Spectral Weighting of Binaural Cues: Effect of Bandwidth and Stream Segregation

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Hypothesis

It is hypothesized that binaural information is integrated over frequencies in the binaural system to lateralize sounds (Pasanen, 1976) into account and might not be applicable to more realistic broadband signals (Stern et al., 1988). This method does not take binaural interference (McFadden and Hafter, 1986) into account and might not be applicable to more realistic broadband signals.

Method and Stimuli

- 10 normal hearing listeners.
- 6 normal hearing listeners (subset from Experiment 1).
- Experiment 1: Static condition
  - Fixed set of stimuli: all 11 noise bands.
  - Experiment 2: Streaming condition
  - Streaming: 4 subconditions: (1) all 11 noise bands, (2) the 2 most outer bands removed, (3) the 7 most outer bands removed, (4) the 11 most outer bands removed.

Experiment 1: Static condition

- Figure 2: Sketch of the subconditions in experiment 1.
- The black bars represent the noise bands with binaural information (ITD or ILD). The dashed bars represent the conditions with uncorrelated noise and in subcondition a the 2 most outer bands were removed.

Experiment 2: Streaming condition

- Figure 3: Perceptual weights (means ± standard errors) for ITD (A) and ILD (B) determined with 10 subjects. The large and small bars represent the condition with 11 and 7 (or 8, if 8) noise bands, respectively. The x-axis shows the conditions with noise bands on the single and double most outer frequency bands.
- Figure 4: Sketch of the time/frequency representation of the signal used in the streaming conditions with a time-frequency of 1.048 Hz (red box). The arrows indicate all used subbands and subbands from this experiment. The black bars represent the target signal as used in the static experiment. The grey bars represent the pre/post cursor and are correlated noise, interaurally out of phase.

Discussion and conclusions

- Results obtained different to what would be expected from the duplex theory.
- Spectrally most outer bands play a special role.

Weighting of frequency bands depends on spectrally near content.
- Streaming leads to an increase in weights.
- Release from interference?
- Increase in weight only when binaural information available.
- At low frequencies for ITD.
- At all frequencies for ILD.

Results different to weights obtained by Stern et al. (1988).

Literature

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