

KEMAR vs CARL

Electroacoustic measurements comparison

Objectives

- ❖ Measure crosstalk or interaural attenuation for KEMAR and CARL.
- ❖ Compute and compare the Head Related Transfer Functions (HRTFs) for KEMAR and CARL.
- ❖ Compute objective metrics from speech samples recorded through KEMAR and CARL, for quantifying signal fidelity.

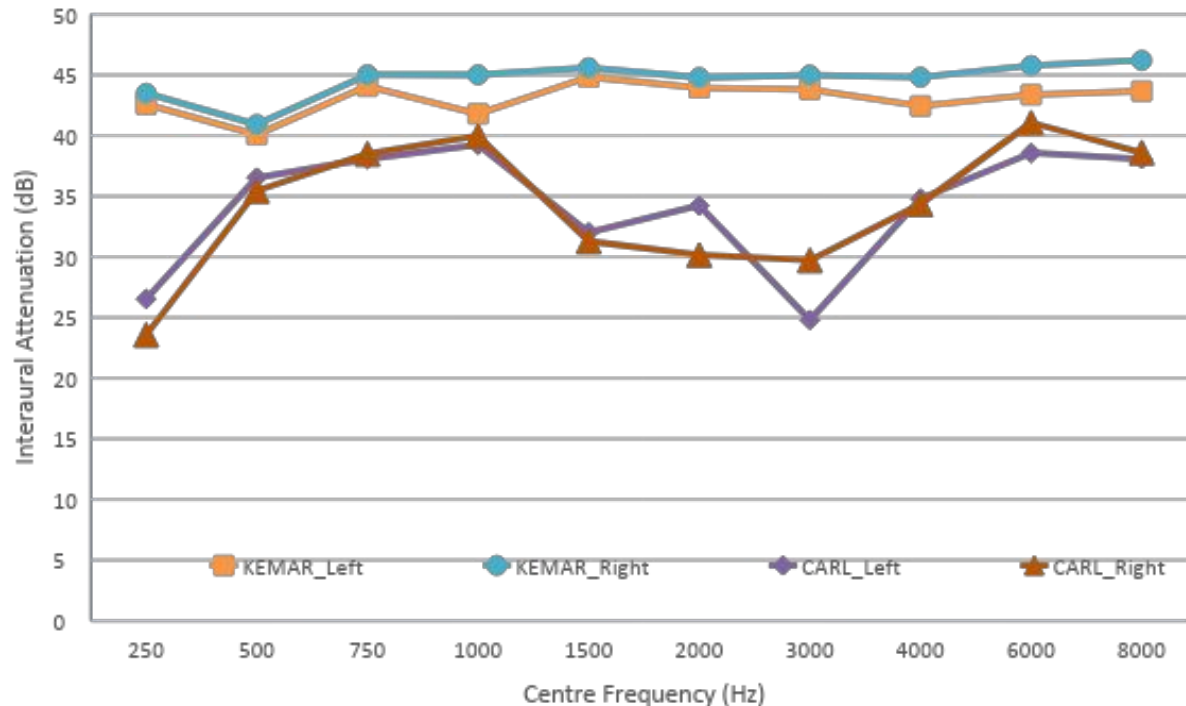


Methodology – Interaural Attenuation

- ❖ DD450 circumaural headphones were placed on both KEMAR and CARL in a sound booth.
- ❖ Narrowband noise, centred at the audiometric frequencies, was played back through DD450s using the ShoeBox Audiometer at 70 dB HL.
- ❖ Interaural attenuation was measured separately for the left and right ears.



KEMAR & CARL Interaural Attenuation



- * No statistically significant difference in the interaural attenuation when the stimulus was presented to the left or right ear.
- * Lower interaural attenuation in the mid frequencies for CARL.



