Global Review of Speech Audiometry Tests

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Global Review of Speech Audiometry Tests

- Historical perspective
- Speech audiometry is important
  - An essential component in a diagnostic test battery
  - Types of speech audiometry procedures
  - Advantages of recorded test materials
- Development of speech audiometry materials in the Chinese languages

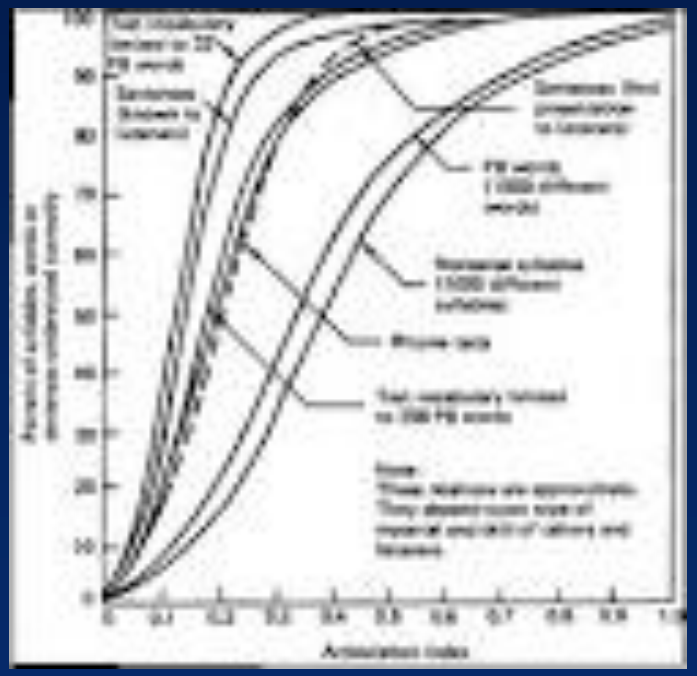
Foundation of Speech Audiometry: Bell Telephone Laboratories

Harvey Fletcher
(1884-1981)

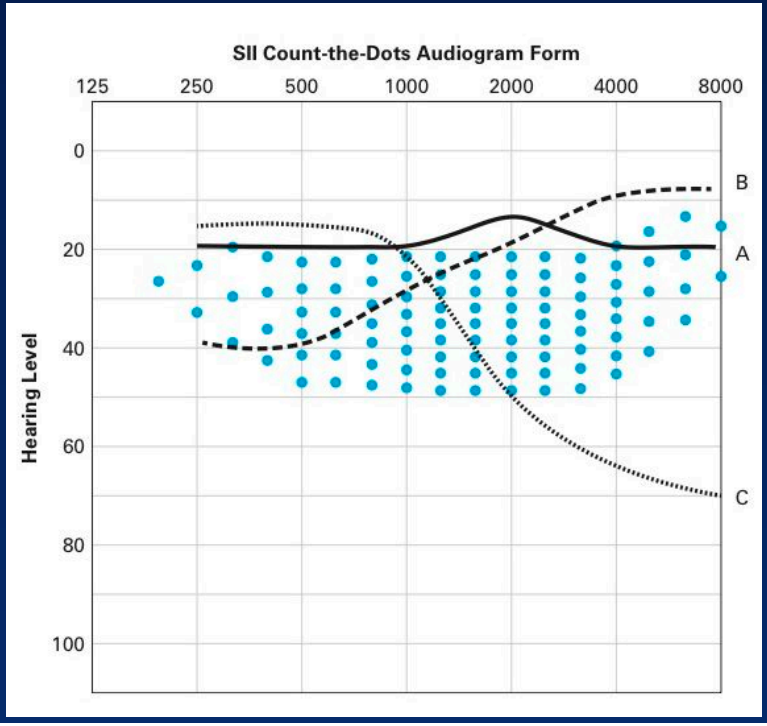
Western Electric Speech Audiometer
Bell Labs

