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Musical scene analysis of hearing-impaired and normal-hearing listeners: a melody and instrument matching task

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ABSTRACT

It is well known that scene analysis is at the core of hearing-impaired (HI) listeners' difficulties of understanding speech in noise. Surprisingly little is known about scene analysis of HI listeners in musical contexts. Here we tested 24 moderately HI listeners and 28 normal-hearing (NH) listeners in their ability to identify instruments and melodies in the presence of a musical accompaniment that acts as a masker (cello/piano dyads or spectrally matched noise). Target signals consisted of four-note melodies. In each trial, a signal-masker mixture was presented followed by two different versions of the signal without masker. Listeners judged which signal version was part of the mixture. Signal versions either differed in terms of timbre (flute vs. trumpet) or in terms of melody. Signal-to-masker thresholds (71% correct response rate) were measured by varying the signal presentation level in a 2down-1up procedure. The masker level was set to 65 dB SPL for NH listeners and to medium loudness for HI listeners. We observed drastically elevated thresholds for HI listeners (>+10dB) compared to NH listeners. Participants with musical training generally exhibited significantly lower thresholds. These results for the first time demonstrate drastic effects of hearing impairment on musical scene analysis.

Keywords: Auditory scene analysis, music perception, hearing impairment

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