

Presented By:
Dr. Jacqueline R Scholl, Au.D., CCC-A, PS

soundwrx.org



BRIDGING THE GAP

From Hospital Discharge to the Classroom



6,000

over 98%

all 50 states & the District of Columbia

2019

1.7 per 1,000

Centers for Disease Control & Prevention
(CDC) Hearing screening and follow-up study, 2019

NBHS Best practice screenings

AABR and/or OAEs

Screening coordinators, grants, local and national organizations providing technical assistance, training, , partnerships, and access to information about evidence based practice.

*miss mild hearing loss
*testing hearing sensitivity

Access is king!



SOUND
WRX

Why we can't stop here

From hospital discharge to the classroom...a lot
can happen



Acquired Hearing Loss

Syndromes (over 400)

Ototoxic Medications

Autoimmune disorders

Syphilis

Genetics (119+ genes associated with sensorineural & mixed hearing loss.

Structural abnormalities of the Temporal Bone

CMV

Measles

Mumps

Varicella zoster

Lyme Disease

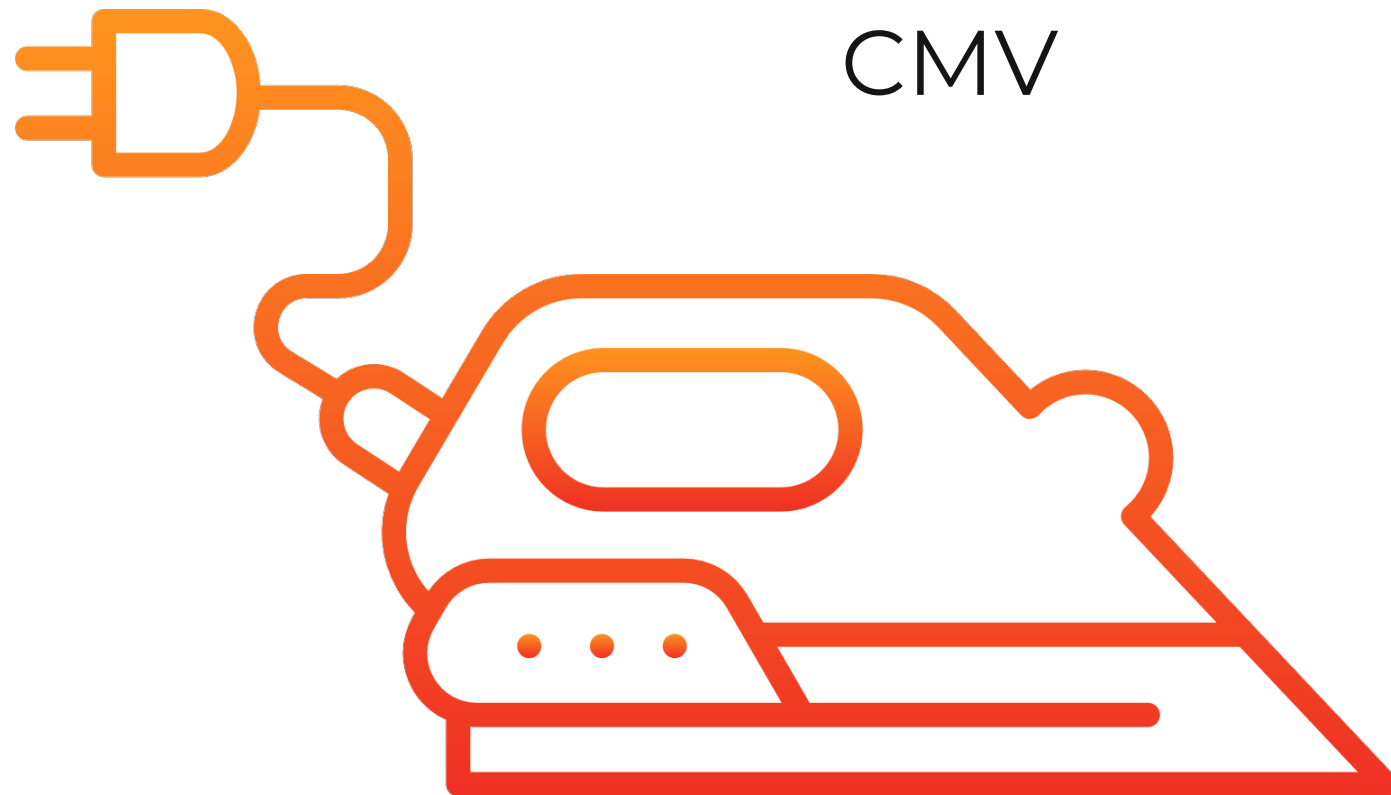
Otitis Media

Meningitis

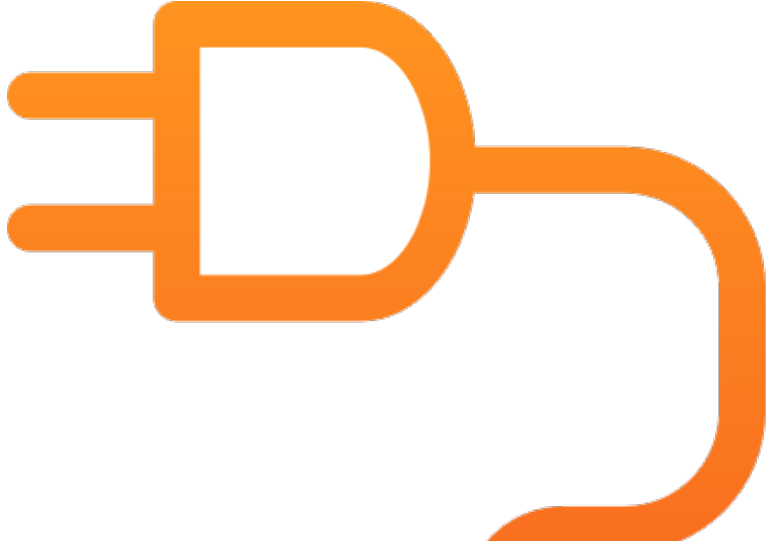
Trauma

Infection

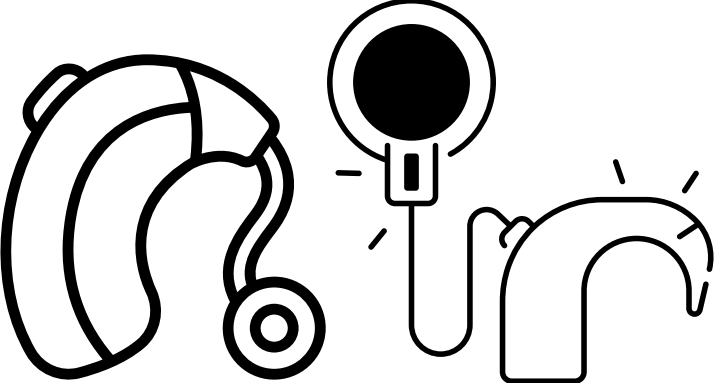
Herpes



Brain



Auditory Pathway



Outer, middle, inner
ear



Acquired Auditory Pathway Problems

Chronic middle ear infections

Head injuries