Foundation of Speech Audiometry: Bell Telephone Laboratories

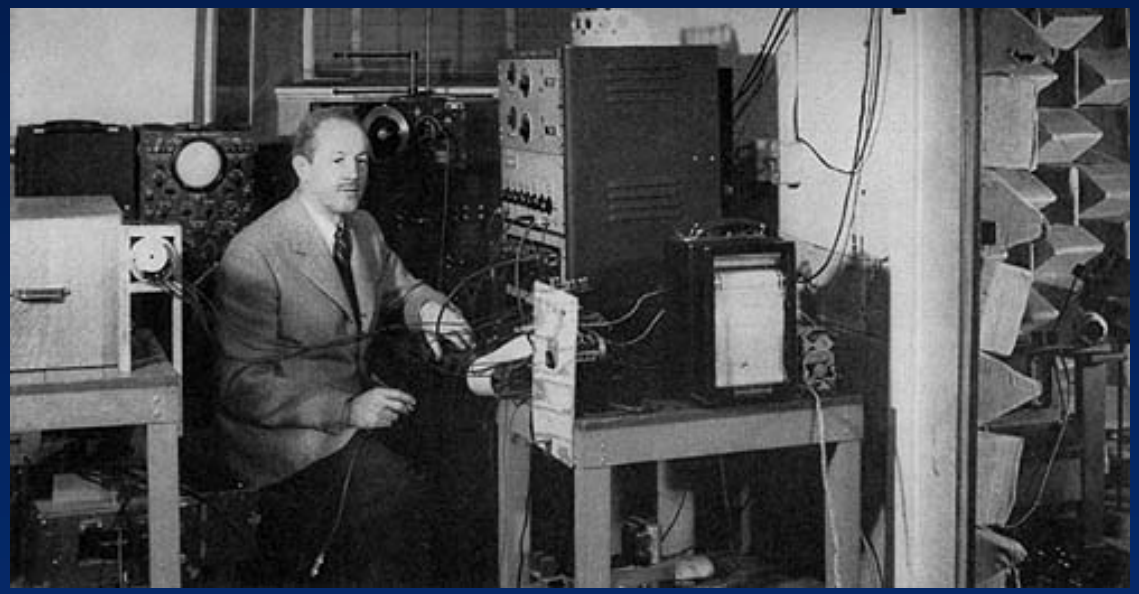
- Fletcher H (1929). Speech and Hearing. New York: D Van Nostrand
- Fletcher H & Steinberg JC (1929). Articulation testing methods. Bell System Technical Journal, 8, 806-854



Foundation of Speech Audiometry: Articulation Index Research is Applied in the "Count-the-Dots" Audiogram



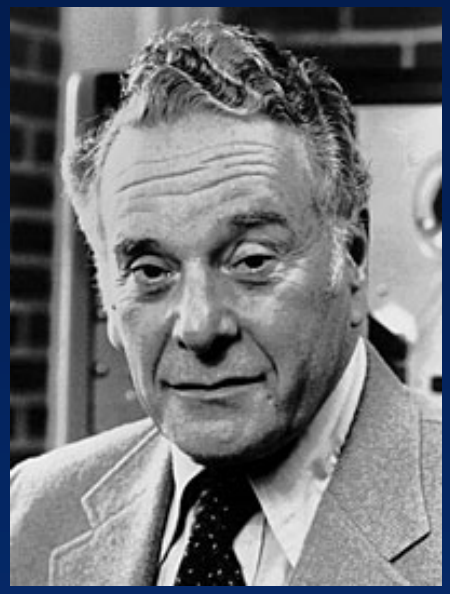
Foundation of Speech Audiometry: Psychoacoustics Laboratory (PAL) Harvard University (1940s and 1950s)



SS Stevens
(1906-1973)

Foundation of Speech Audiometry: Psychoacoustics Laboratory (PAL) Harvard University (1940s and 1950s)

Hallowell Davis
(1896-1992)



Ira Hirsh
(1922-2010)

Foundation of Speech Audiometry
Psychoacoustics Laboratory (PAL)
Harvard University (1940s and 1950s)

- Davis H (1948). The articulation area and the social adequacy index for hearing. Laryngoscope, 58, 761-778
- Egan JP (1948). Articulation testing methods. Laryngoscope, 58, 955-991
- Hirsh IJ, Davis S, Silverman et al (1952). Development of matierals for speech audiometry. Journal of Speech & Hearing Disorders, 17, 321-337
- Hudgins CV, Hawkins JE, Karlin JE & Stevens SS (1947). The development of recorded auditory tests for measuring hearing loss for speech. Laryngoscope, 40, 57-89

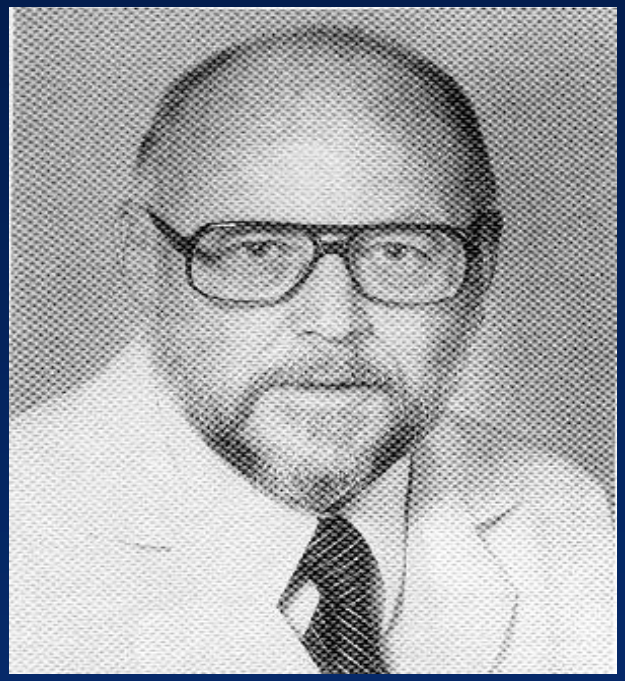
Audiology Test Battery: 60+ years Ago

- Test battery at the beginning of our profession, in order of test administration
  - Air-conduction pure tone audiometry
  - Bone-conduction pure tone audiometry
  - Speech reception thresholds
  - Word recognition (PB word lists)
  - Uncomfortable loudness level (UCL), i.e., loudness discomfort level (LDL)

