

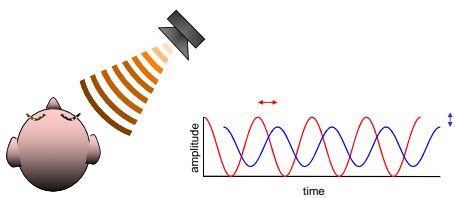
Processing in The Superior Olivary Complex

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Binaural cues for Localising Sounds in Space

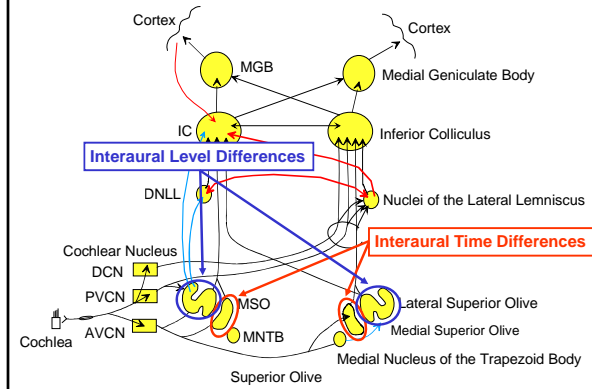


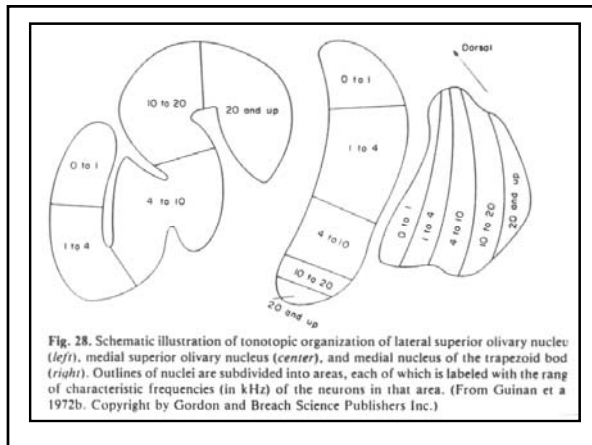
Interaural *Time* Differences (ITDs)
Interaural *Level* Differences (ILDs)

Binaural Mechanisms of Sound Localization

- Interaural time (or phase) difference at low frequency are initially analysed in the MSO by coincidence detectors connected by a delay line system.
- Interaural level differences at high frequency are initially analysed in the LSO by input that is inhibitory from one ear and excitatory from the other.

The Auditory Nervous System



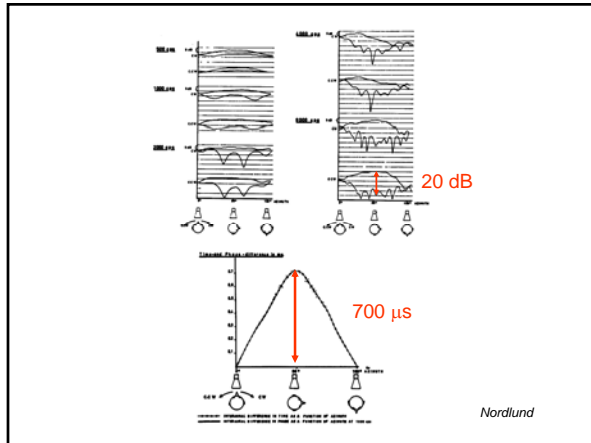


Binaural Hearing

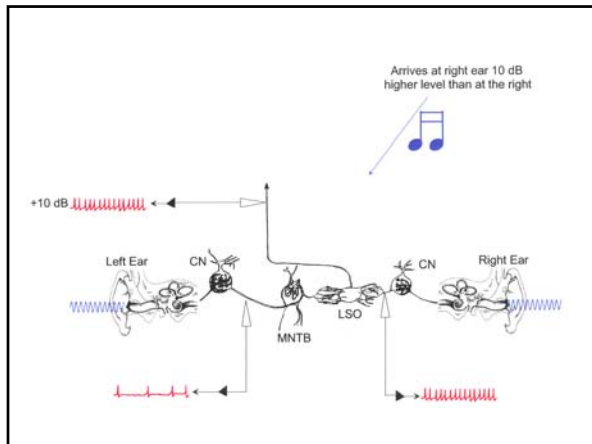
The ability to extract specific forms of auditory information using two ears, that would not be possible using one ear only.