Neurological issues

Seizures

Lyme disease

Lead poisoning

Genetics

Low birth weight

Prematurity

Jaundice

Oxygen deprivation

exposure to chemicals that are toxic to the brain

Other environmental issues



Brain



Auditory Pathway



outer, middle, inner ear

Auditory Processing Disorder

The appropriate diagnosis means
the right intervention.

The auditory pathway is plastic!



Prevalence of Hearing Loss Among Children 6-19 Years of Age

The Third National Health and Nutrition Examination Study

Niskar AS, Kieszak SM, Holmes A, Esteban E, Rubin C, Brody DJ. Prevalence of Hearing Loss Among Children 6 to 19 Years of Age: The Third National Health and Nutrition Examination Survey. JAMA. 1998;279(14):1071-1075. doi:10.1001/jama.279.14.1071

How many children start school with hearing loss?

14.9%

A total of 14.9% of US children had low-frequency or high frequency hearing loss of at least 16 dB hearing level in one or both ears.

This study was done
30 years ago.



Hearing Screening Guidelines



ASHA

2002

Guidelines

22 YEARS

AMERICAN
ACADEMY OF
AUDIOLOGY



2011

Guidelines

12 YEARS



2023

Guidelines

VIA!



2019

34 states mandated
school hearing
screenings

No standardization

No monitoring

Usually a pure tone sweep
at 1000 Hz, 2000 Hz &
4000 Hz - 20 dBHL



P.T.A.

