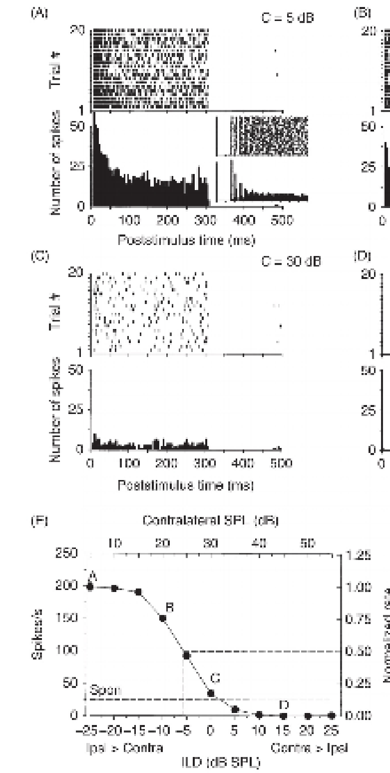
- Holding one ear level and changing the other → ◺
- Varying one cue while holding others → ILD
- Still, also exhibit CD
- Also LSO needs fast τ_rise to spike
- steep sensitivity to ITD, transient-onset

Exc and INH to DNLL + ipsi ICC, overlap in ICC with MSO
only INH to DNLL + contra ICC, no overlap



RELEVANT YIN SECTIONS

- ACOUSTIC CUES
  - PROCESSING OF ITD
    - JEFFRESS
    - BUSHY CELLS
    - COINCIDENCE IN MSO
  - CD
  - LIMITATIONS OF JEFFRESS
  - SOURCE OF DELAYS
  - CELLULAR BASIS OF COINCIDENCE DETECTION
  - PROCESSING OF ILD
  - INTEGRATION OF CUES

OTHER QUESTIONS

- WHY MSO spontaneous activity?
  - ↳ SBCs spontaneous cause autocoincidences either binaural or monaural
- IS MSO COINCIDENCE DETECTION?
  - ↳ not instantaneous, shifted by recent history

- WHY MSO?

- WHY LSO? EXCITED BY IPSI EAR STIMULATION AND INHIBITED BY CONTRA EAR STIM.

ILD

SUBTRACTION (or ANTICORRELATION)

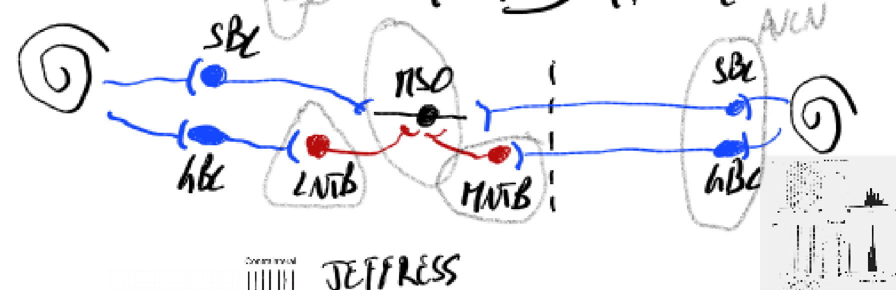
vs

SOUND LOCALIZATION

CROSS - CORRELATION

ITD

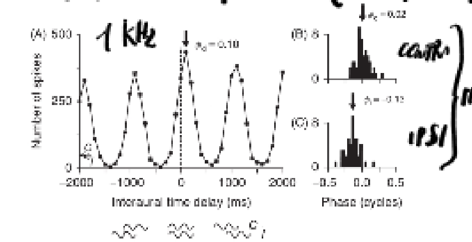
ITD RANGE: [0, 800 μs]



EXCITATION

INHIBITION

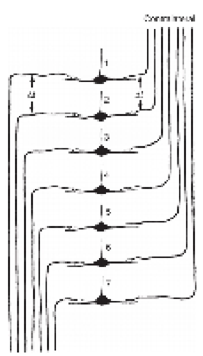
MSO response (ICC proxy)



OTHER SECTIONS

- COCHLEAR DELAYS (SCHROEDER)
  - ↳ Respects OD vs CF distribution and π-limit, but only if "contra CF < ipsi CF" bias in cochlear errors
    - ↳ maybe, maybe not
- AXON originates from dendrite
  - ↳ only in small % of MSO cells
- $\tau_{rise,ipsi} < \tau_{rise,contra}$
  - ↳ not reproduced
- McAlpine: maximal change of firing rate over physiological range, so MSO is like LSO — TWO CHANNEL HEMISPHERIC MODEL
- Day ML 2013 maximum likelihood estimates "found to be more successful" than firing rate

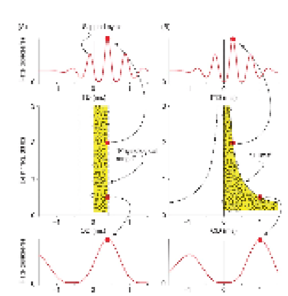
1. SYMMETRICAL inputs that are out of phase give diff. perception
2. DIVERSITY of ODs needed in complex envs
3. INTERAURAL DECORRELATION uses peaks not rate change
4. BEHAVIORAL data after unilateral brain lesions: ipsilateral unaffected
5. No anatomical evidence for such comparison



JEFFRESS

Problems:

1. Neurons with large ODs only tuned to low freq, OD magnitude decreased with increasing CF
2. Upper limit in internal delays, ≃ ½ CF⁻¹ (characteristic period) ← π-delay



↳ WHY?

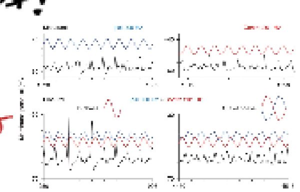
- Counteract autocorrelation?
- Brand: "Inhibition DELAYS excitatory EPSP"
  - ↳ phaseshifted
  - ↳ supported by strychnine application shifting OD to zero
  - ↳ but FAST IPSP!

PROBLEMS

Dynamic ITD tuning
- → Only over specific freq range
- → Two hemispheric channels (no big delay map)

1. Subthreshold monaural summed predicts binaural suprathresh, so why INH?
2. Franken 2015 did not find sustained, phase-locked inhibition
3. Roberts 2013 finds leading inh but no delaying effect
4. Myoga shows limited leading inh eff
   - ↳ proposes lagging inhibition advances ipsi EPSP → but disagrees with Roberts

WAS IT REALLY LIKE THIS? DIDN'T THEY SHOW MCL8?



- Roberts "Inhibition shortens coincidence window"
  - ↳ maybe increased leakiness?