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Calibration effects on optimal stimulus paradigms for measurement of distortion product otoacoustic emissions in humans

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Distortion product otoacoustic emissions (DPOAEs) and therefrom derived input/output (I/O) functions suffer from an interindividual variability in humans. This poster describes calibration effects on optimal primary tone settings.

Assumption: The optimal path in the primary tone level space (L1, L2 space) using a ear simulator based calibration method (ECCC) is notably less frequency dependent compared to in the ear (ITE) calibration. Basing on ITE, the optimal path is similar to the scissor's paradigm (Kummer et al., 2000), but differs notably when using a different calibration method.

Method: DPOAEs were measured in 13 normal hearing humans at test frequencies f2 = 1, 2, 3, 4, 6 and 8 kHz with fixed frequency ratio f2/f1 =1.2. The combinations of primary tone levels L1 and L2 differed whereas L2 reached from 25 to 75 dB SPL in steps of 10 dB and L1 varied in steps of 3 dB in a vast range in order to record individually maximal levels of DPOAE in L1, L2 space. Basing on the same data, the optimal primary tone settings were determined individually and in mean dependent on ECCC and ITE.

Result: Using ECCC, the optimal path over all subjects and frequencies was L1=0.5 L2 +39 [dB SPL]. Using ITE, the optimal path was L1,ITE = 0.5 L2,ITE + 42 or L1,ITE = 0.42 L2,ITE +44 [dB SPL] when restricted to stimulus levels L2< 65 dB SPL like in comparable studies in literature.

Conclusion: With regard to the whole frequency range, individually optimized stimulus paradigms basing on ECCC differed less than optimal stimulus paradigms basing on ITE. The instrument used for measurment must also be taken into account together with the used calibration method, in order to apply a general, optimal stimulus paradigm for eliciting DPOAEs.

References:

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