1897
1972

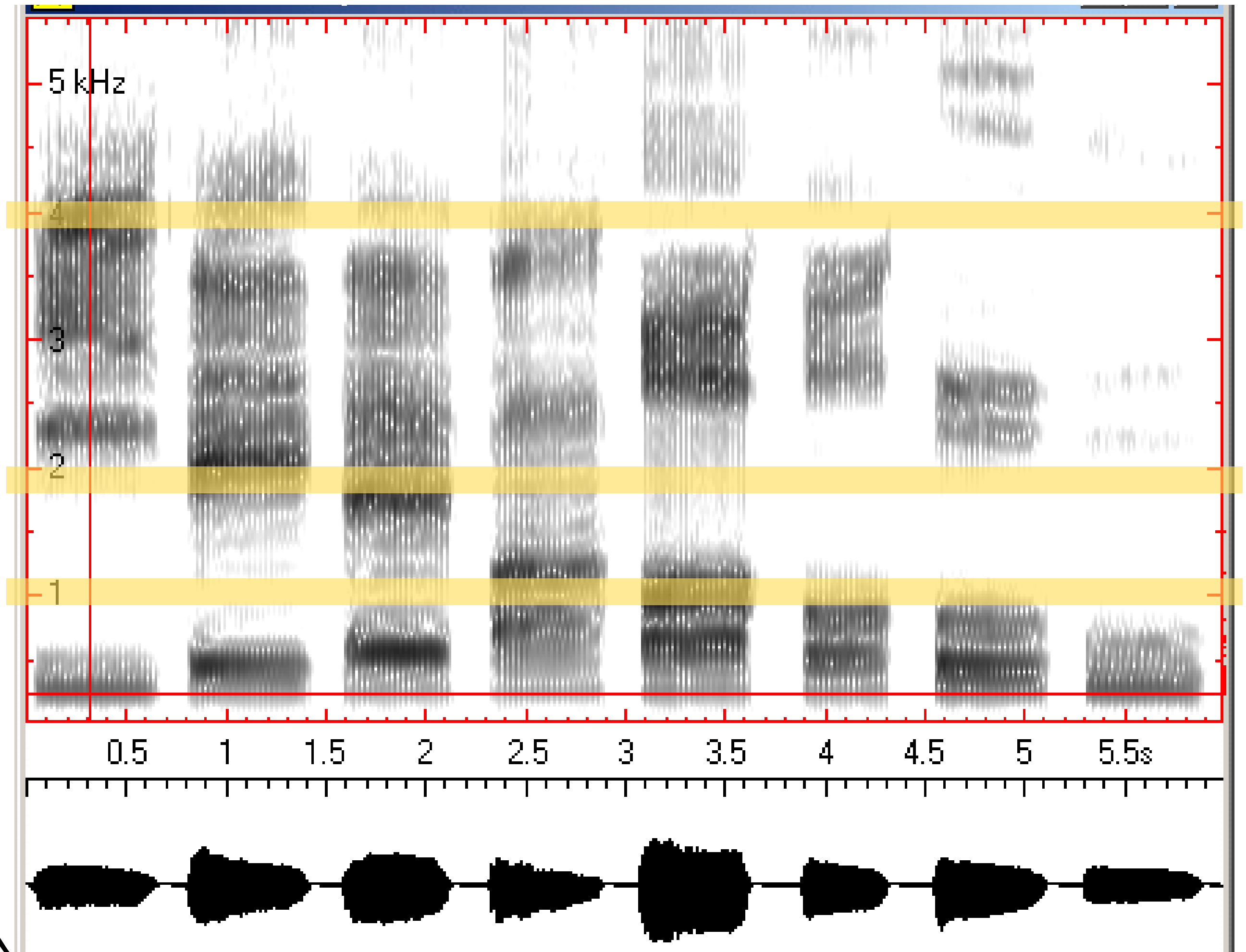
104

Parent
Teacher
Association

U.S.



1000 Hz
2000 Hz
4000 Hz



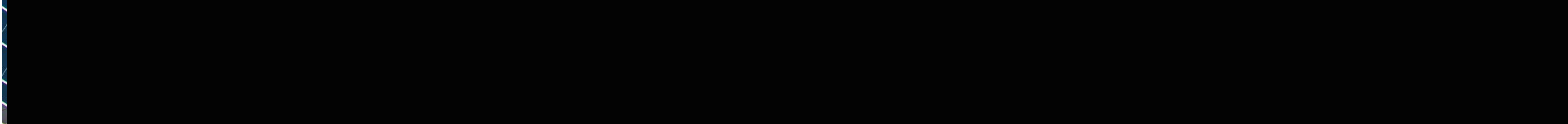
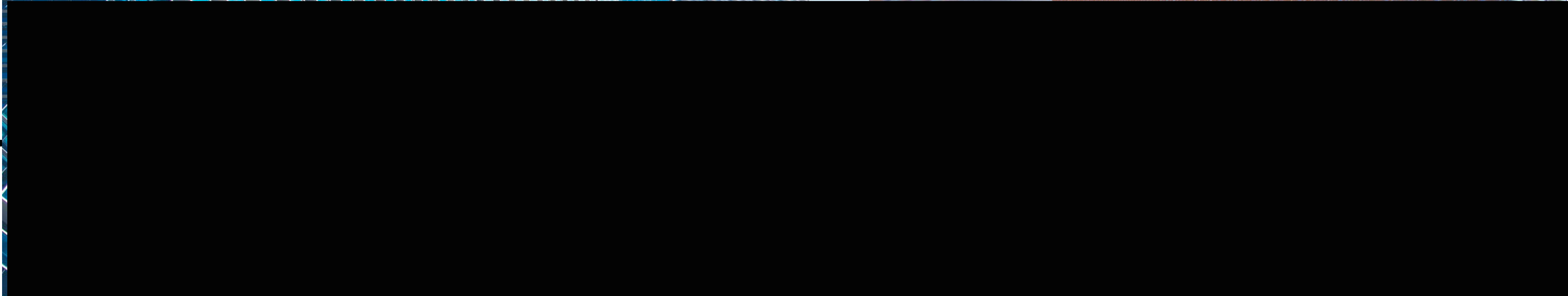
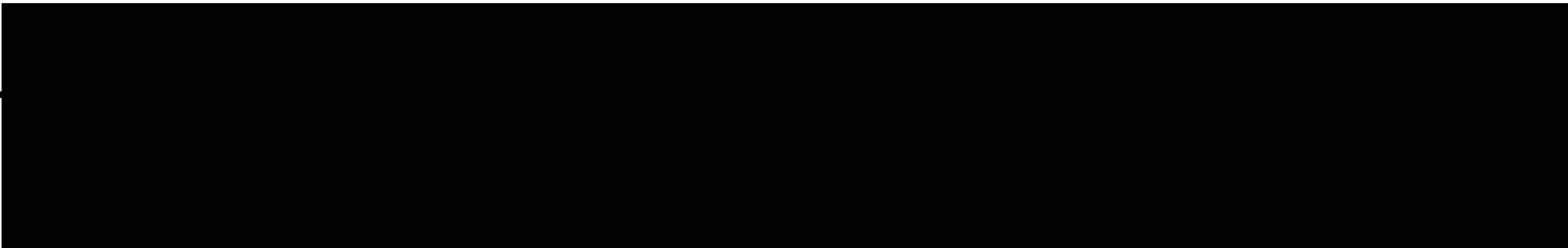
5

