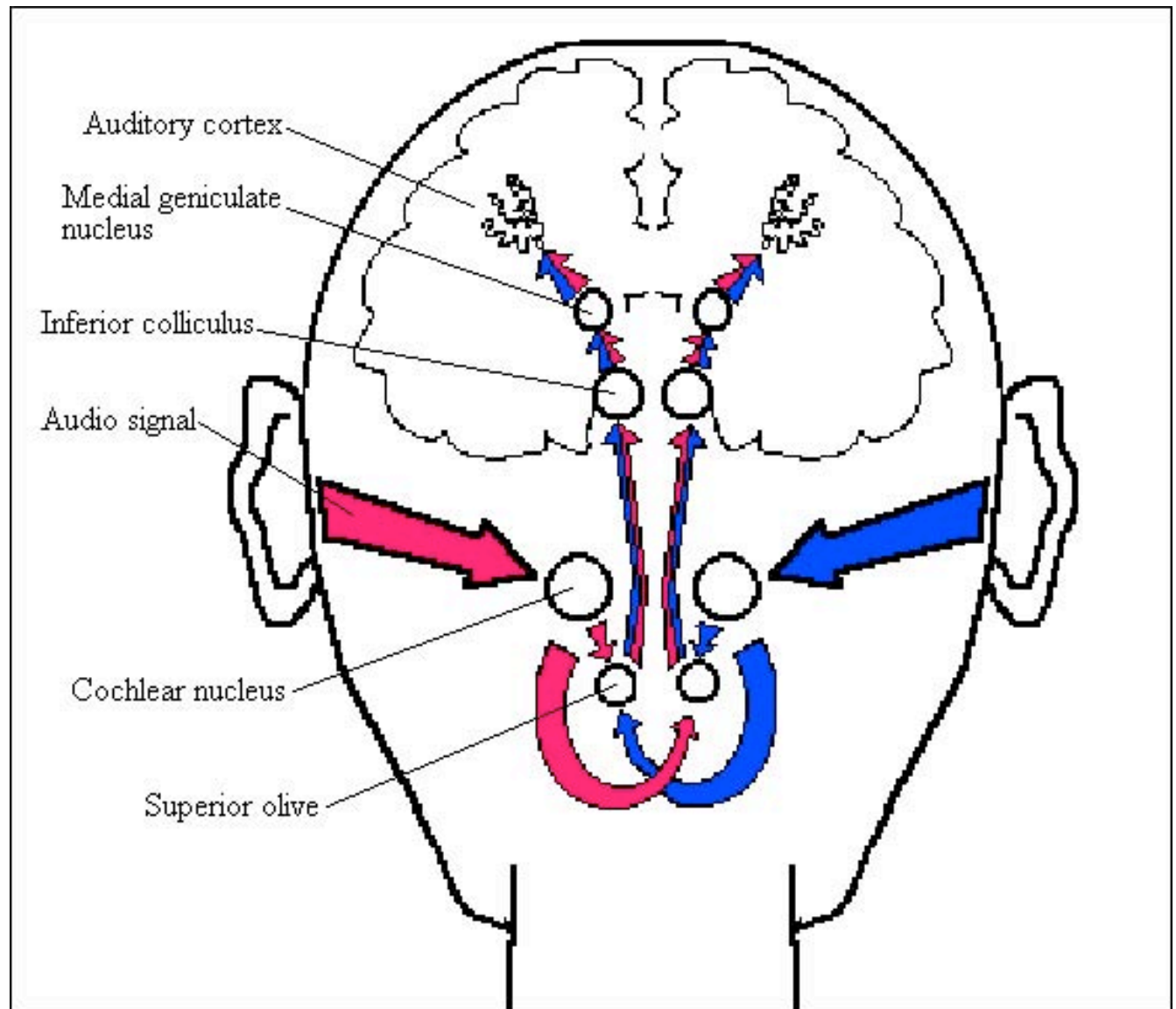
