

The Speech-to-Song-Illusion revisited

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We are exploring the boundaries of speech and song in an acoustic-perceptive perspective. We investigate a musical illusion first described by Diana Deutsch (1995, Deutsch et al. 2008). In this “speech-to-song illusion” a phrase read by Diana Deutsch shifts to be heard as sung without changing any acoustic characteristics of the signal. This illusion is achieved by simply repeating the phrase several times in exactly the same way. As far as we know, the effect was found only with this single phrase as piece of evidence. We assume that some acoustic characteristics of this phrase supported the perceptive shifting from speech to song in a specific way. Our assumption is that the shifting will occur earlier, i.e. after fewer repetitions, when specific acoustic characteristics are present in a sound signal. We have set up a reaction time experiment using the speech-to-song illusion as a method to test several hypotheses about the nature of the acoustic characteristics that will support the perceptive drift.

In our experiment, several naturally spoken sentences of German were modified regarding two dimensions which are assumed to be shared by speech and song: rhythm/metrics and tonal structure. The following main hypotheses are tested: (1) a perceptual shift from speech to song is predominantly induced by rhythmic properties of the signal (*rhythmico-metrical hypothesis*) or (2) the shift will be mainly facilitated by tonal factors when music-related tonal characteristics are established in the signal (*tonal hypothesis*).

For each hypothesis, two conditions were taken into consideration. To test the rhythmico-metrical hypothesis, we used sentences with an isochronous distribution of stressed syllables vs. sentences with non-isochronous stress occurrence assuming that the perceptual shift from speech to song should occur earlier in isochronous sentences. In the second condition we tested the influence of timing assuming that the temporal equalization of intervocalic intervals will result in an earlier shift opposed to equalization of acoustic syllable onset intervals of stressed and unstressed syllables.

In order to examine the tonal hypothesis and the influence of tonality, f₀-trajectories of the test sentences were stylised in a contour-like versus level-like way assuming that the level-like condition is strongly associated with song perception. In the other tonal condition, we compared sentences with and without a prominent tonal interval (perfect fifth) at the end of the phrase suggesting that prominent intervals will cue the perception of scalar structure thus facilitating song perception. A set of 32 stimuli was tested using a reaction time paradigm. This study is still in progress. However, some preliminary results will be presented and discussed. The experimental findings can give us useful evidence for modelling the acoustic basis of speech and song perception and reveal shared resources.

Deutsch, Diana; Lapidis, Rachael; Henthorn, Trevor (2008): The speech-to-song-illusion. Paper presented at the 156th Meeting of the Acoustical Society of America.

Deutsch, Diana (1995): Musical Illusions and Paradoxes. CD. La Jolla, CA: Philomel Records.