Source: Wiener F & Miller G. Hearing aids. In Combat Instruments II. Washington, D.C. NDRC Report 117, 216-232, 1946

Raymond Carhart

James Jerger
"Father of Diagnostic Audiology"
Developed Speech Audiometry Procedures in the 1960s



GSI 162 Speech Audiometer

Audiometers for Speech Audiometry from the 1970s to the Present

GSI 10

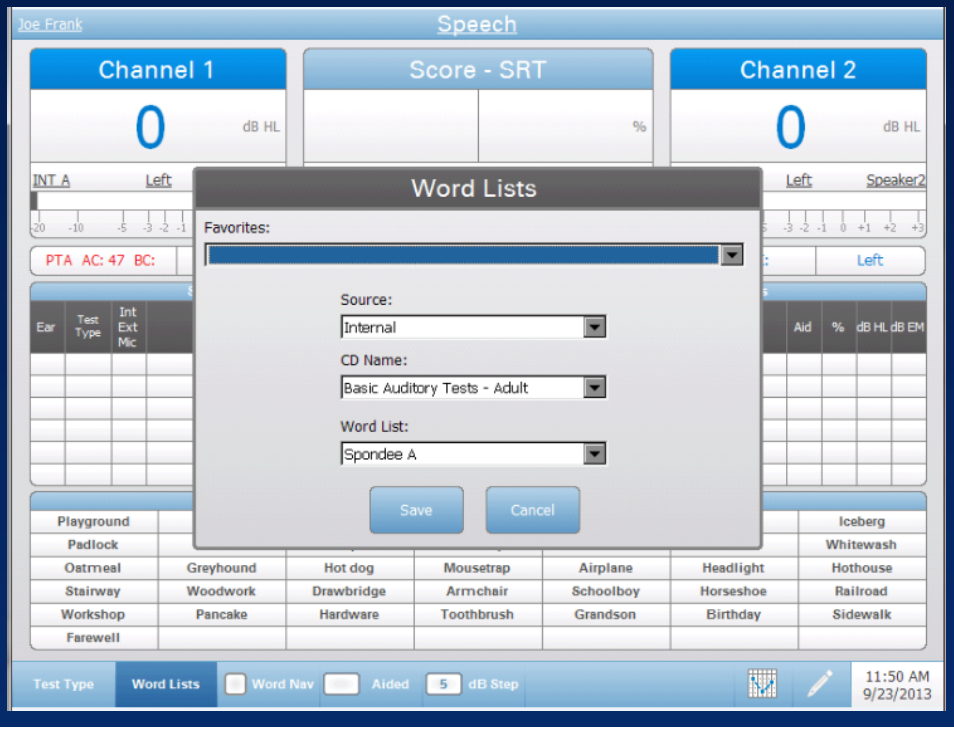
GSI 61

GSI 16

GSI AudioStar

A Modern Audiometer for Speech Audiometry
GSI AudioStar Pro

A Modern Audiometer for Speech Audiometry
GSI AudioStar Pro

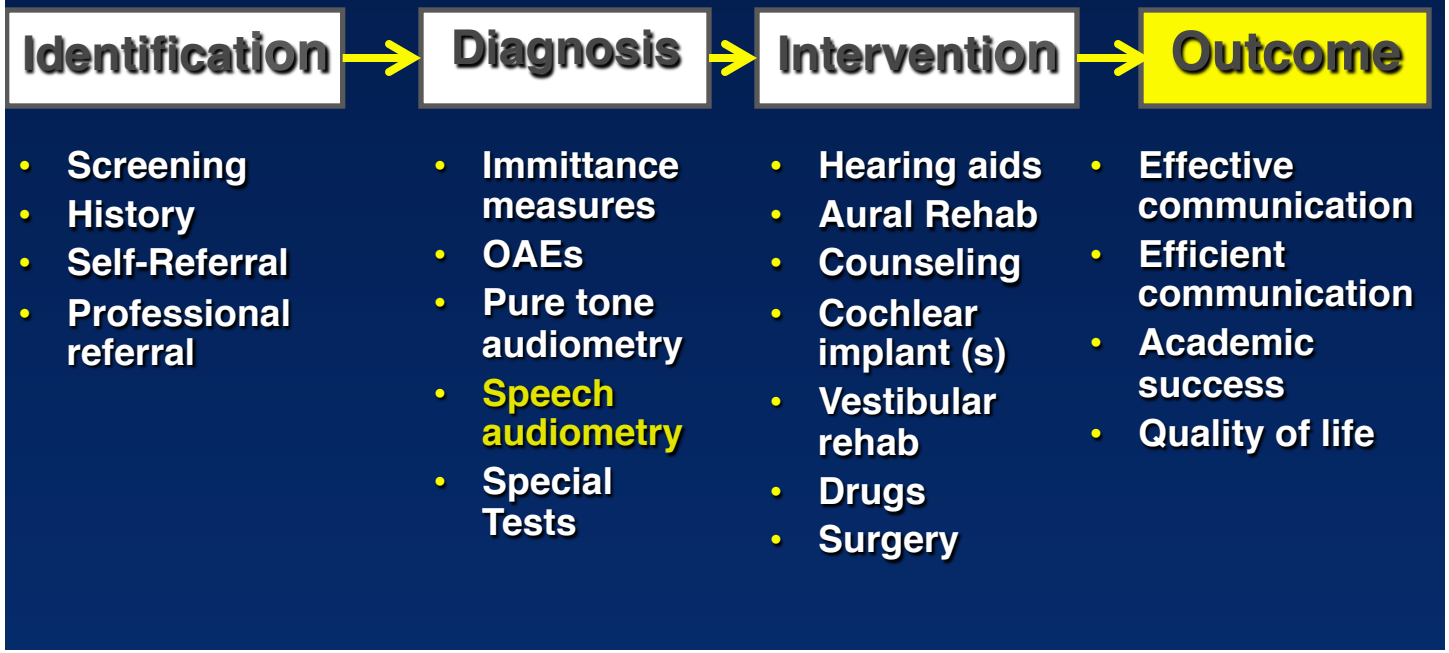