4

3

2

1

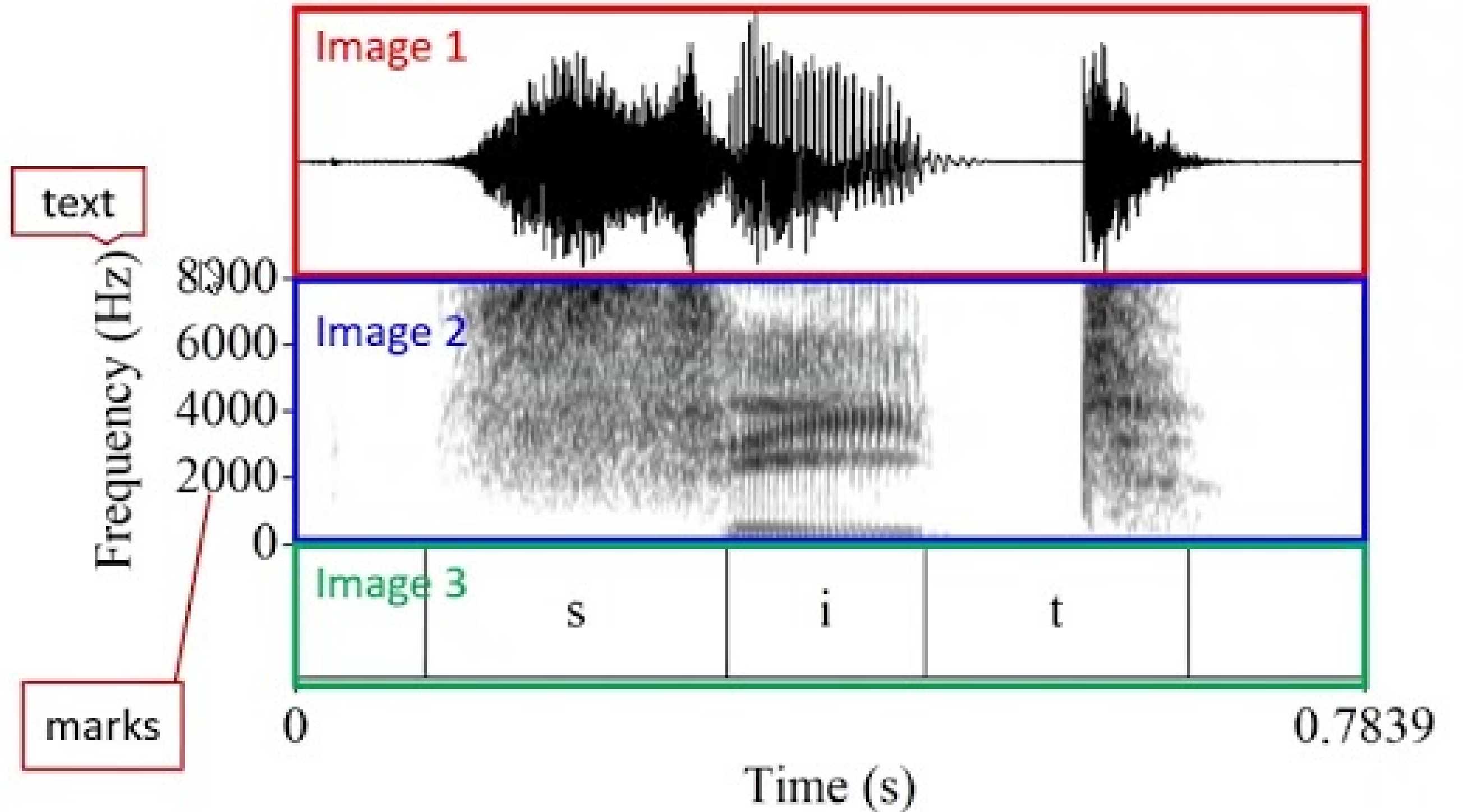


