

Simulated Human Behavioural Audiometry

Tone, Speech, Masking, Tympanometry, Acoustic Reflexes, OAEs, with more to come



Innovative Virtual Training for Performing Human Behavioural Audiometry

- SimHBA provides real-time simulations as if a learner is performing live behavioural audiometry on patients
- SimHBA is a part of a suite of learning software helping educators teach clinical testing of patients with various levels and types hearing functions. It is appropriate for use in introductory behavioural audiometry courses
- SimHBA can be used for self-directed clinical training and practice, one-on-one teacher-to-student instruction, and full-course integration with random and predefined cases and instructor-protected assignments and exams for in-class and remote learning

SimHBA's user-friendly interface

- Easily assess **pure-tone thresholds**, **speech detection thresholds (SDT)**, **speech recognition thresholds (SRT)**, and **word recognition scores (WRS)** using air- and bone-conducted stimuli ← masked and unmasked
- A familiar audiometer format mimics naturalistic experiences in selecting stimulus intensities, frequencies, and types (Tone, Live*, and Recorded Speech). *SRT/WRS via microphone is currently only available for Windows 8/10.
- Easily score pure-tone thresholds on audiograms and reveal true thresholds by a click of a button
- Cross-over stimulation and masking are modelled based on thresholds and AC and BC inter-aural attenuations
- Patient responses and response times are based on psychometric functions and fluctuating attention
- Listen to what the patient likely hears with 'Stimulus Playback' with live testing of SDT, SRT, or WRS.

The screenshot displays the SimHBA interface with a simulated audiogram for a 67-year-old person. The interface includes a 'Booth' window with a patient avatar, 'Psychometrics' plots, and 'Audiometer' controls. Two audiograms are shown: 'Right Ear' and 'Left Ear'. The 'Right Ear' audiogram shows a red line with markers indicating a threshold of approximately 25 dB HL at 125 Hz, rising to about 75 dB HL at 20 kHz. The 'Left Ear' audiogram shows a blue line with markers indicating a threshold of approximately 25 dB HL at 125 Hz, rising to about 75 dB HL at 20 kHz. A 'Recorded Word List' is visible, showing words like 'knock', 'kite', 'take', etc. An 'Audiogram Key' table is also present.

	Right	Left		Right	Left
AC unmasked	O	X	No response	↙	↘
AC masked	△	□	Single response	/	/
BC unmasked	<	>	Soundfield	S	S
BC masked	[]	Soundfield aided	A	A

Simulated case of a 67-year old person with bilateral threshold elevations sloping towards the high frequencies.

SimHBA's case generator

- Simulate hearing cases for **typical**, **conductive (CHL)**, **sensorineural (SNHL)**, **auditory neuropathy spectrum disorder (ANS)** and **retrocochlear** hearing types across all ages birth to 120+ years.
- Build your own cases or allow SimHBA to randomly generate cases for you
- Assignment modes hide specific case information in order to fairly evaluate student performances during remote or in-class assessments using SimHBA
- Open mode allows learners to see true information for training purposes

The screenshot shows the 'Randomly Simulate Hearing Types' interface. It includes buttons for 'Typical', 'CHL', 'SNHL', 'ANS', and 'Retro'. Below, a table displays 'True Thresholds' for Air Conduction (AC) and Bone Conduction (BC) for both Left Ear (LE) and Right Ear (RE) across various frequencies (125, 250, 500, 1, 2, 4, 6, 8, 12.5, 16, 20 kHz) and PTA-3 scores.

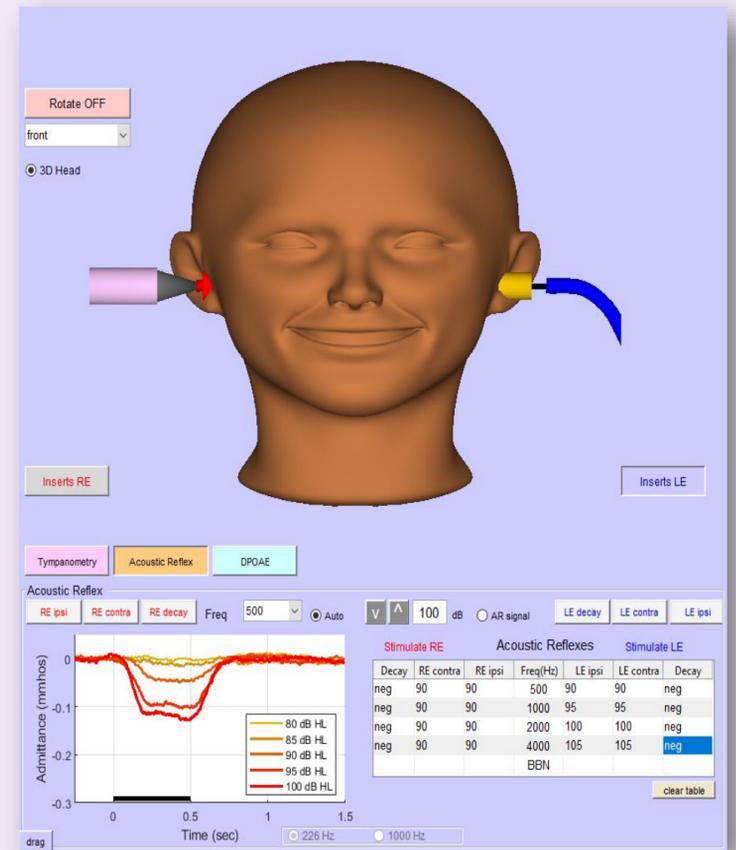
	.125	250	.500	1	2	4	6	8	12.5	16	20 kHz	PTA-3
AC: LE	20	25	30	50	65	70	75	75	80	80	80	48
AC: RE	25	30	25	30	45	50	55	60	60	60	65	33
BC: LE	15	20	30	45	65	65	70	70	75	80	75	47
BC: RE	25	30	20	25	40	55	50	55	55	55	60	28
%ANS	LE = 0	RE = 0			% retro	LE = 0	RE = 0					

SimHBA's suite of feature-packed simulators

Tone
Speech
Masking
Tympanometry
Acoustic Reflex
OAE
with more to come

SimHBA's simulators (Audiometry, Tympanometry, Acoustic Reflexes, OAEs)

- Learners develop their hands-on skills in **behavioural audiometry, tympanometry, acoustic reflex, and distortion-product otoacoustic emissions** testing across a range of hearing populations (Typical, CHL, SNHL, ANSD, and Retrocochlear)
- Tympanometry simulator replicates middle-ear admittance testing
- Tympanograms, ear-canal volume, static admittance, and peak pressures are readily displayed just like in clinical systems
- Acoustic Reflex (AR) simulator includes testing ipsilateral and contralateral ARs and contralateral AR decay. Learners report their judgments in a fillable AR table.
- Distortion-Product Otoacoustic Emission (DPOAE) simulator simulates DPOAEs and plots DP grams while generating a DPOAE chart for learners to interpret (see Case report below).



SimHBA's case report

- Instructors and learners can create and save a case history within a report
- The case report displays all results on a single page so that learners can easily interpret the findings, summarize their interpretations, and make recommendations (Note: summary and recommendation sections are not shown below)
- Case reports can be saved and sent to instructor for grading
- Instructor versions can unlock hidden case information within assignments, such as true audiometric thresholds