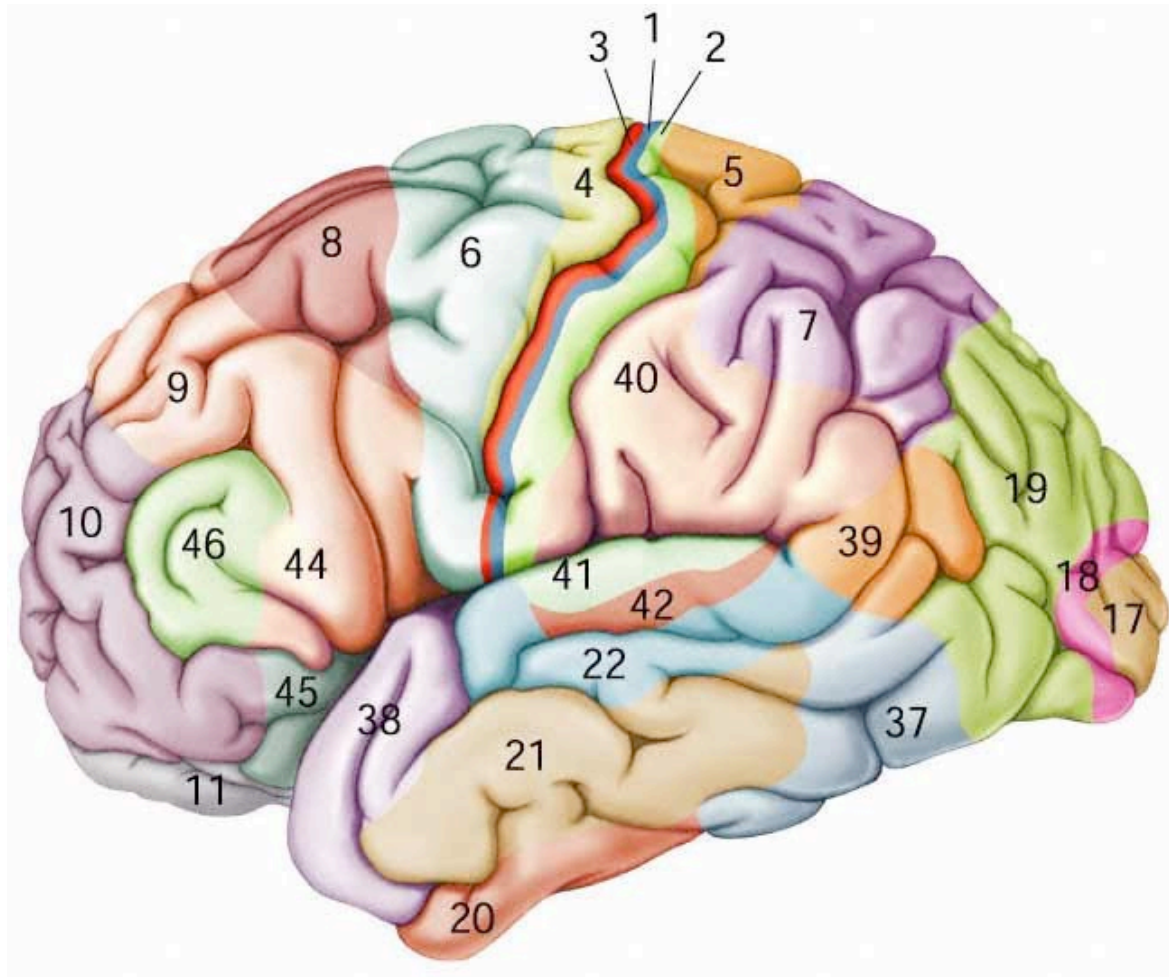


