

VOICE QUALITY IN IDENTIFYING EMOTIONS BY CHILDREN WITH NORMAL AND WITH IMPAIRED HEARING

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Abstract

Voice quality and vocal characteristics in identification of emotions were studied in 12 year-old children (n = 18) with normal hearing (NH) and in 8-17 year-old children (n = 25) with impaired hearing (IH) and using cochlear implants (CIs). A listening test for emotion identification was organized for the NH children as a group in their classroom during a school day. The IH children were tested singularly in a soundproof studio during their biannual control visit to the hospital. The vocal stimuli were produced by five professional actors and student actors (2 males, 3 females). The samples consisted of nonsense sentences and prolonged vowels /a:/, /i:/ and /u:/ (N = 32). Four emotions were expressed: anger, contentment, excitement and fear. The acoustic characteristics of the samples were analyzed using Praat software and statistics were studied using SPSS software. The NH children identified the emotions with 75% accuracy and valence (a positive, neutral or negative emotion) with 84% accuracy. The IH children identified emotions with 57% accuracy and valence with 70% accuracy. Thus, the identification was statistically significantly different between the two groups ($p < 0.001$). Females were more accurate than males in both groups (NH: $p = 0.025$, IH: $p < 0.001$). Anger was best recognized of the emotions expressed. In NH children, the identification correlated with F0, F1 and F3, and in IH children with F1. In IH children, correct identification was related to the child's implantation age: those implanted before age of 3 identified emotions better than others ($p < 0.001$). In the results, the significance of F1 may be related to wider mouth opening and thus, louder voice. This tends to indicate that children may rely on sound pressure level (SPL) in their emotion identification. In NH children, the significance of F3 may refer to the importance of its frequency in perception as it was highest in anger. It is possible that that the frequency area of F3 is not yet transmitted by the CIs very well, as their development has so far concentrated on speech recognition, and in speech, the discriminating formants are F1 and F2. Furthermore, the implantation age in IH children seemed to have an impact on correct emotion identification. Thus, learning the emotional concepts and a large variety of duration and frequencies of sounds in early childhood may help children's social and emotional development and support their vocal interaction.