Simulated Pure Tone Audiometry

# Purpose

This tool is used to simulate audiometry in a simplified setting. It is designed to segue students from a basic instruction into either a more realistic simulation or practice on human participants.

# Instructions

This tool can be used to simulate simple air conduction audiometry, air and bone conduction audiometry, masking, and a masking dilemma. There are three tests on air conduction testing tab; all other tabs only have one test.

Each row represents one presentation. Students enter their intended presentation level, transducer, and masking level into the green box, depending on the column. As test get more complex, students will also need to indicate the transducer they are using and the masking level.

In the presentation column, students who enter the correct presentation level will see the blue box will change to indicate if the participant did or did not respond. If the student enters the wrong value, then the phrase ‘wrong value’ will remain there. Once the students learn how the patient responds, they can use that information to determine the next presentation level in the next row.

If students are presenting a sound or masking into one ear, then they need to indicate which ear by putting the level in to appropriate column for that ear and entering ‘none’ into the other column. If they are not masking, then they need to enter ‘none’ for both columns. The specific options for each cell are indicated on each sheet.

Once students obtain a threshold, the blue cell will state ‘AC (or BC) threshold.’ If they are masking, then it may indicate that the threshold is unmasked. Students will know they are finished and have completed the assignment correctly because all green cells will have something other than ‘n/a’ and all blue cells will have something other than ‘wrong transducer’ or ‘wrong value.’

All air conduction threshold testing starts at 30 db HL; bone conduction threshold testing starts at 10 dB above the air conduction threshold. Pure tone testing follows the modified Hughson-Westlake procedure; 20 dB jumps until patient identified a signal, then 10 down 5 up until a threshold is detected. The threshold is labeled when it is detected twice with the ascending technique.

For masked audiograms, air conduction testing starts in the right ear and bone conduction testing always starts in the ear with the highest air conduction threshold. Masking is applied with the Hood technique; start at 10 dB above air conduction in the non-test ear and ascend by 5 dB until three increases do not lead to a change in threshold. Students should assume a 40 dB IA for air conduction and 0 dB IA for bone conduction when determining when to mask.

# Technical Specifications

In this simplified simulation, the patient always responds when the presentation level is at or above threshold and never responds when the presentation level is below threshold.

We did not account for an occlusion effect in this simulation.

All responses were calculated under the assumption that a patient has an interaural attenuation of 40 dB for air conduction testing and 0 for bone conduction testing.

Masking dilemma is assumed when masking levels reach the limit of the audiometer (110 dB HL).

# Modifications

The cells are locked for ease of use, but the password is huskie. You may unlock the document to make desired modifications. Please email me if you have any comments or concerns regarding this exercise.

Contact Charles Pudrith, Northern Illinois University at cpudrith@niu.edu.