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. This is hypothesized because a method derived from 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 Pasanen, 1976) into account and might not be applicable to more realistic broadband signals

Method and Stimuli

- Weights derived with a logistic regression analysis
- 10 normal hearing listeners
- 5 dB, 10 dB and 15 dB
- Sound pressure level
- Auditory system of hearing
- Binary output (left/right lateralization)
- Probability described as

  \[ P = \frac{e^{\beta_0 + \beta_1x}}{1 + e^{\beta_0 + \beta_1x}} \]

  With \( \beta_0 \) being the weights leading and the linear model

  \[ y = \beta_0 + \beta_1x \]

- Stimuli presented via embedded in headphones (HDA200)
- 11 JAFEC (left/right decision tasks)

- Spectrally most outer bands play a special role
- Weighting of frequency bands depends on spectrally near content
- Content on only one spectral side leads to high weight (condition 1b)
- Uncorrelated noise on the other side does not change the weight (comparing condition 1a to 1c)
- Listener’s judgement of lateral location of sound is biased by binaural cues on the most outer frequency bands

Discussion and conclusions

- Results 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
- Content on only one spectral side leads to high weight
- Listener’s judgement of lateral location of sound is biased by binaural cues on the most outer frequency bands

- Streaming leads to an increase in weight
- Release from interference
- Increase in weight only when binaural information available
- At low frequencies for ITD
- At all frequencies for ILD