A Modern Audiometer for Speech Audiometry
GSI AudioStar Pro

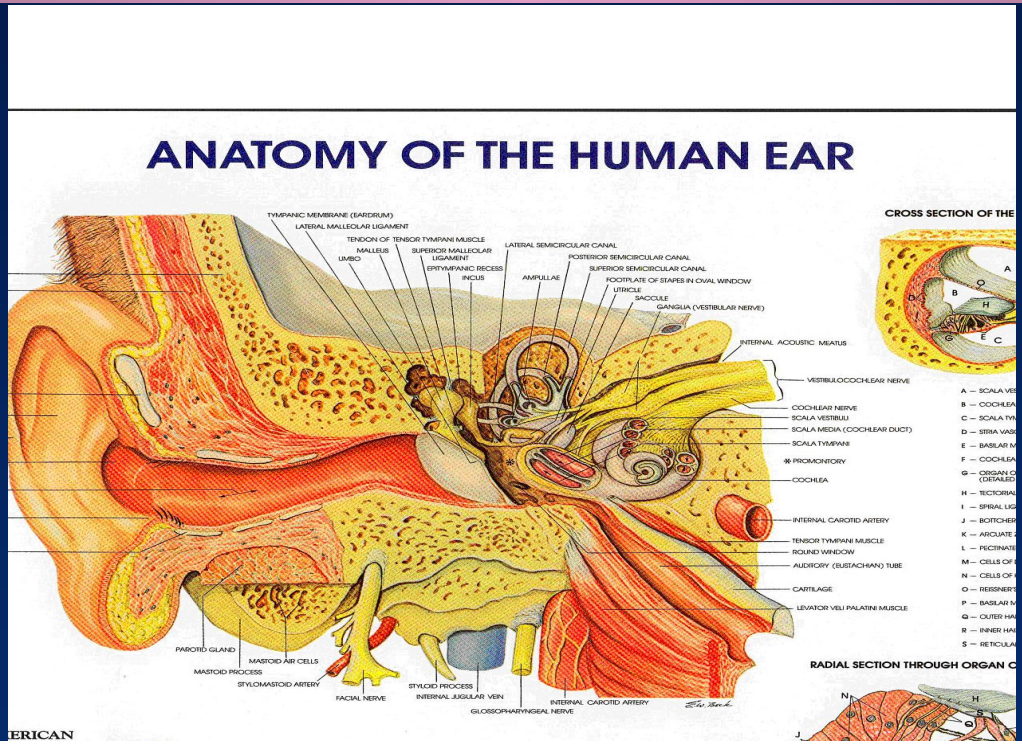
Global Review of Speech Audiometry Tests

- Historical perspective
- Speech audiometry is important to evaluate communication
  - Types of speech audiometry procedures
  - Advantages of recorded test materials
- Development of speech audiometry materials in the Chinese languages

Speech Audiometry in Evidence-Based Practice: Categories of Research Evidence (ASHA, 2004)



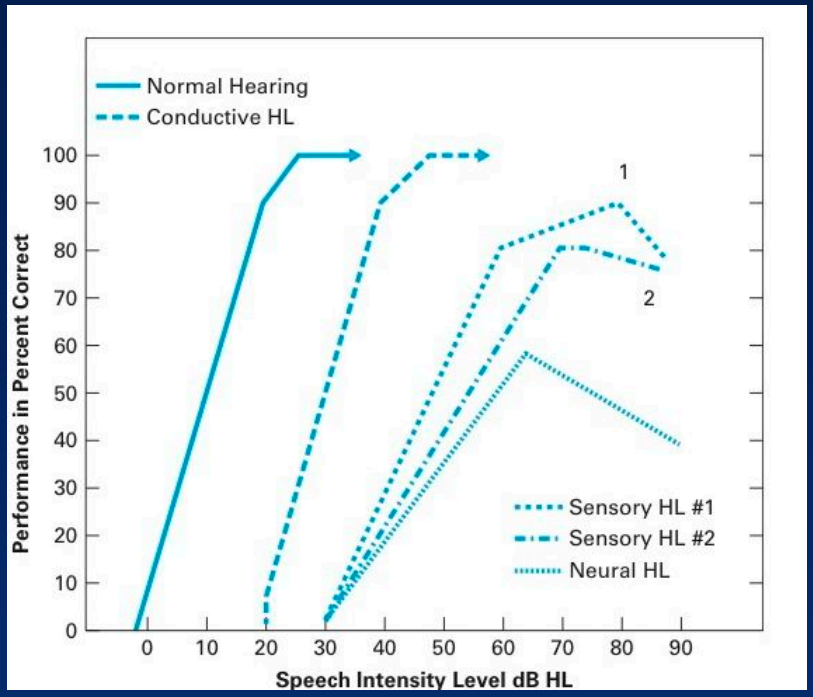
Speech Audiometry Assessment of the Peripheral Auditory System