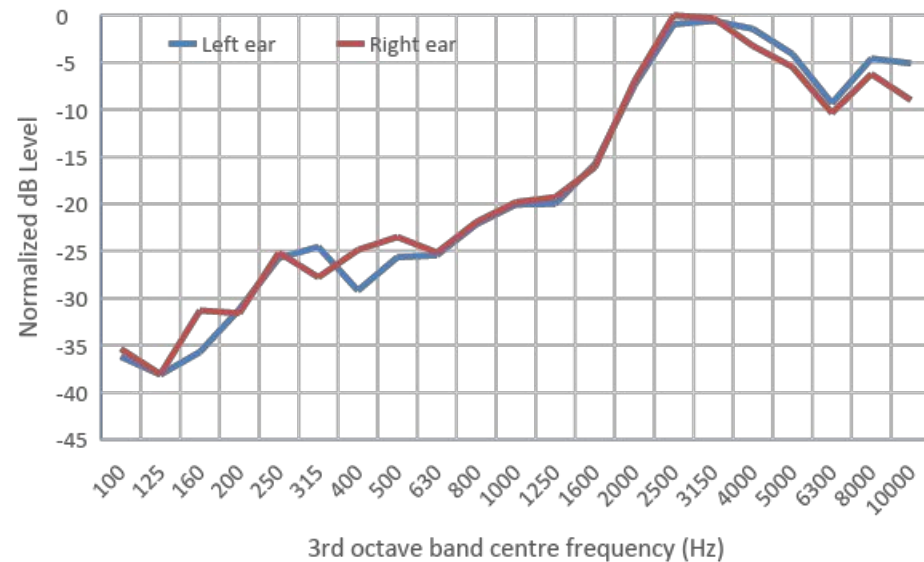
Methodology - HRTFs

- ❖ Both KEMAR and CARL were placed at the centre of a loudspeaker array in the National Centre for Audiology (NCA)'s anechoic chamber.
- ❖ Maximal length sequences (MLSs) were presented from 0, 90, 180, 270 degrees azimuth.
 - The corresponding left and right ear impulse responses for KEMAR and CARL were subsequently estimated.
 - Third octave spectra were then calculated from the impulse responses.

