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Effect of telephone bandwidth on digit triplet test

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Background/aims
Speech recognition in noise tests have been implemented over the telephone network in both the Netherlands and United Kingdom and have received over 0.5 million calls. The basis of both tests is recognition by the caller of digit triplets presented in a background on speech-shaped noise and use of the normal keypad to indicate the digits heard. Both tests run adaptively by modifying the signal-to-noise ratio (SNR) to find the point at which the participant is scoring 50% correct. Hence the score on the test is the SNR in dB. Results from both Dutch and English tests correspond closely, including showing that about 4 dB higher SNR is required when the test is run over the telephone network, compared to the identical test run using earphones in the laboratory. The aim of the present study was to measure how much of that 4 dB could be accounted for by the limited frequency bandwidth of the telephone network, which is specified from 300 to 3400 Hz.

Methods
Ten otologically normal subjects listened in the laboratory via TDH-50P earphones to the English digit triplets at a range of fixed SNR to establish the function relating percent correct recognition to SNR, under two filter conditions: unfiltered and telephone bandwidth. Logistic regression was used to estimate the 50% correct point on the function for each condition.

Results
Logistic regression gave mean SNR values for 50% correct triplet recognition of 12.0 and 10.8 dB respectively for unfiltered and filtered conditions.

Conclusions
Only 1.2 dB of the 4 dB difference between the unfiltered laboratory implementation and telephone network implementation of the English digit triplet test can be attributed to limited telephone frequency bandwidth. Other distortions within the network appear to degrade speech recognition scores to a greater extent.