Effects of musical training and hearing loss on pitch discrimination

Our ability to perceive the pitch of complex sounds is essential for melody perception and for our enjoyment of music. It also plays an important role in speech perception to convey intonation and sometimes meaning, e.g., in tonal languages, and greatly helps segregation of competing sound sources. Humans are able to discriminate very small changes in the pitch of complex harmonic sounds, with fundamental frequency difference limens (F0DLs) that can be smaller than 1% of the fundamental frequency (F0). However, performance in such pitch discrimination tasks is known to depend on the harmonic content of the sound and whether the harmonics are resolved by the auditory frequency analysis operated by cochlear processing. F0DLs are also heavily influenced by the amount of musical training received by the listener and by the spectrotemporal auditory processing deficits that often accompany sensorineural hearing loss. This paper reviews the latest evidence for how musical training and hearing loss affect pitch discrimination performance, based on behavioral F0DL experiments with complex tones containing either resolved or unresolved harmonics, carried out in listeners with different degrees of hearing loss and musicianship. A better understanding of the interaction between these two factors is crucial to determine whether auditory training based on musical tasks or targeted towards specific auditory cues may be useful to hearing-impaired patients undergoing hearing rehabilitation.