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

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Introduction

Auditory-borne neural signals are held in a single sound source in the presence of other sound sources by binaural auditory effects. This is commonly referred to as the binaural cue effect. It is known that binaural cues are very important in localizing the sound source in space. Auditory-borne neural responses are widely used in studies of the temporal and spectral properties of binaural cues. The effects of audibility and localization on the binaural system are well known. The weights derived with a logistic regression analysis are depicted in Figure 3. The full set condition shows that the weights are normalized relative to their mean value. The weights without frame indicate the streamed conditions and the red highlighted ones the on condition. The weights from Stern et al. are scaled to fit the range of the here obtained weights.

Hypothesis

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

Method and Stimuli

- 10 normal hearing listeners
- 20 dB sound level
- Electroacoustic output via equalized headphones
- Spectral weighting functions were previously derived using inverted sensitivity thresholds of narrowband stimuli (Stem et al., 1988).
- The authors give a detailed description of the center frequencies (Hz) of the stimuli.

Experiment 1: Static condition

- Figure 2 shows the subconditions in experiment 1. The black bars represent the noise bands with binaural information (ITD or ILD). The dashed bars represent the streaming conditions. Figure 3 shows the weights for all conditions. The weights without frame indicate the on condition and the red ones the off condition. The weights from Stern et al. are scaled to fit the range of the here obtained weights.

Experiment 2: Streaming condition

- Figure 4 shows the subconditions in experiment 2. The black bars represent the noise bands with binaural information (ITD or ILD). The dashed bars represent the streaming conditions. Figure 5 shows the weights for all conditions. The weights without frame indicate the on condition and the red ones the off condition. The weights from Stern et al. are scaled to fit the range of the here obtained weights.

Discussion and conclusions

Results different to what would be expected from the duplex theory.

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

Literature