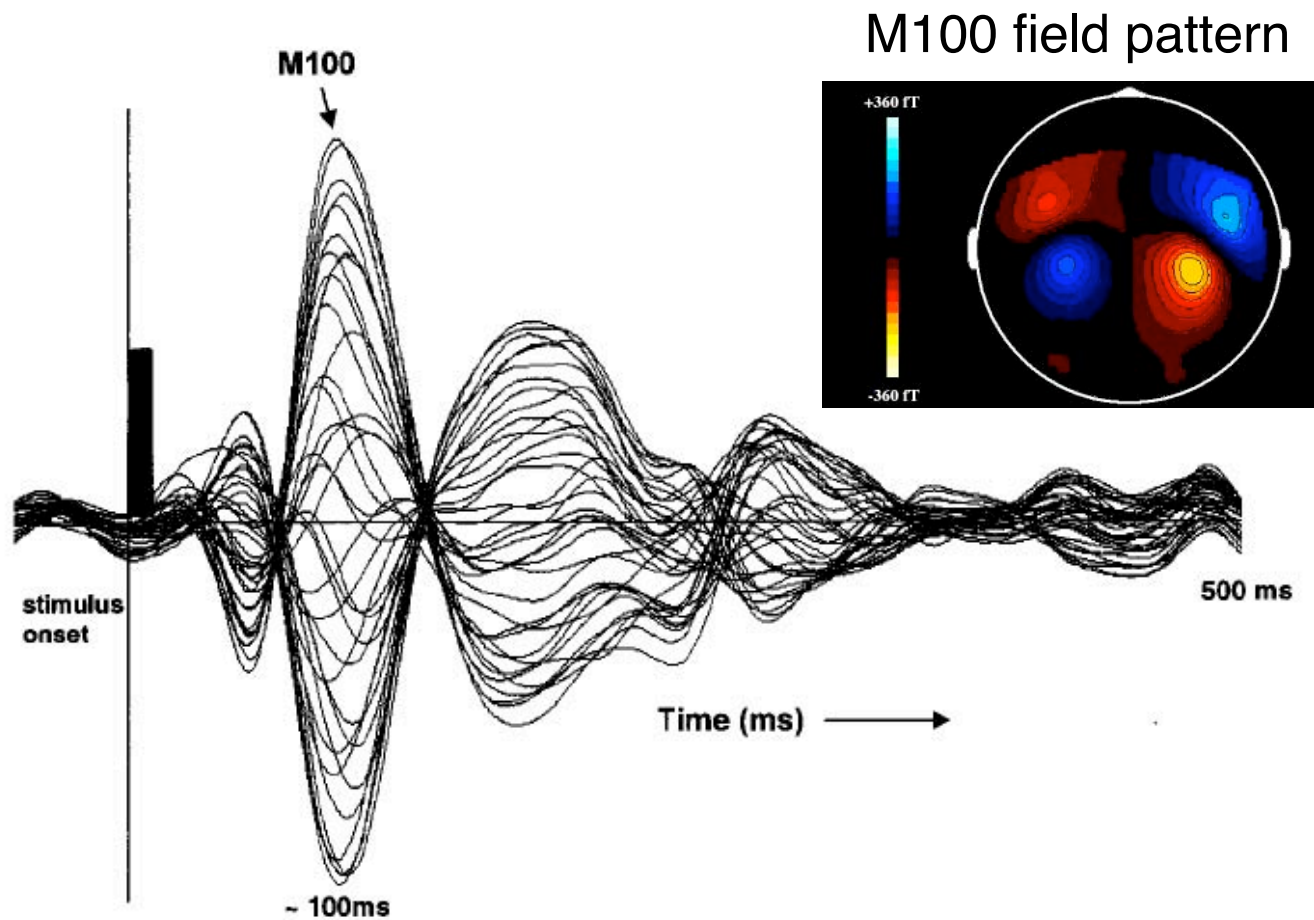
Auditory input reaches primary auditory cortex about 10–15 msec after stimulus onset (Liegeois-Chauvel, Musolino, & Chauvel, 1991; Celesia, 1976).





