Native and non-native listeners' perception of English consonants in three types of noise

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How background noise affects speech perception depends on the noise type. Moreover, this depends on the listener's language background: noise hinders perception of a second language more than perception of the native language. But does is matter whether native and non-native listeners are conversing in a factory versus a train? This paper assesses whether different noise types affect identification of different consonants by native and non-native listeners differently.

In a phoneme identification experiment, English and Dutch listeners heard all 24 English consonants in VCV stimuli in quiet and three noise types: competing talker, speech-shaped noise, and modulated speech-shaped noise (signal-to-noise ratio: -6 dB). Differential effects of noise type for English and Dutch listeners were found for eight consonants (/p t k g m n ŋ r/). Interestingly, these phonemes are no random set but include all voiceless and one voiced stop, all nasals, and one approximant. For these eight phonemes, a complex pattern with highly variable effects of noise type on the identification by native and non-native listeners was found: each noise type hindered non-native listeners more than native listeners for some of the phonemes, but none of the noise types did so for all phonemes with a particular manner or place of articulation.

These results have important consequences for all studies of native and non-native speech perception in noise. Noise type matters; moreover, the diversity of perceptual cues and the differences between native and non-native listeners' use and weighting of these cues are likely to lead to hard to predict, complex patterns of results like those presented here, where both listener groups and phonemes are affected differently by different noise types. The present results thus suggest that the outcomes of any study on native and non-native speech perception in noise will crucially depend on the types of noise employed.