Speech Audiometry Procedures for General Auditory Assessment

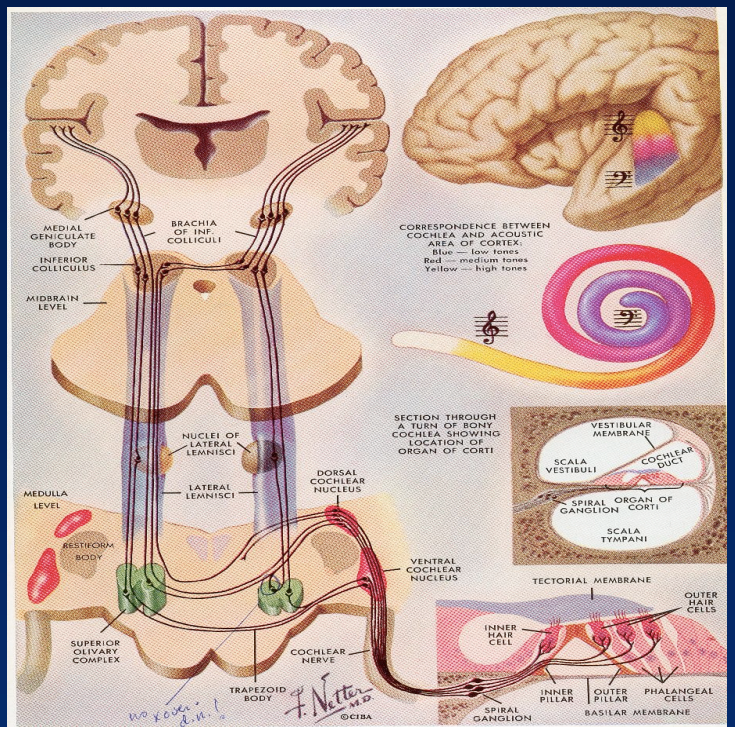
- Threshold measures
  - Speech awareness or detection tests (SAT or SDT)
  - Speech recognition threshold (SRT)
- Word recognition tests
  - Phonetically balanced word lists (≥ 25 words)
  - Verbal or picture pointing response mode
  - Efficiency is increased with 10 most difficult words first
  - Performance intensity functions are most accurate measure
- Speech-in-noise tests, e.g,
  - Speech-in-noise (SIN) or QuickSIN
  - Hearing in Noise Test (HINT

Speech Audiometry Procedures for Performance Intensity Functions for PB Words



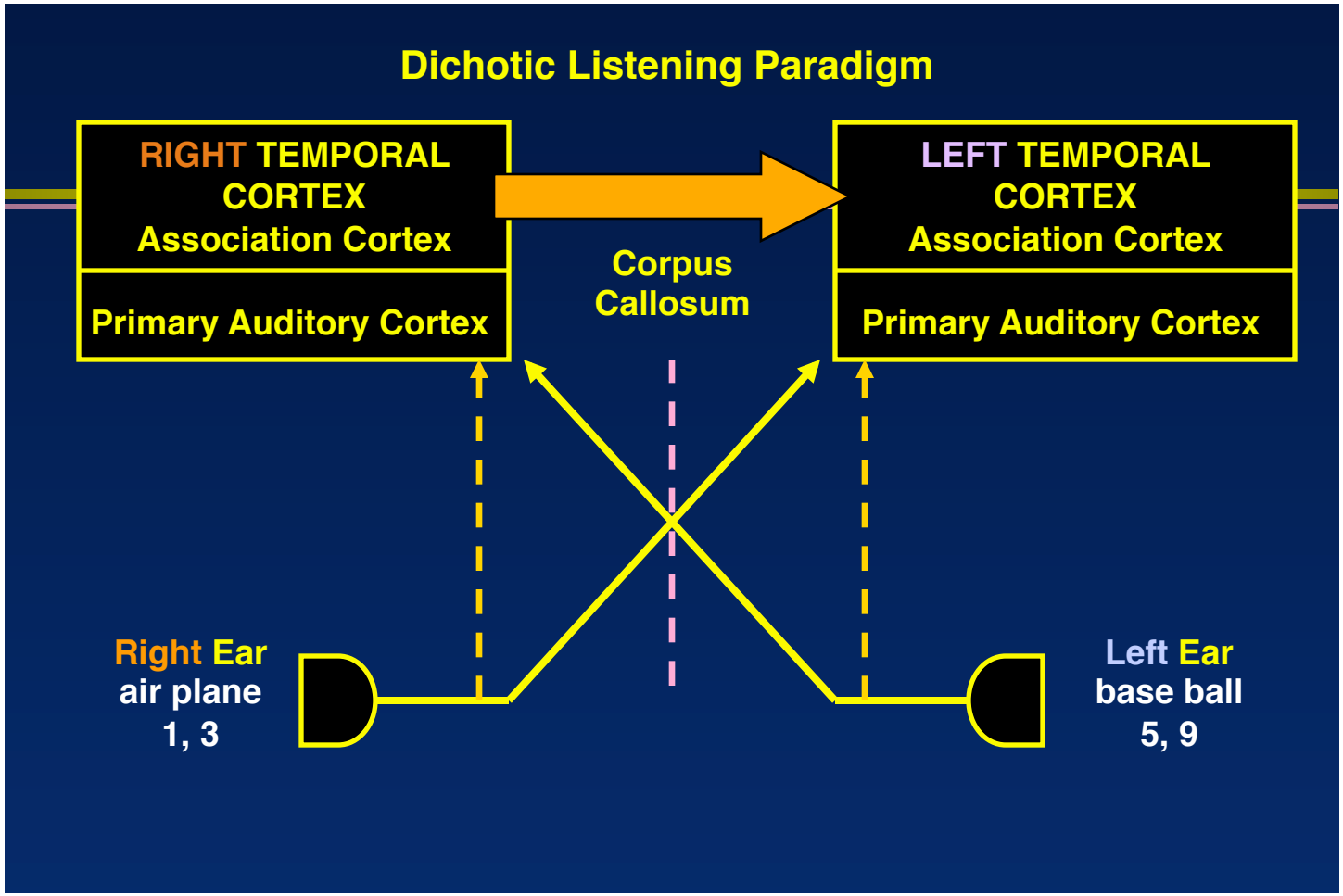
A Modern Audiometer for Speech Audiometry
GSI AudioStar Pro with QuickSIN