Primary auditory cortex (A1): Brodmann areas 41 and 42.  
Auditory-association cortex (A2): Brodmann area 22.

# An auditory evoked neuromagnetic field



Roberts, Ferrari, Stufflebeam & Poeppel, 2000, *J Clin Neurophysiol*, Vol 17, No 2, 2000

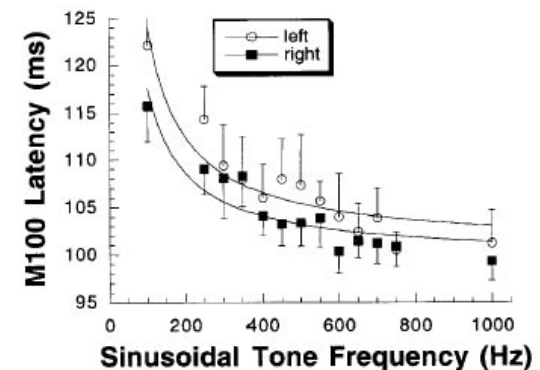


# Questions

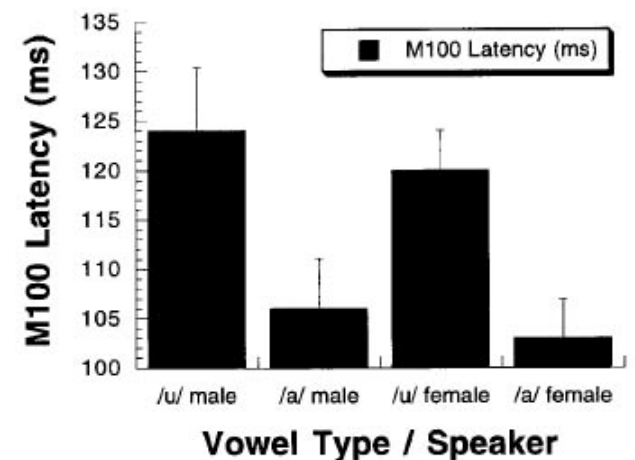
- Is speech special? If so, when and where?
- How early does knowledge of your native language affect processing?

# M100 (N1 in ERP terms)

- Intensity: higher intensity → shorter latency, smaller amplitude
- Frequency: higher frequency → shorter latency
- Phonetic identity: e.g., shorter latencies for *a* than for *u* (explainable in spectral terms)
- Function of M100 activity in speech processing unclear.



(Roberts & Poeppel, *Neuroreport*, 1996)



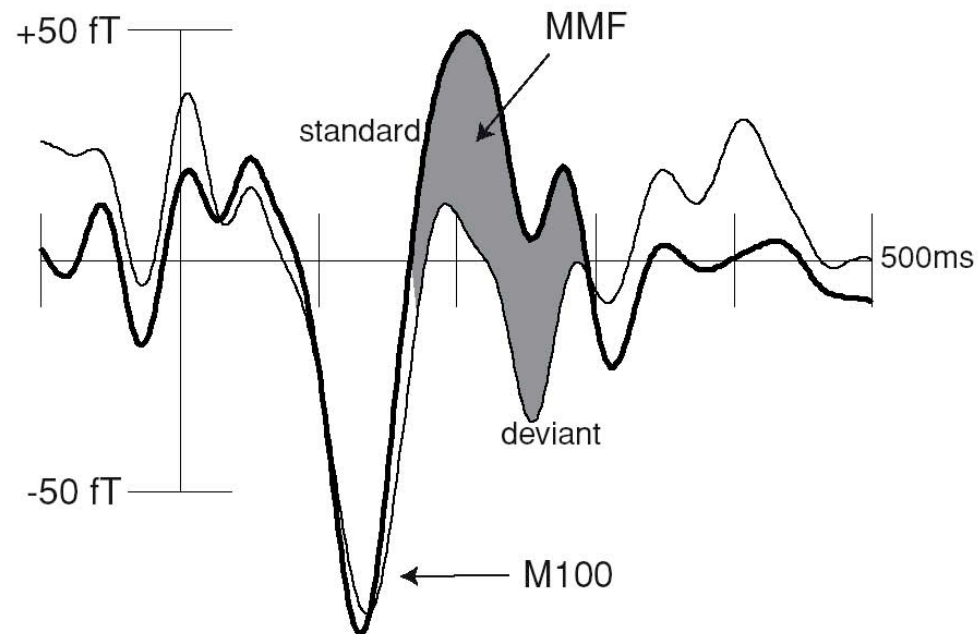
(Poeppel et al., *Neuroscience Letters*, 1996)

# Auditory Mismatch Field (MMF)

- Elicited in an oddball paradigm:

XXXXXX**Y**XXXXXXXX**Y**XXXXXXXX**Y**XXXXXXXX**Y**XXXXXXXXXX**Y**XXXXXXXXXX

- Generated by deviants in STG at 150-200ms (usually bilaterally).
- Tool for studying categorical perception.