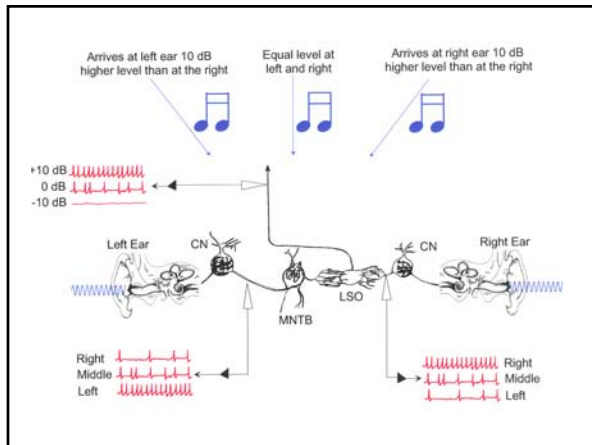
Advantages of Two Ears

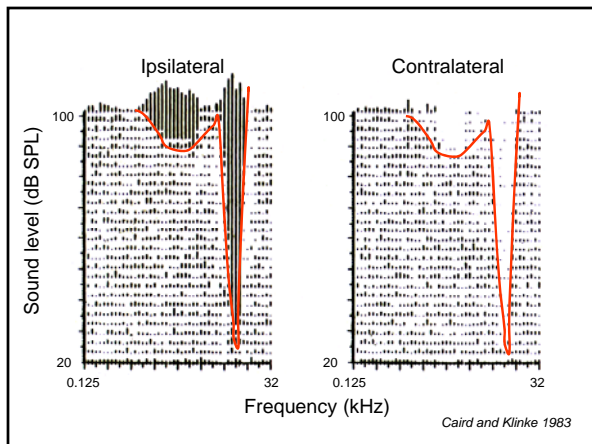
- Improved detection / increased loudness
- Removing interference from echoes
- Improved detection of sounds in interfering backgrounds
- Spatial localization
- Detection of auditory motion

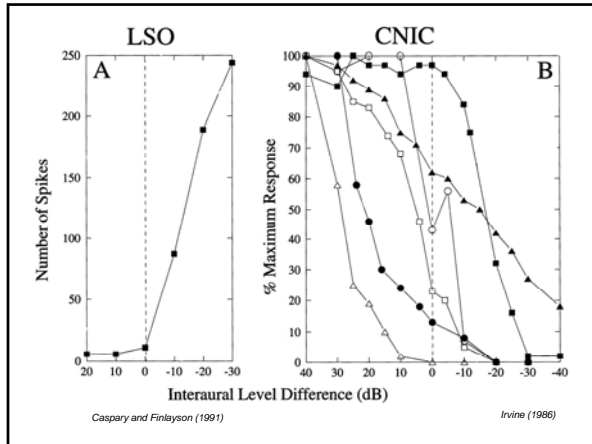


Interaural level differences
(high frequency)