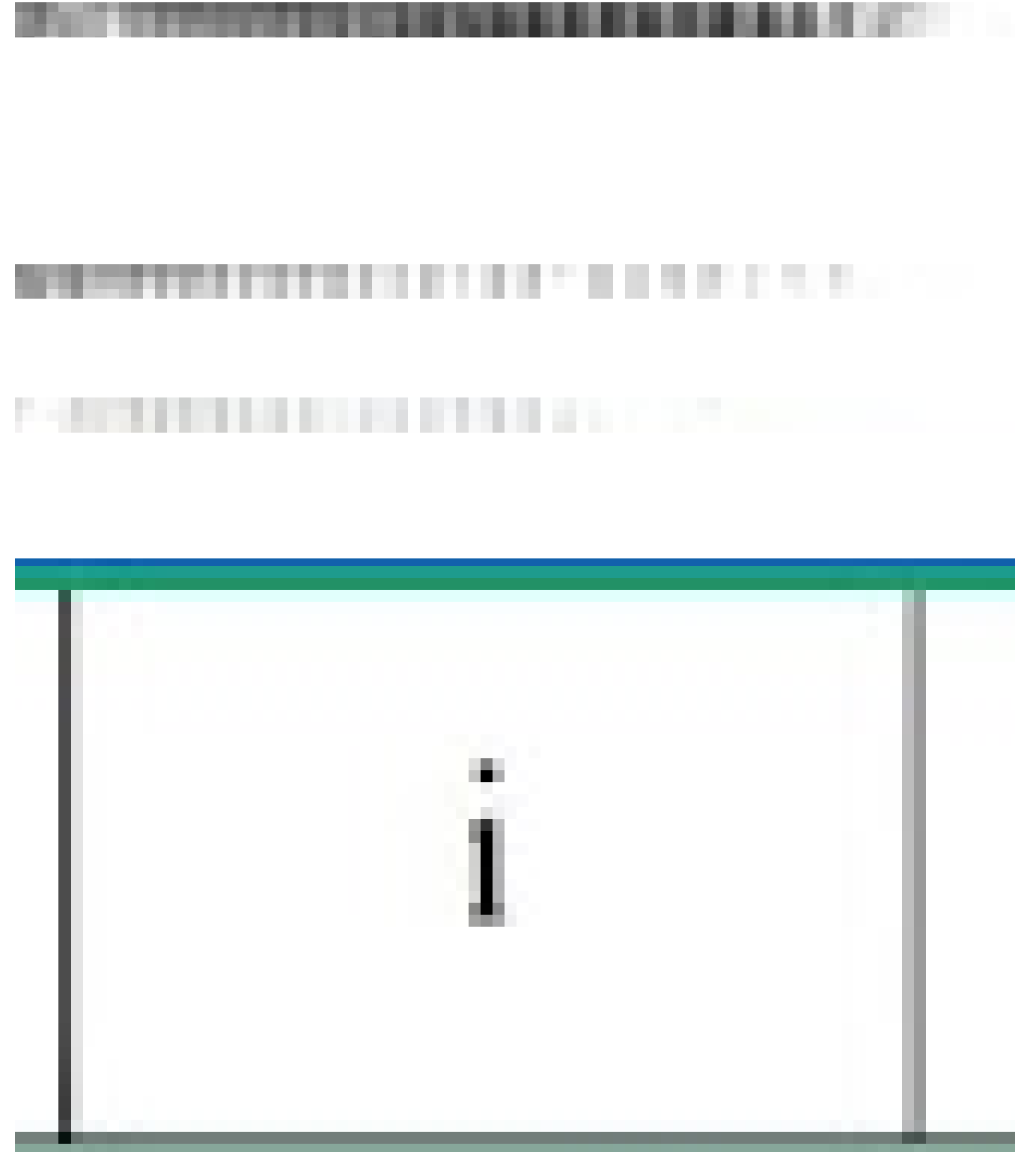
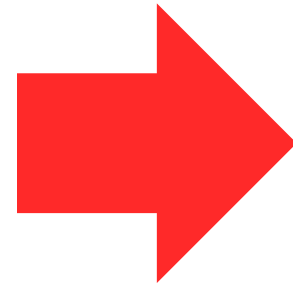