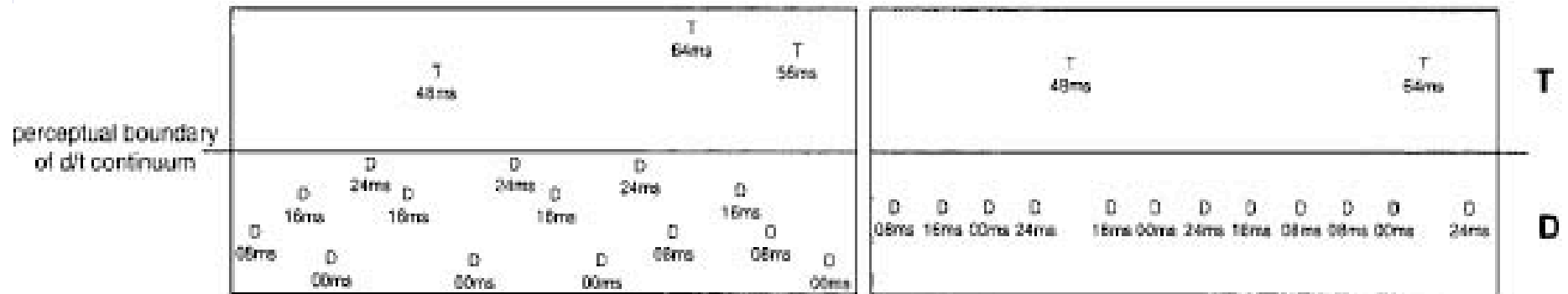




## **Auditory Mismatch Field (MMF)**

- Phillips et al. 2000, JNC: Does the MMF generator has access to phonemic categories?
  - **Study of categorical perception in a situation when the stimuli form a physical continuum.**