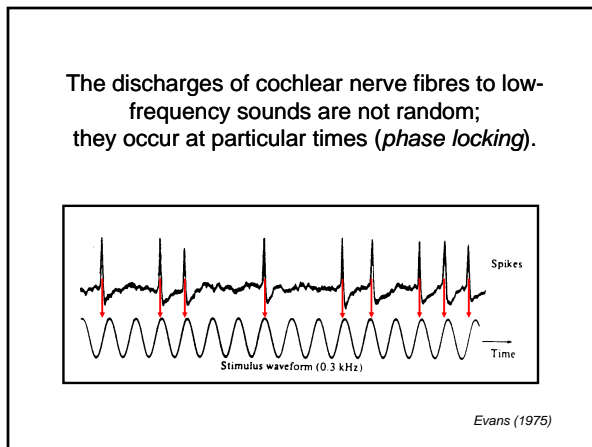


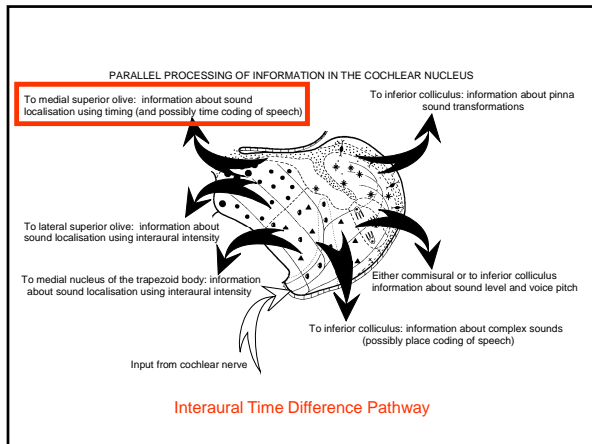


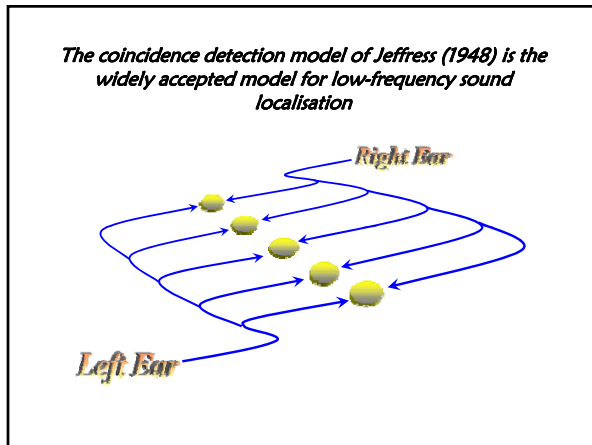


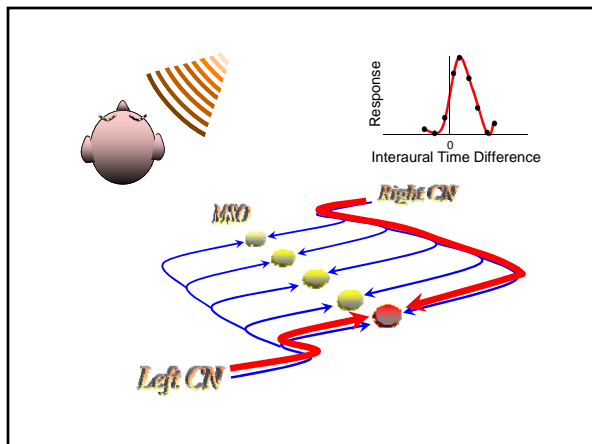


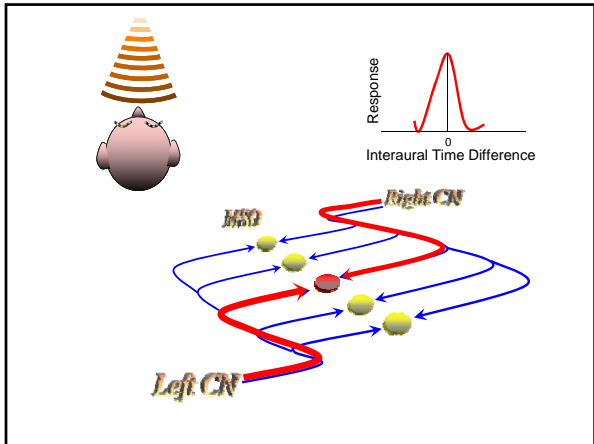
Interaural time differences
(low frequency)