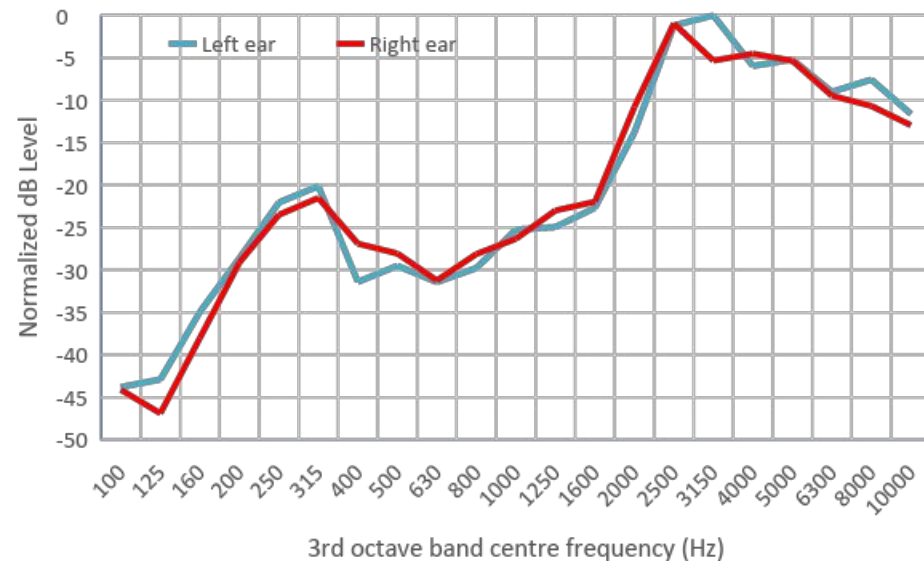


KEMAR & CARL HRTFs – 0° azimuth

KEMAR

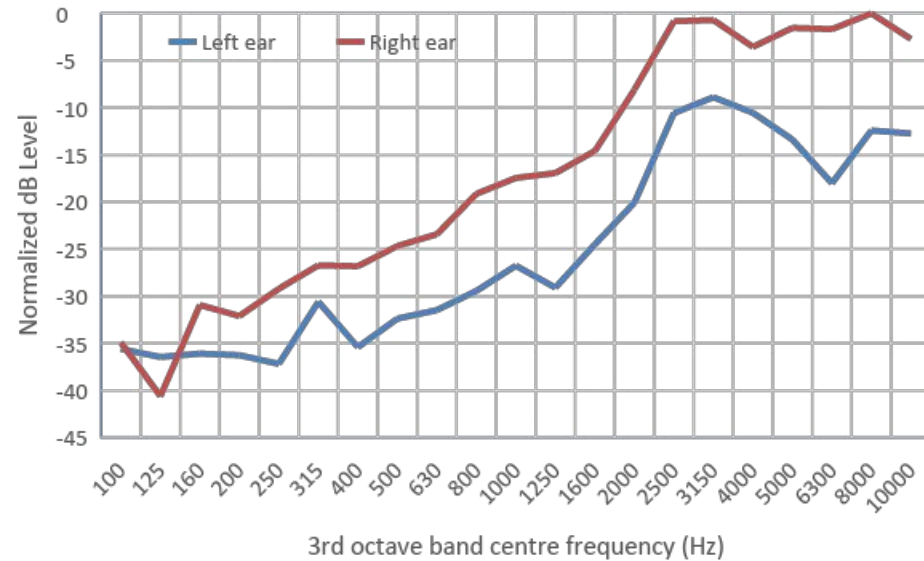


CARL (newer)

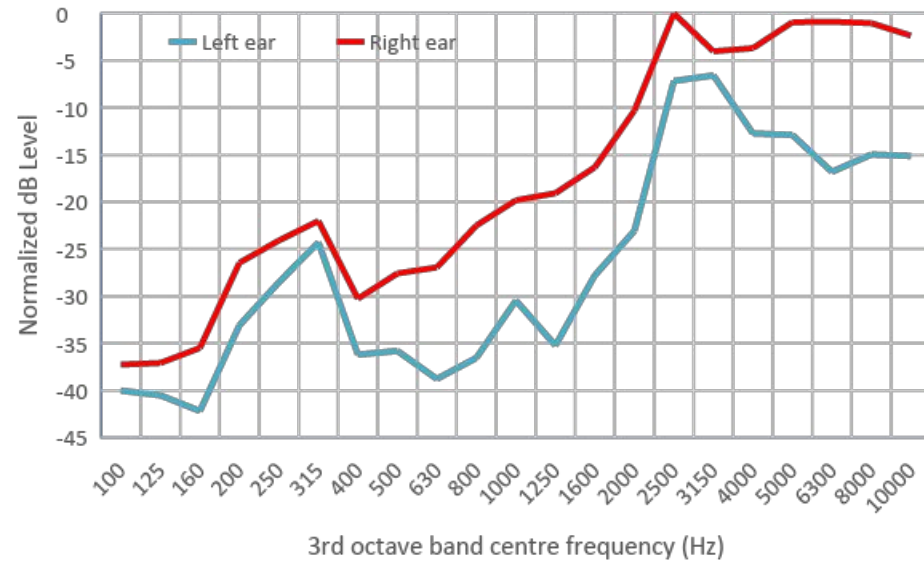


KEMAR & CARL HRTFs – 90° azimuth

KEMAR

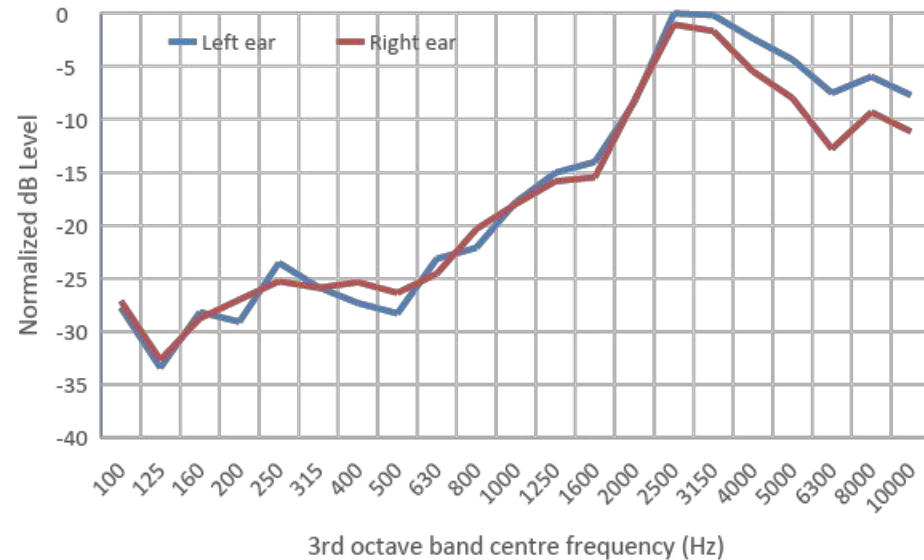


CARL (newer)

