

Both Contextual and Talker-Bound F0 Information Affect Voiceless Fricative Perception

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Speech perception is sensitive to context. An example of this is the contrastive effect of fundamental frequency (F0) on the perception of voiceless fricatives' spectral center of gravity (CoG) (e.g., Niebuhr, 2017). However, whether knowledge about a talker's characteristic mean F0 can produce similar effects remains unknown. The present study therefore investigated the effects of contextual (Exp 1) and talker-bound (Exp 2) F0 information on the perception of the voiceless fricatives /s/ and /ʃ/. In Experiment 1, in a 2AFC task, native Dutch listeners (N=10) categorized target words as the Dutch words “sok” /sɔk/ or “sjok” /ʃɔk/ embedded in a carrier sentence (“Nu komt het woord...”) in 3 intermixed F0 conditions. The fricatives were tokens from a synthetic 8-step fricative continuum from /s/ to /ʃ/. The carrier sentence was pitch shifted ± 4 semitones to create High-F0 and Low-F0 context conditions, alongside a Mid-F0 (i.e., non-shifted) control condition. Ambiguous fricatives were perceived as more /s/-like in Low-F0 sentences compared to High-F0 sentences. In Experiment 2, new participants (N=32) first listened to 20 minutes of speech (exposure) from the same talker whose voice had been consistently pitch-shifted up (High-F0 group) or down (Low-F0 group) ± 4 semitones. Afterwards, a 5-step subset of the original 8-step fricative continuum was used in a 2AFC task where participants categorized stimuli without carrier sentences as “sok” or “sjok”. The continuum was again perceived as more /s/-like for the Low-F0 group compared to the High-F0 group. Together, the findings suggest that listeners use not only the immediate context but also previously established knowledge about talkers' typical F0 to interpret incoming speech sounds.

References

- Niebuhr, O. (2017). On the perception of “segmental intonation”: F0 context effects on sibilant identification in German. *EURASIP Journal on Audio, Speech, and Music Processing*, 2017(1), 19. <https://doi.org/10.1186/s13636-017-0115-3>