We Hear with Our Brain! Speech Audiometry Permits Efficient and Sensitive Assessment of the Central Auditory Nervous System



Speech Audiometry Procedures for Central Auditory Assessment

- Behavioral measures
  - Speech-in-noise tests
  - Distorted speech tests
    - ✓Filtered speech materials
    - ✓Time compressed speech materials
  - Dichotic listening tests
- Objective measures
  - Speech evoked auditory brainstem response (ABR)
  - Speech evoked cortical auditory evoked responses


Dichotic Listening Paradigm
RIGHT TEMPORAL CORTEX
Association Cortex
Primary Auditory Cortex
Corpus Callosum
LEFT TEMPORAL CORTEX
Association Cortex
Primary Auditory Cortex
Right Ear
air plane
1, 3
Left Ear
base ball
5, 9

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Global Review of Speech Audiometry Tests: Advantages of Recorded Test Materials

- Tests consist of carefully selected words spoken by a single person without a distinct dialect
- Materials are available for male or female speakers
- Speech is professionally recorded in a sound studio with high quality equipment
- Speech intensity level is calibrated with an audiometer and presented consistently throughout the test
- Variability in patient performance is minimized permitting comparison of test results over time
- Speech materials are the same
  - Each time they are used in a clinic
  - From one clinic to the next

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Global Review of Speech Audiometry Tests: Development of Chinese Language Speech Audiometry Materials

- Cheng JY (1966). Selecting and editing of Chinese speech audiometry test lists. Zong Hua Er Bi Yan Hou Ke Za Zhi, 12, 106-111
- Shen Y & Wang SX (1983). Development of a speech audiometry testing material. Xin Li Xue Bao, 16, 75-87
- Zhang et al (2006). Development and equivalence evaluation of monosyllabic lists of mandarin speech test materials. Zong Hua Er Bi Yan Hou Ke Za Zhi, 41, 341-345
- Ji F, Chen AT, Zhao Y, Xi X, & Han DY (2010). Development of a script of phonemically balanced monosyllabic lists of Mandarin-Chinese. J Otology, 5, 8-19

Global Review of Speech Audiometry Tests: Development of Chinese Language Speech Audiometry Materials

Acta Oto-Laryngologica, 2011; 131: 962–969

informa
healthcare

ORIGINAL ARTICLE

Development of a Mandarin monosyllable test material with homogenous items (I): Homogeneity selection

FEI JI*, XIN XI*, AI-TING CHEN, JUN YING, QIU-JU WANG & SHI-MING YANG

Department of Otolaryngology/Head and Neck Surgery, Chinese PLA Institute of Otolaryngology, Chinese PLA General Hospital, Beijing, China

Global Review of Speech Audiometry Tests: Recent Review of Chinese Language Speech Audiometry Materials

Hearing, Balance and Communication, 2013; 11: 52–63

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REVIEW ARTICLE

Chinese speech audiometry material: Past, present, future

XIAORAN MA[1], BRADLEY McPHERSON[1] & LIAN MA[2]

[1]*Division of Speech and Hearing Sciences, Faculty of Education, The University of Hong Kong, Hong Kong, and* [2]*School of Stomatology, Beijing University, Beijing, China*

Global Review of Speech Audiometry Tests: Recent Review of Chinese Language Speech Audiometry Materials *(Ma, McPherson & Ma, 2013)*

Table I. Summary of selected speech audiometric material developed for mainland China adults.