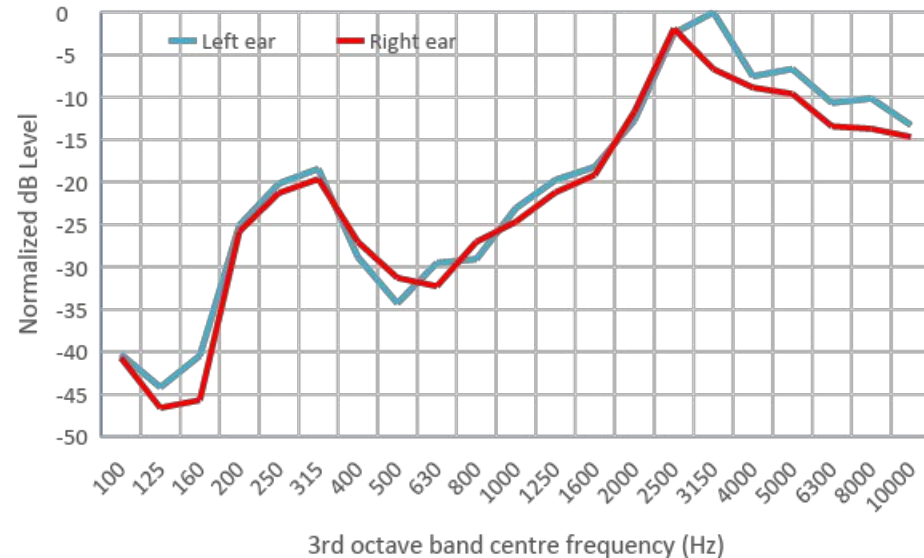


KEMAR & CARL HRTFs – 180° azimuth

KEMAR

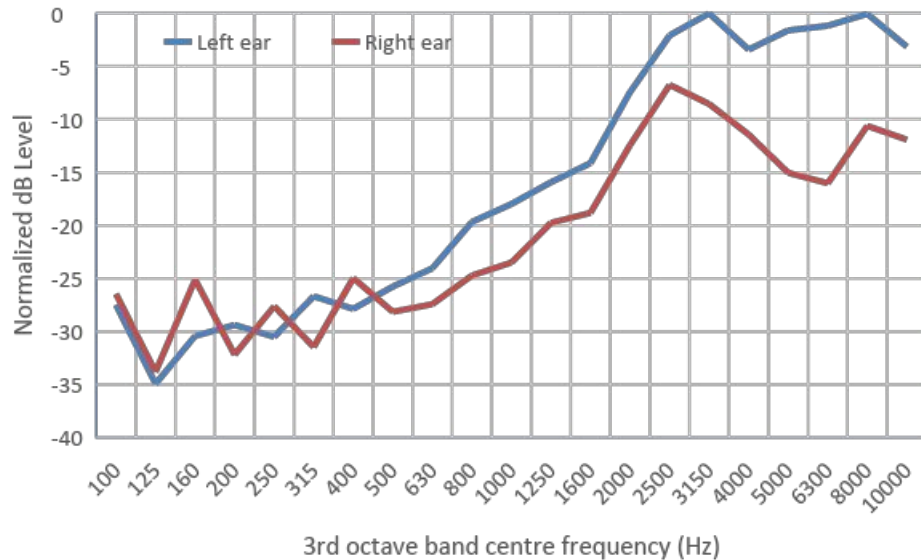


CARL (newer)