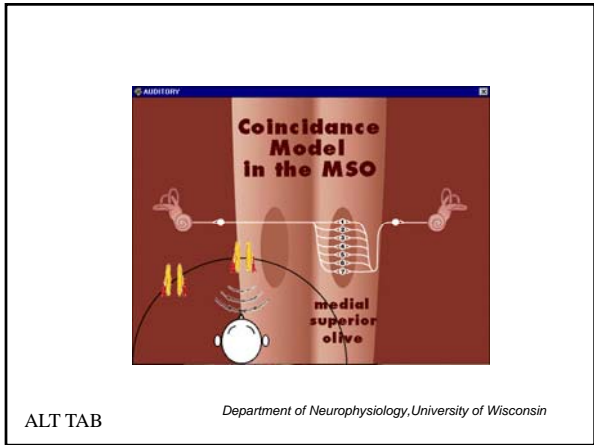


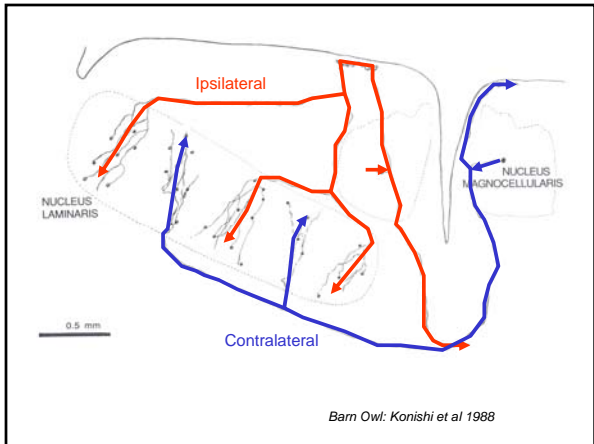


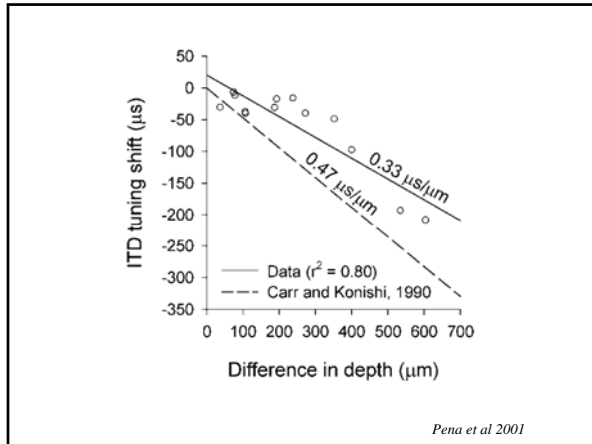


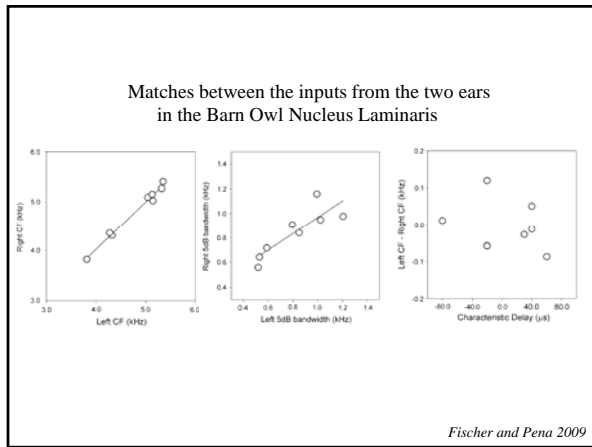


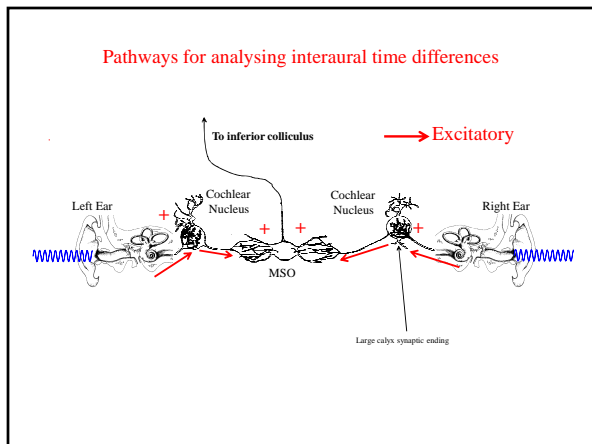


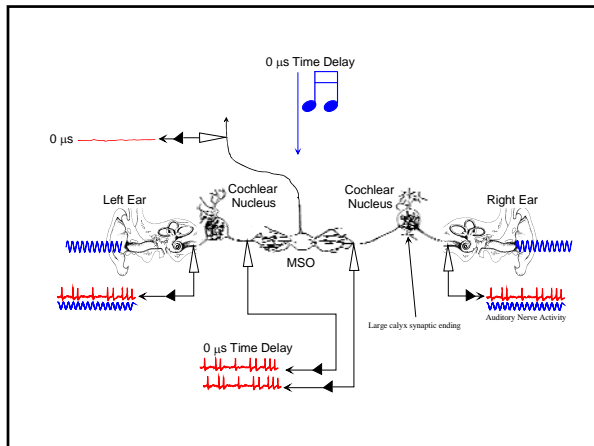


