## BSc Audiology AUDL 4007

## Auditory Perception

# Lab Week 6: Temporal modulation transfer functions (TMTF)

### *Introduction*

A popular way to assess temporal resolution is based on the detection of sinusoidal amplitude modulations impressed on a noise. In this lab, you will measure your threshold for detecting the modulation of an octave-wide band of noise centred at 2 kHz at three different modulation frequencies (8, 32 and 128 Hz).

### *Method*

You will be using an adaptive technique in a three-interval, three-alternative forced-choice (3I-3AFC) format as implemented in the computer program *Glimpse*. A fuller description of can be found at:
http://www.phon.ucl.ac.uk/courses/spsci/audper/Help_Glimpse.htm

The only difference to the instructions given there, is that here you will choose one of the three Spec files TriplesTMTF8.txt, TriplesTMTF32.txt or TriplesTMTF128.txt. Each modulating frequency has a continuum of sounds spanning modulation depths of 1% to 100%, which corresponds to 20log(m) values of -40 to 0 dB.

### *Observations*

First do 2 practice runs, one at 8 and one at 128 Hz. Then run yourself on the three conditions in whatever order you like. You can then use the '*Toggle Data'* option to inspect the results. This will show you both the adaptive track as well as summary statistics. If your track looks 'odd', do another test at that modulation rate. Your threshold will be expressed in terms of an arbitrary number of a stimulus along the continuum (from 1-41). To calculate the modulation depth that you could just detect (in dB), subtract 41 from the stimulus number. Plot your modulation depth as a function of modulation rate on the graph on the opposite side, which is from Viemeister (1979).

### *Discussion*

These stimuli were constructed by first impressing the modulator on a wide-band noise, and then filtering into an octave band. Would splatter detection be a problem in these stimuli, and why?

You probably did not do as well as Viemeister's listeners. Why might that be? Would the fact that a wide-band noise was used in that study be significant?

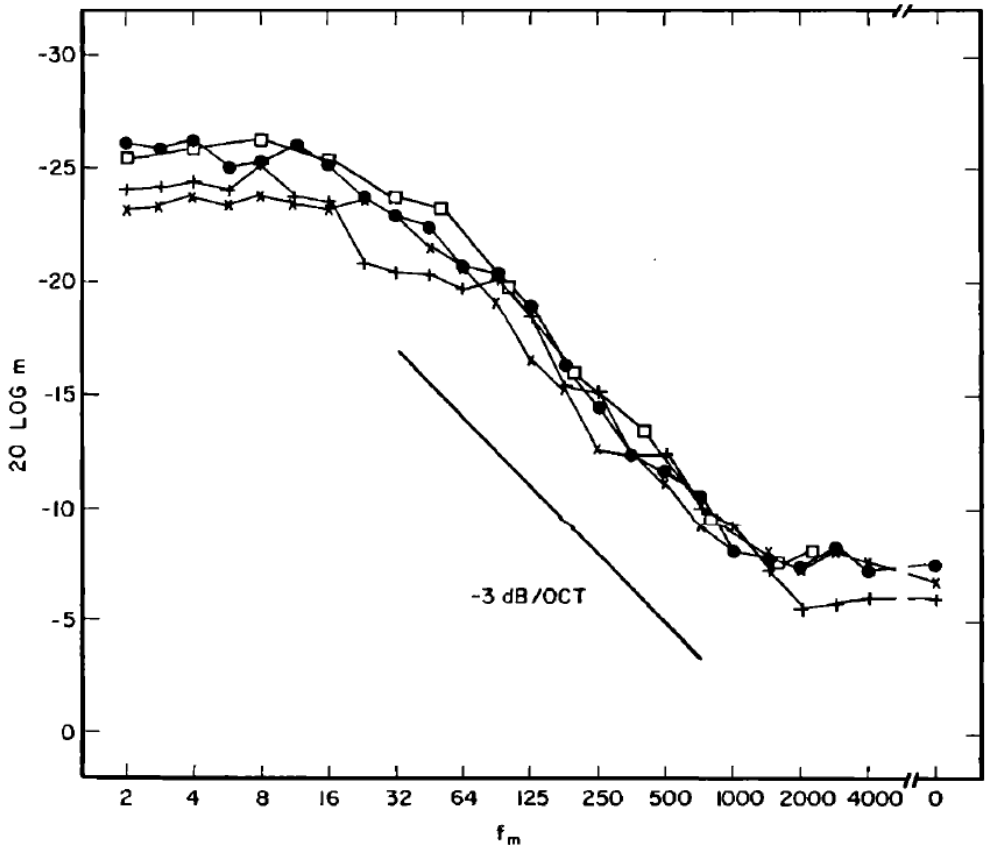


FIG. 2. TMTFs obtained with a continuous wideband noise carrier. The ordinate is the modulation index for sinusoidal amplitude modulation necessary for 70.7% correct responses as measured in a 2IFC tracking procedure. For $f_m = 0$ Hz, the value plotted is the modulation depth for sinusoidal modulation which produces an increment in average power equal to the measured increment threshold. The spectrum level of the carrier was 40 dB SPL and the modulation was present for 500 ms. Data are shown for individual observers: S1 (●); S2 (×); S3 (+); S4 (■).



Reference List

Viemeister, N. F. (1979). Temporal-Modulation Transfer-Functions Based Upon Modulation Thresholds. *Journal of the Acoustical Society of America, 66,* 1364-1380.