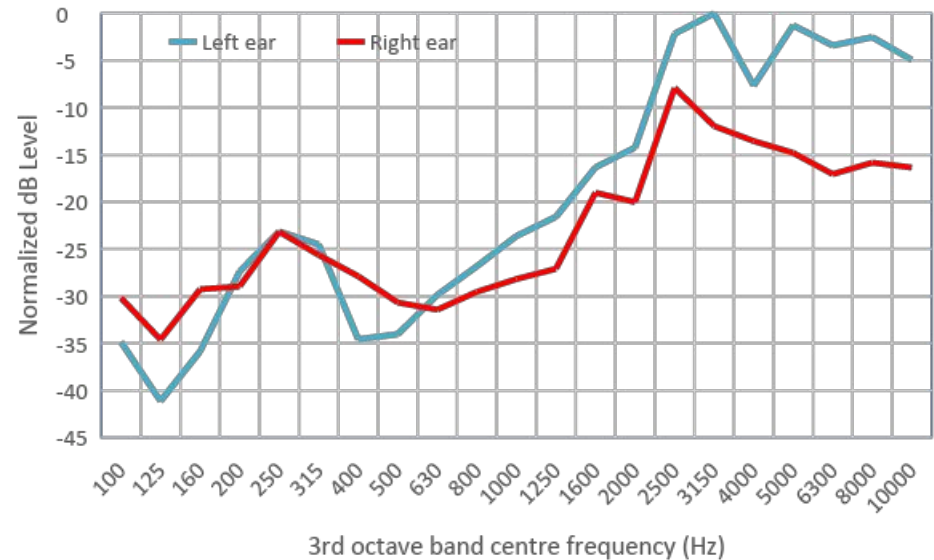


KEMAR & CARL HRTFs – 270° azimuth

KEMAR



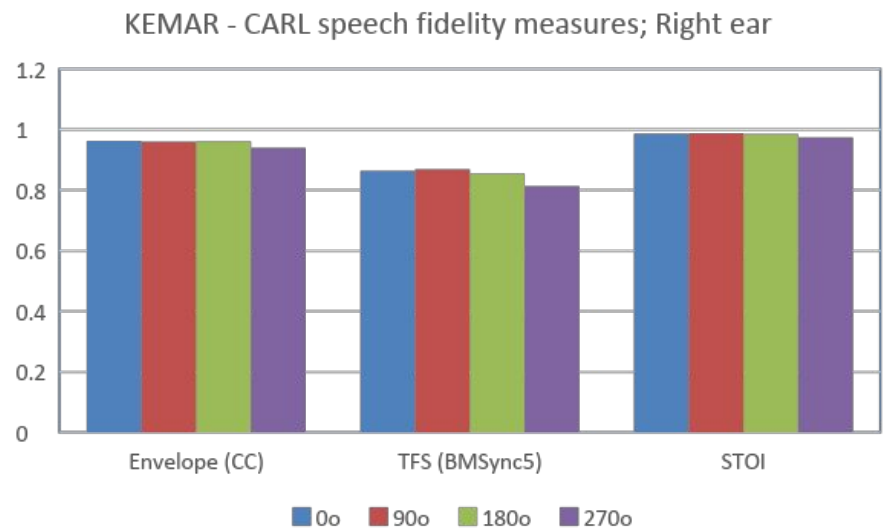
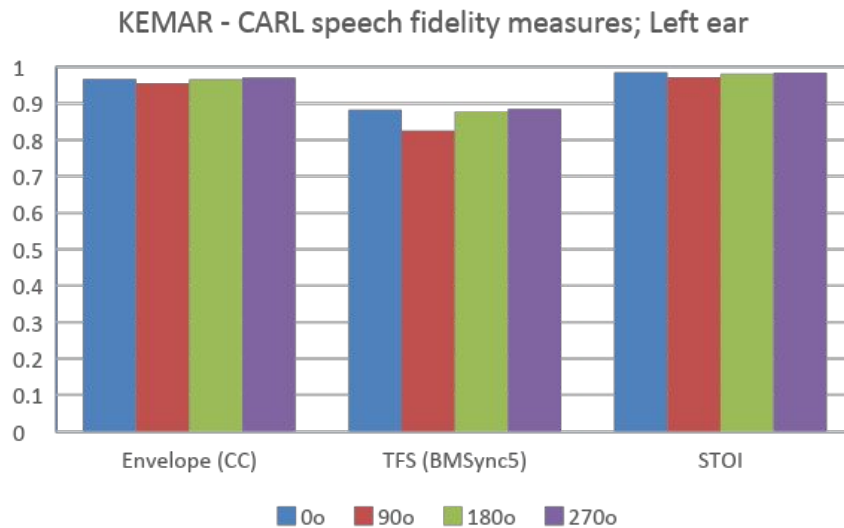
CARL (newer)



Methodology – Signal Fidelity Measures

- ❖ Both KEMAR and CARL were placed at the centre of a loudspeaker array in the National Centre for Audiology (NCA)'s anechoic chamber.
- ❖ Male and female speech sentences were presented from 0, 90, 180, 270 degrees azimuth.
 - The corresponding left and right ear responses for KEMAR and CARL were recorded.
 - These recordings were compared to each other using the speech envelope and fine structure “closeness” indices.

Signal fidelity measures



- * Envelope distortion and STOI metrics were statistically similar when KEMAR and when KEMAR and CARL speech recordings were compared, for both ears.
- * Fine structure differences were evident, due to the differences in the HRTFs.





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