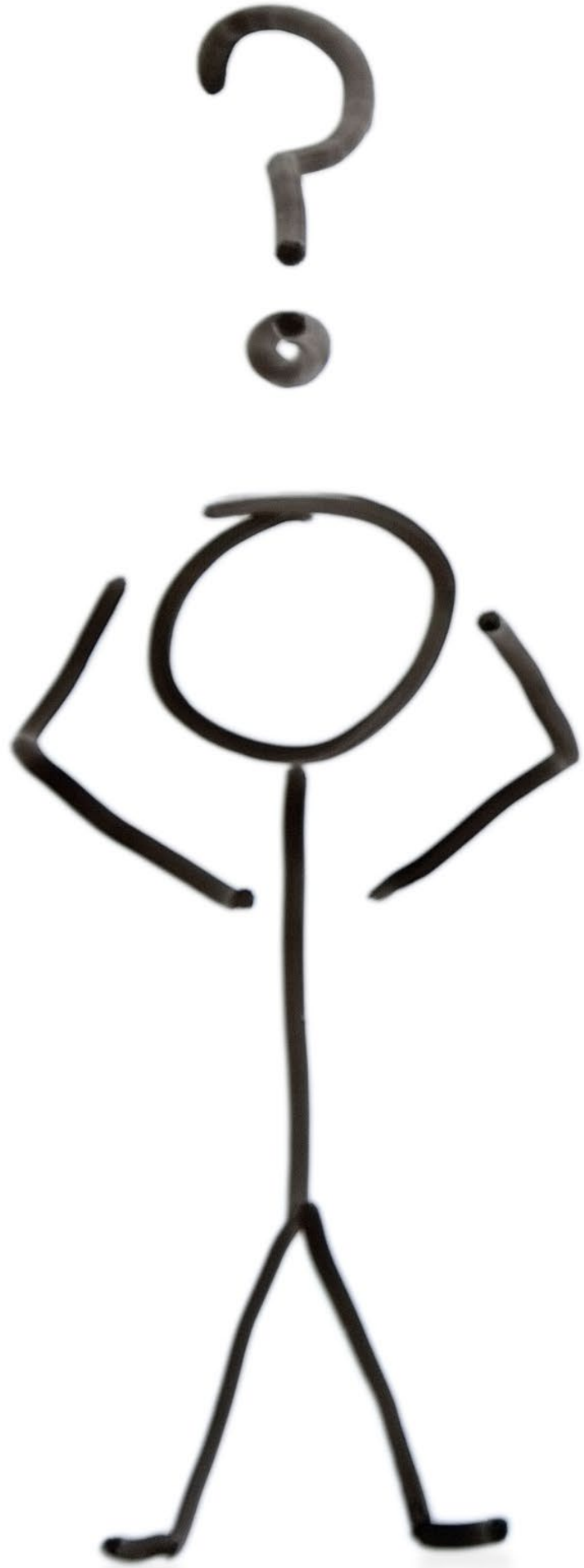
Fundamental Frequency (F0) contributes to overall intelligibility of speech

Range of F0 for an adult is
105-245Hz

Pure tone screenings tell
you nothing about how
speech is perceived. It is
merely a snapshot of
hearing sensitivity.







How are we
currently
doing?



OKLAHOMA 2019-2020



$$\begin{array}{r} \text{Total School Population} * \text{3\%} \\ (698,696) * .03 = 20,961 \end{array}$$

$$\begin{array}{r} \text{Child Find for HI} - 20,961 \\ (1,409) - 20,961 = 19,672 \end{array}$$

19,672



102,696

(14.9%)