Authors	Year	Institute	Test materials	Characteristics
Zhang Y (21)	1955	Beijing Hospital	Disyllabic words	First speech test material in Mainland China
Cai X (22)	1963	PLA Guangzhou General Hospital	Disyllabic spondaic words	First to relate speech test results to hearing loss pathologies
Cheng J (23)	1966	Shanghai Ruijin Hospital	Monosyllabic, disyllabic, and trisyllabic words	Structure followed the test battery developed at the Harvard Psychoacoustic Laboratory
Shen Y, Wang S (24)	1983	Institute of Psychology, Chinese Academy of Sciences	Monosyllabic words	Psychometrical equivalence evaluation
Bao Z (25)	1986	Institute of Acoustics, Nanjing University	Monosyllabic words	For assessing the intelligibility of speech transduced through communication equipment
Gu R et al. (26)	1985	PLA General Hospital, Beijing	Staggered spondaic words and competing sentences	Collected normative data
Zhang H et al. (30)	1990	Peking Union Medical College Hospital	Speech material and lip-reading test material	For patients with profound hearing loss
Zhang J (31)	1995	Chinese National Technical Committee	Monosyllabic words	Standardized lists by Chinese National Technical Committee
Krenmayr A et al. (37)	2011	Beijing Institute of Otolaryngology, and the University of Innsbruck	Loudness-balanced syllables in all four Mandarin tones	Tonal speech test for cochlear implant adults
Chen X et al. (46)	2001	Beijing Institute of Otolaryngology	Words, sentences, tones, vowels and consonants	Computerized training and evaluation system
Zhang H et al. (47)	2008	Beijing Institute of Otolaryngology	Monosyllabic, disyllabic words and sentences	List equivalence was evaluated
Ji F, Xi X (48)	2007	PLA Institute of Otolaryngology, Beijing	Monosyllabic words	Well-validated phonetically balanced material
Nissen S et al. (50,51)	2005	Brigham Young University, Utah	Disyllabic and trisyllabic words	Materials were psychometrically equivalent and digitally recorded
Wong L et al. (74)	2007	The University of Hong Kong, and Beijing Institute of Otolaryngology	Sentences	Adaptive test protocols for adult Mandarin speakers

Global Review of Speech Audiometry Tests: of Chinese Language Hearing in Noise Test (Mandarin)

Development of the Mandarin Hearing in Noise Test (MHINT)

Lena L. N. Wong, Sigfrid D. Soli, Sha Liu, Na Han, and Ming-Wei Huang

Objective: **To develop two versions of the Mandarin Hearing In Noise Test (MHINT). These tests are adaptive tests that measure the reception threshold for sentences (RTSs) in quiet and in noise. The RTS is the presentation level at which half the sentences are correctly recognized.**

enced results for the MHINT to be compared directly with results in other languages. The MHINT would benefit from further evaluation of its validity.

(Ear & Hearing 2007;28;70S–74S)

Speech audiometry serves as a diagnostic tool and

Global Review of Speech Audiometry Tests: of Chinese Language Hearing in Noise Test (Cantonese)

Development of the Cantonese Hearing In Noise Test (CHINT)

Lena L. N. Wong and Sigfrid D. Soli

Objective: To develop a Cantonese version of the Hearing In Noise Test (CHINT) with the same features as the English Hearing In Noise Test (HINT) (Nilsson, Soli, & Sullivan, 1994).

test. The CHINT would benefit from further evaluation of validity.

(Ear & Hearing 2005;26;276–289)

Global Review of Speech Audiometry Tests: of Chinese Language Hearing in Noise Test *(Wong & Soli, 2005)*

EAR & HEARING, VOL. 26 NO. 3

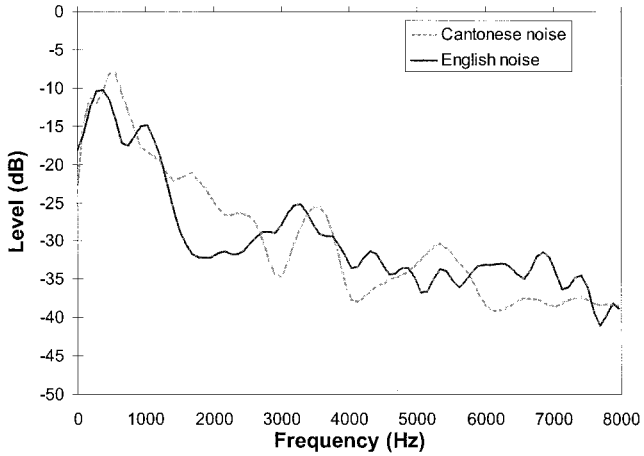

Fig. 1. Long-term average spectrum of Cantonese and English Hearing In Noise Test speech and noise.

Zhu et al (2012). Mandarin Chinese speech recognition by pediatric cochlear implant users. *Int J Pedi ORL, 75*, 793-800

Two Syllable Word Materials

Appendix 1

Example of disyllable test list.