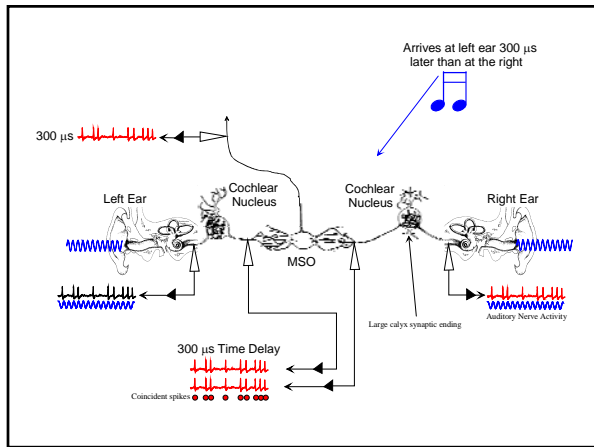


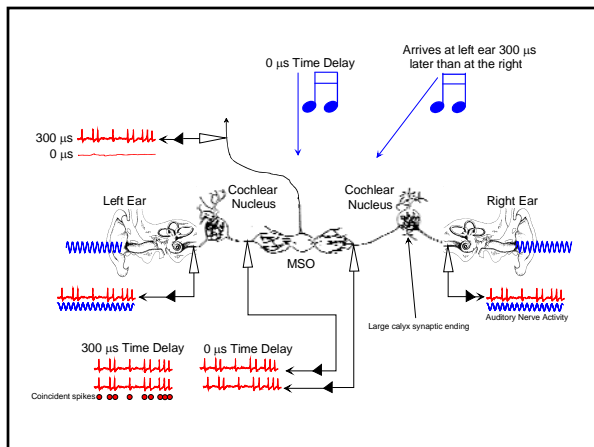


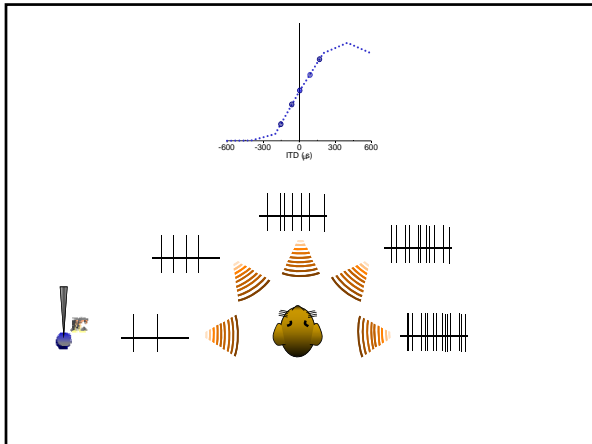


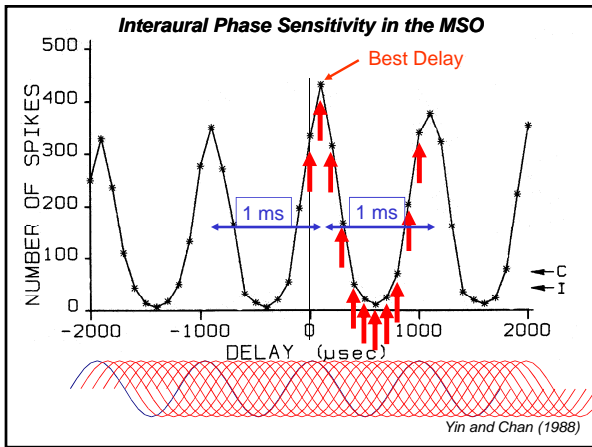


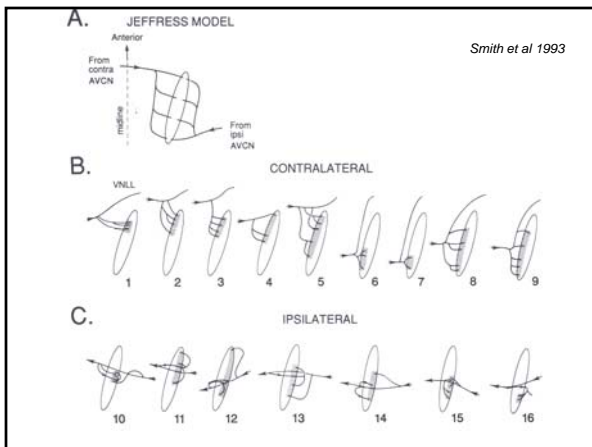


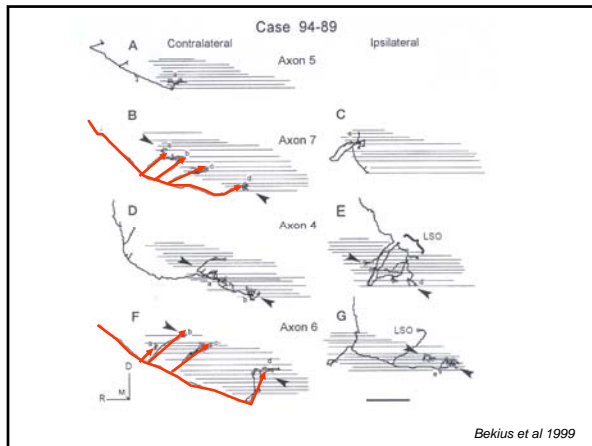