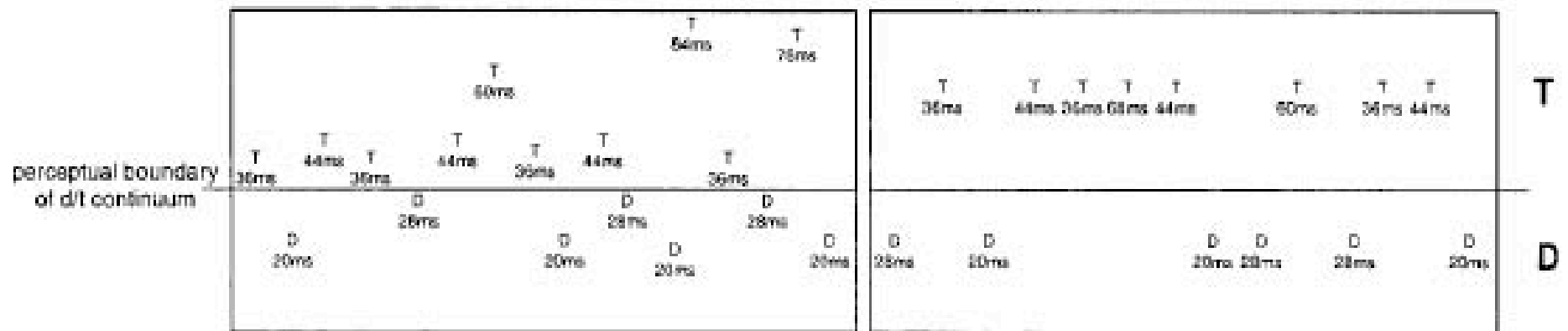
## Phonological Contrast Experiment



(a) Acoustic Representation

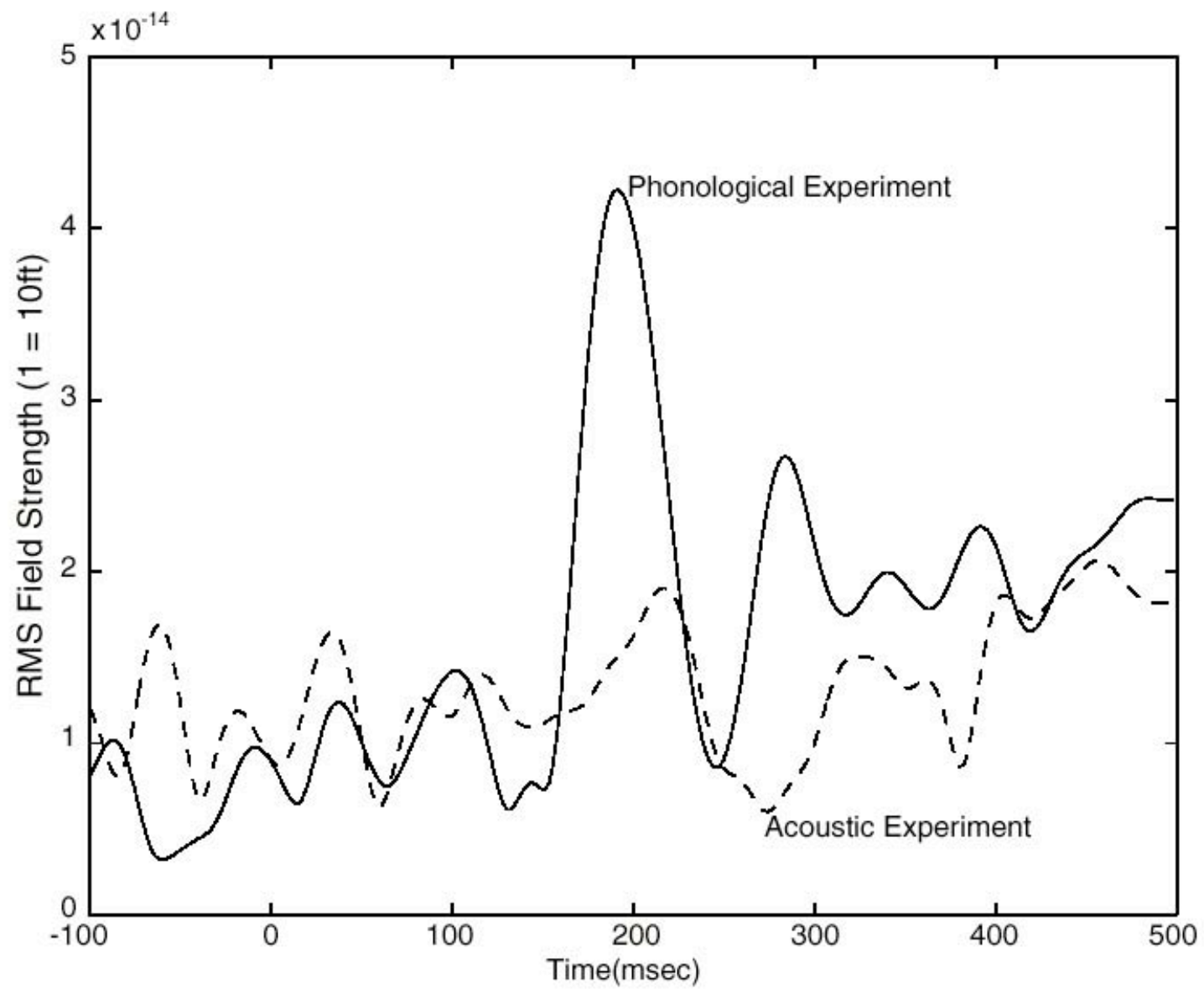
(b) Phonological Representation

## Acoustic Contrast Experiment



(c) Acoustic Representation

(d) Phonological Representation





## **Acoustic-phonemic analysis**

- What we know: that by 200ms superior temporal cortex “knows” about phonemic categories.
- What we don’t know: what computation leads to this “knowledge”.



## **Acoustic-phonemic analysis**

- Pure word deafness: selective inability to understand speech.
- Bilateral STG damage necessary for pure word deafness.
- Speech processing bilateral but likely asymmetric (see Hickok & Poeppel, 2004 and refs therein).