Number	Mandarin	Chinese Pinyin	English meaning
1	上课	shàng kè	class
2	集合	jí hé	put together
3	大门	dà mén	gate
4	设立	shè lì	found
5	担心	dān xīn	worry
6	忘记	wàng jì	forget
7	道歉	dào qiàn	sorry
8	电池	diàn chí	battery
9	地址	dì zhǐ	address
10	儿童	ér tóng	child

Zhu et al (2012). Mandarin Chinese speech recognition by pediatric cochlear implant users. *Int J Pedi ORL, 75*, 793-800

Sentence Materials

Appendix 2

Example of sentence test list.

Number	Mandarin Sentence	Number of keywords	Chinese Pinyin	English meaning
1	快请进！	2	kuài qǐng jìn!	Please come in!
2	现在起床。	2	xiàn zài qǐ chuáng.	Get up now.
3	这双鞋太小了。	3	zhè shuāng xié tài xiǎo le.	These shoes are too small.
4	他去邮局买邮票。	7	tā qù yóu jú mǎi yóu piào.	He goes to the post office to buy stamps.
5	星期天一起去爬山。	7	xīng qī tiān yì qǐ qù pá shān.	We will climb a mountain together on Sunday.
6	借的东西我已经还了。	6	jiè de dōng xī wǒ yǐ jīng huá le.	I already returned all the things I borrowed.

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International Hearing Care Technician

IHCT Certificate

Contact Us for more information:
info@aicme.com
Watch our video at
www.aicme.com/ihct

American Institute of Continuing Medical Education℠

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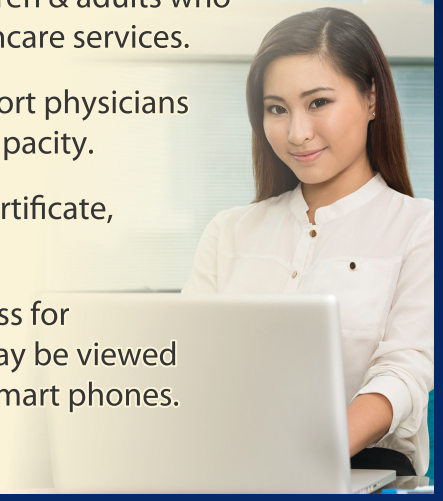
2. Educate technicians to support physicians & audiologists, increasing capacity.
3. Create jobs with the IHCT Certificate, improving sustainability.
4. Utilize existing internet access for online education. Classes may be viewed on computers, tablets and smart phones.



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Is designed to provide general knowledge and skills required by a hearing care technician who will work under the supervision and direction of a physician, otolaryngologist or audiologist. Successful completion of the core curriculum leads to a Hearing Care Technician Certificate.

Each Course features

A 48-60 minute instruction through a narrated PowerPoint presentation on a focused topic. Presentations include text, figures, and video demonstrations to enhance the learning experience.

Selected readings and resources, including websites and other internet sources information, are recommended for each topic.

Cloud Based Learning Platform

24/7 access to courses and content. Enduring – you own the courses / materials forever.

International Hearing Care Technician Certificate

Core Curriculum

www.dizzy.com or http://aicme.com

Basic hearing

- Auditory anatomy and physiology
- Hearing & Sound (hearing science)
- Professional responsibility
- History taking and record keeping
- Patient contact and counseling
- Medical and audiological terminology

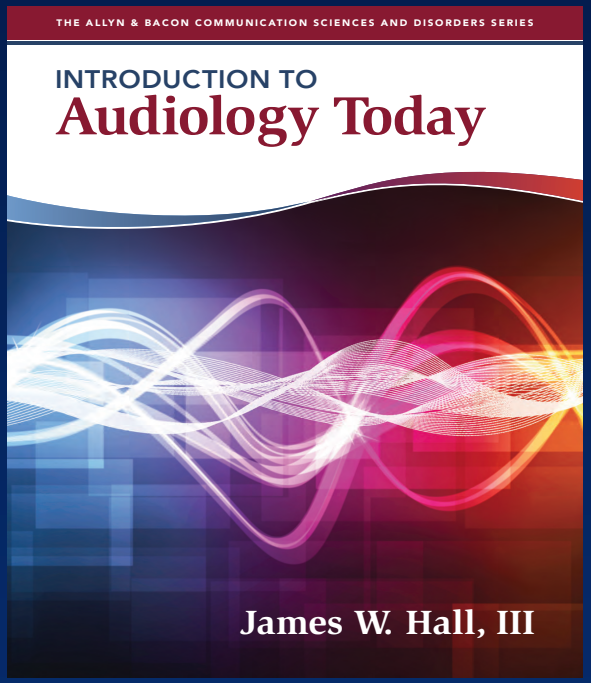
Auditory disorders

- Otoscopic inspection and ear examination
- Middle ear disorders
- Inner ear disorders
- Retrocochlear (neural) disorders

Assessment Techniques

- Introduction to the audiometer
- Pure tone hearing test techniques: Air conduction
- Pure tone hearing test techniques: Bone conduction
- Masking theory and techniques
- Audiogram patterns
- Simple speech audiometry
- Tympanometry
- Otoacoustic emissions
- Introduction to diagnostic audiological assessment
- Audiology applications of tele-health

Source of More Information of Speech Audiometry and Much More: Thank You! … *Questions?*



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