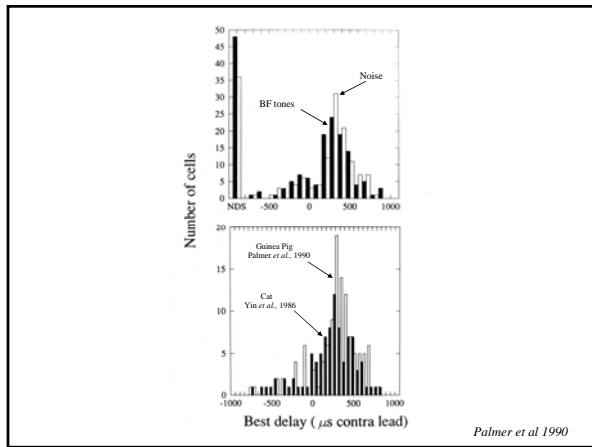


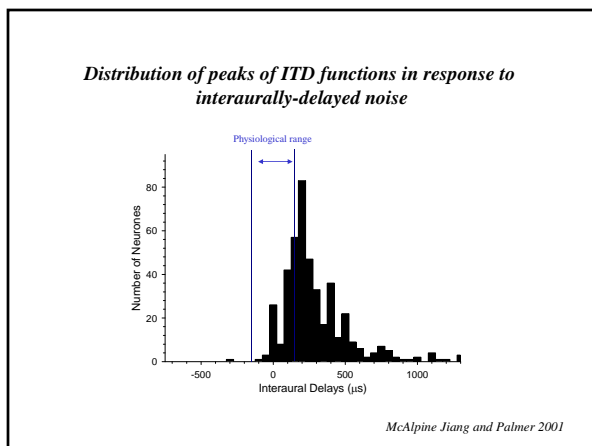


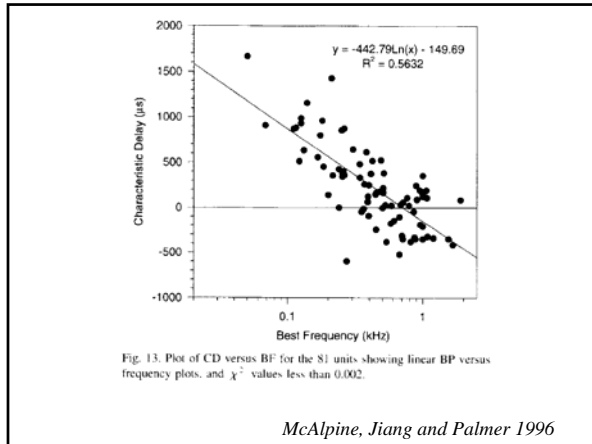


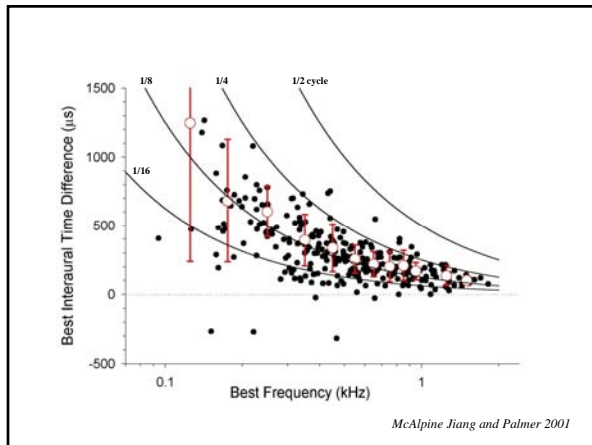


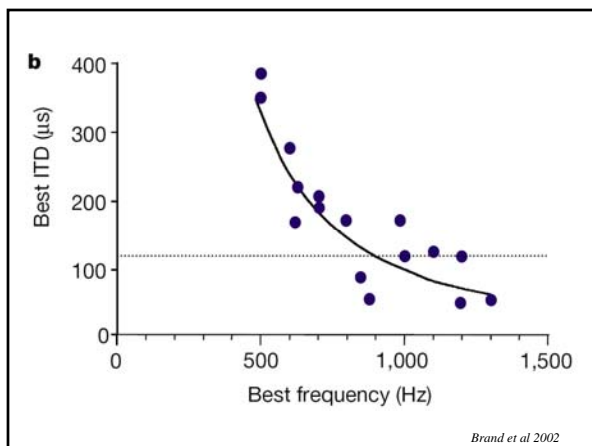


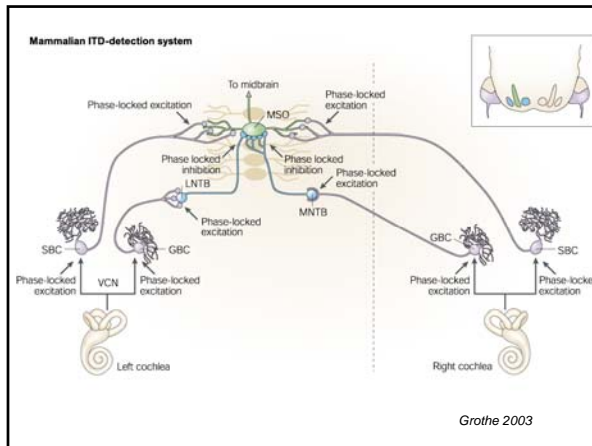


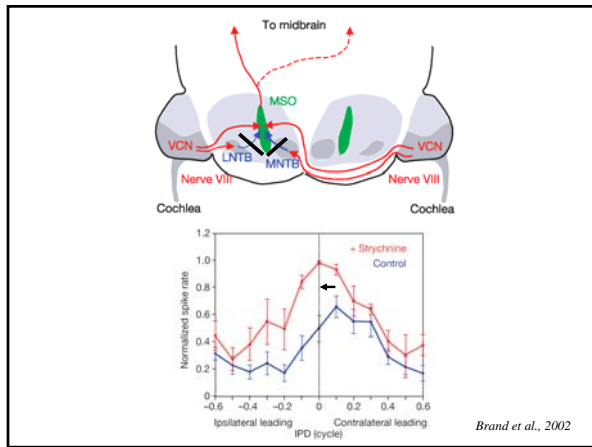


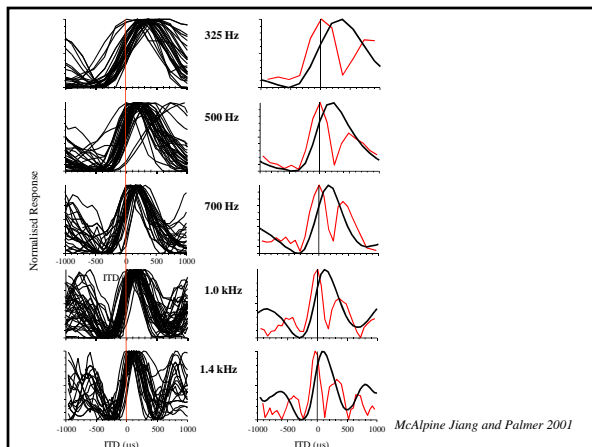




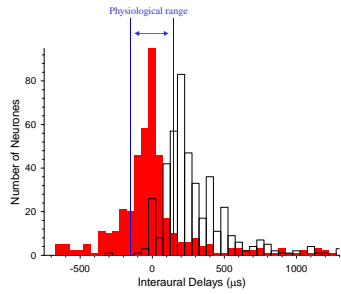




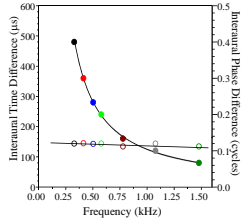
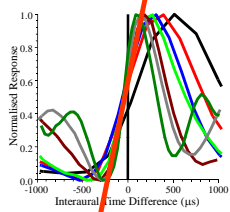




Distribution of steepest slopes of ITD functions in response to interaurally-delayed noise



McAlpine Jiang and Palmer 2001



McAlpine Jiang and Palmer 2001

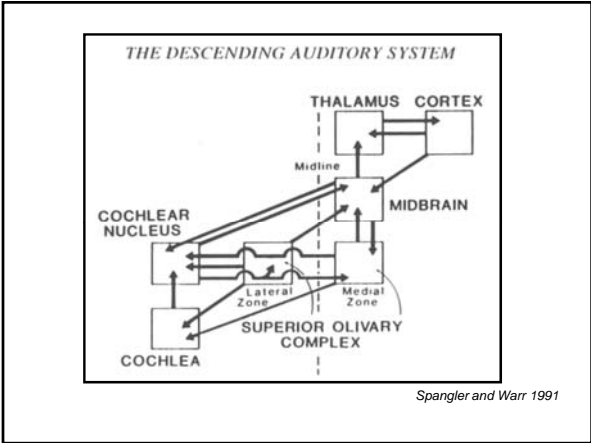
ITD processing is BF-dependent.

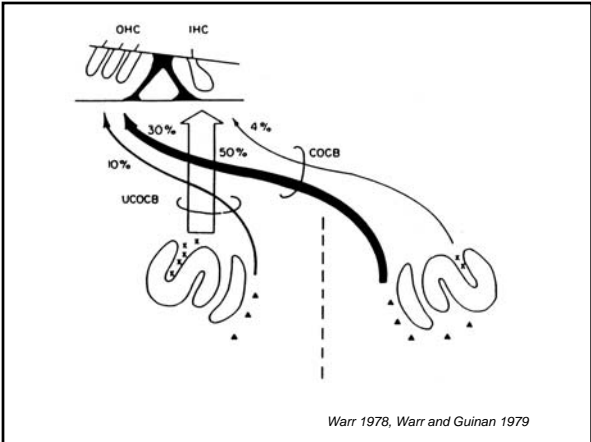
ITD functions are steepest around midline.

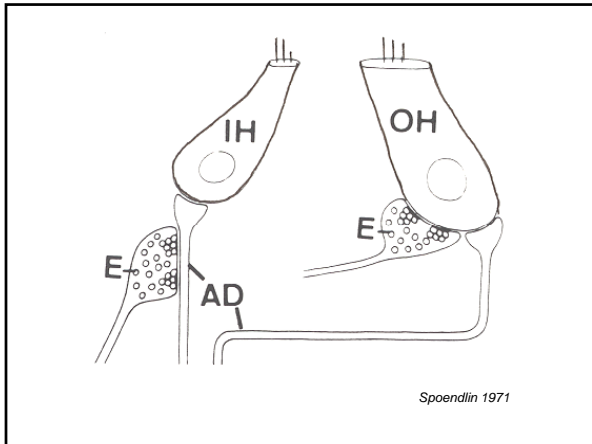
The consequence of this is that:

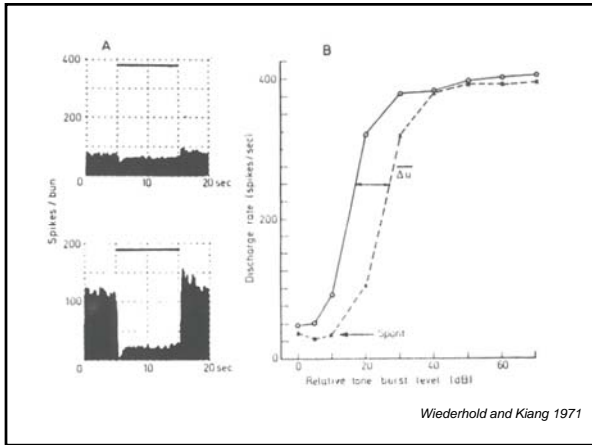
As ITD increases across the physiological range the activity at any frequency increases

Descending pathways









Function of the descending or centrifugal innervation

- Protection from acoustic trauma
- Control of the mechanical state of the cochlea
- Involvement in selective attention
- Detection of complex signal in noise