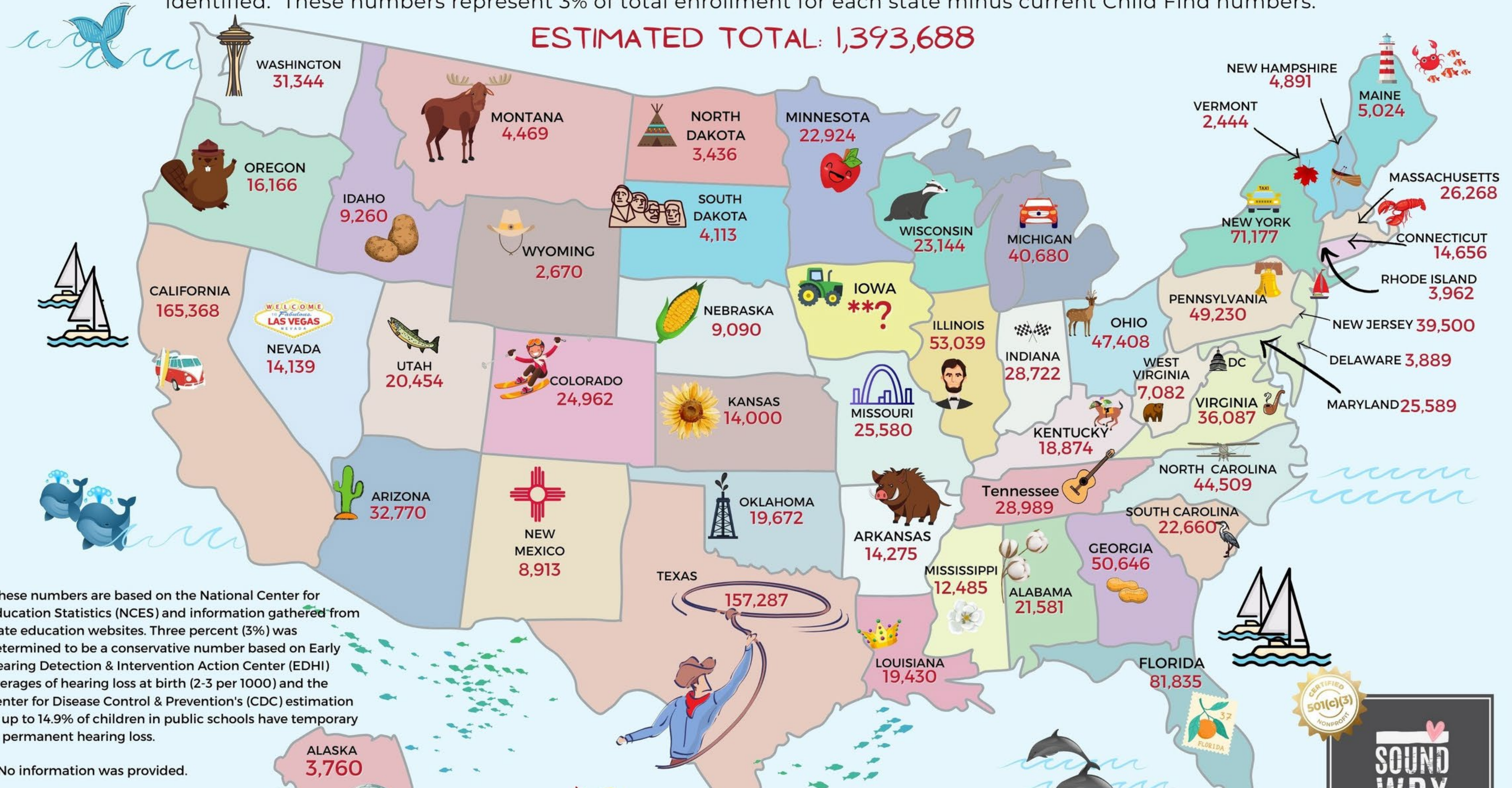


SOUND
WRX

STATE OF DISGRACE

The following numbers represent an estimated number of public school children with hearing loss who have not been identified. These numbers represent 3% of total enrollment for each state minus current Child Find numbers.

ESTIMATED TOTAL: 1,393,688



*These numbers are based on the National Center for Education Statistics (NCES) and information gathered from state education websites. Three percent (3%) was determined to be a conservative number based on Early Hearing Detection & Intervention Action Center (EDHI) averages of hearing loss at birth (2-3 per 1000) and the Center for Disease Control & Prevention's (CDC) estimation of up to 14.9% of children in public schools have temporary or permanent hearing loss.

**No information was provided.



SOUND WRY

BEST PRACTICE



Best Practice Hearing Screening Protocols Among Children 5-9 Years of Age

Ramesh Kaipa, Ph.D., Oklahoma State University

Jacqueline R. Scholl, Au.D., Soundwrx

Fall 2023 - Spring 2024

- Otoscopic examination
- Pure tones .5, 1, 2, 4, 6, 8 kHz at 20 dBHL
 - Tympanometry
 - Acoustic Reflexes (ipsi)
 - DPOAEs

Kid's Hearing Games

Sound Scouts

Rhythmicity



Kid's Hearing Games

Wayne Barber, M.D., FACS

Dave Miller



Game-based pure tone screening

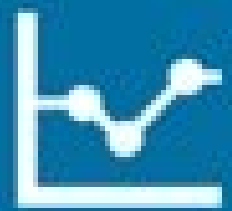
iOS, Android App

Headphones

Tablet

Free download





Hearing Results



Sound Scouts™
Hear for your future.

Sound Scouts

Carolyn Mee, Founder & CEO

Professor Harvey Dillon, Chief Scientist

Screens in 7 minutes:

Speech-in-Quiet

Tones-in-Noise

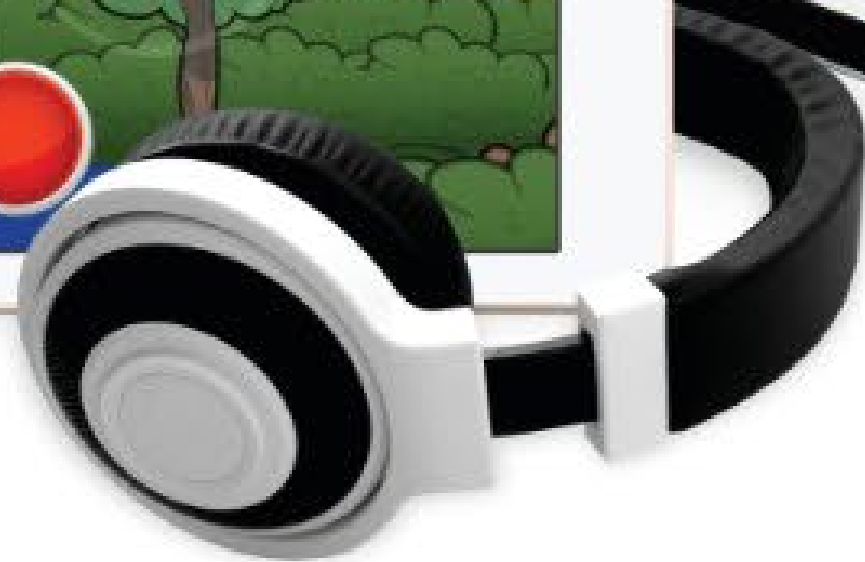
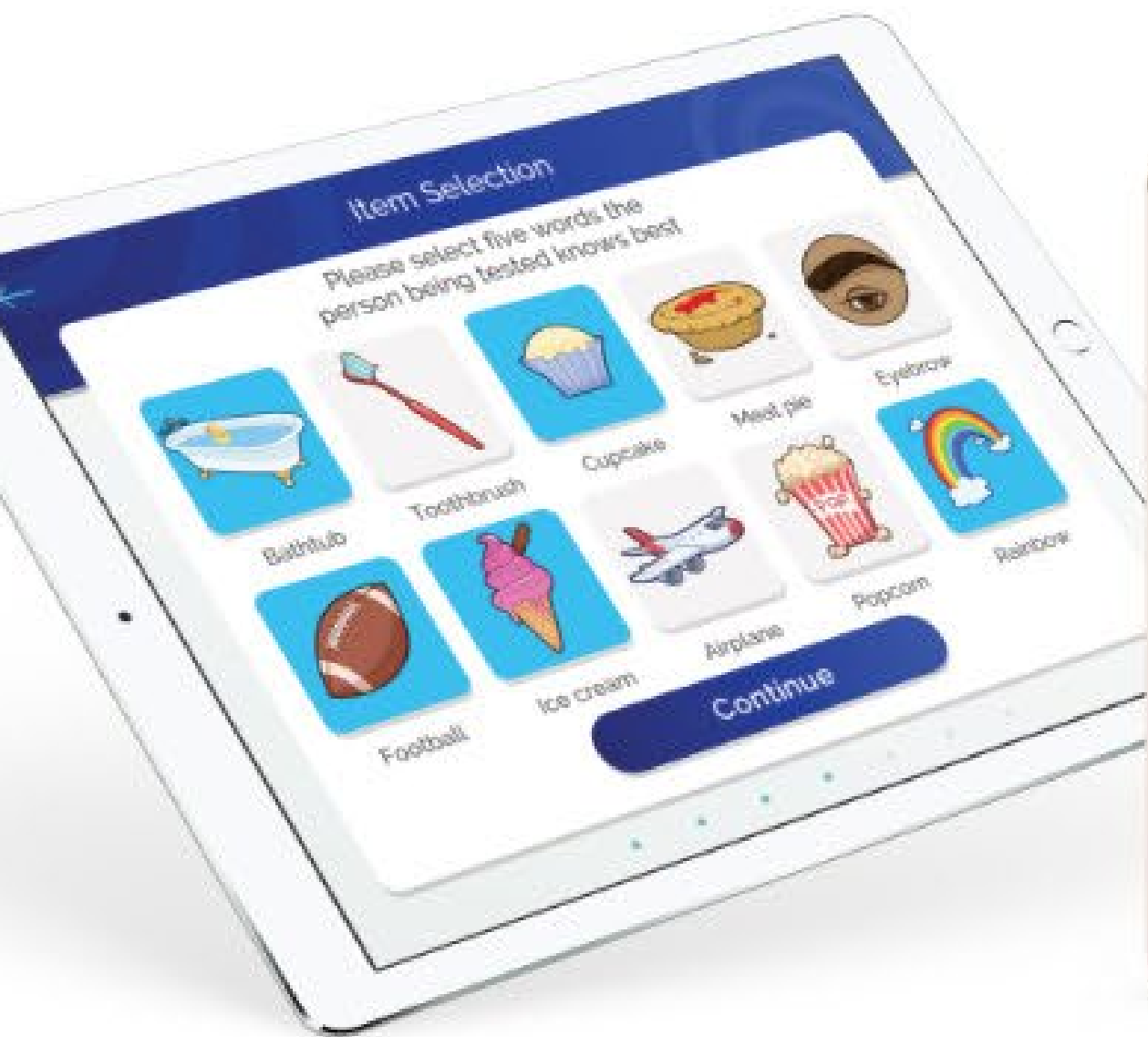
Speech-in-Noise

iPad

Sennheiser HD 300 Headphones (\$50)

app (free download) - \$8-10 for results





Rhythmicity

UCSF Sandler Neurosciences Center

Ted Zanto, Ph.D., Director of Neuroscience Division, Neuoscape

Associate Professor - Neurology

Tablet-based game designed to objectively assess sensorimotor synchronization ability with auditory, visual and tactile stimuli.



EXIT DEMO MODE
EXIT

NEXT LEVEL:

ON-BEAT

GET READY TO TAP ON THE BEAT
(TAP TO CONTINUE)

LEVEL	TASK	STIMULUS	TEMPO	COMPLETED
1	ON-BEAT	AUDIO-VISUAL	Medium	Next
2	OFF-BEAT	AUDIO-VISUAL	Medium	
3	CONTINUATION	AUDIO-VISUAL	Medium	

Level 1

RHYTHM SCORE

HOW LOW CAN YOU GO?

Lower is better

34

(TAP TO CONTINUE)

0

ON-BEAT INSTRUCTIONS

ON-BEAT AUDIO+VISUAL

4

TAP TO THE BEAT



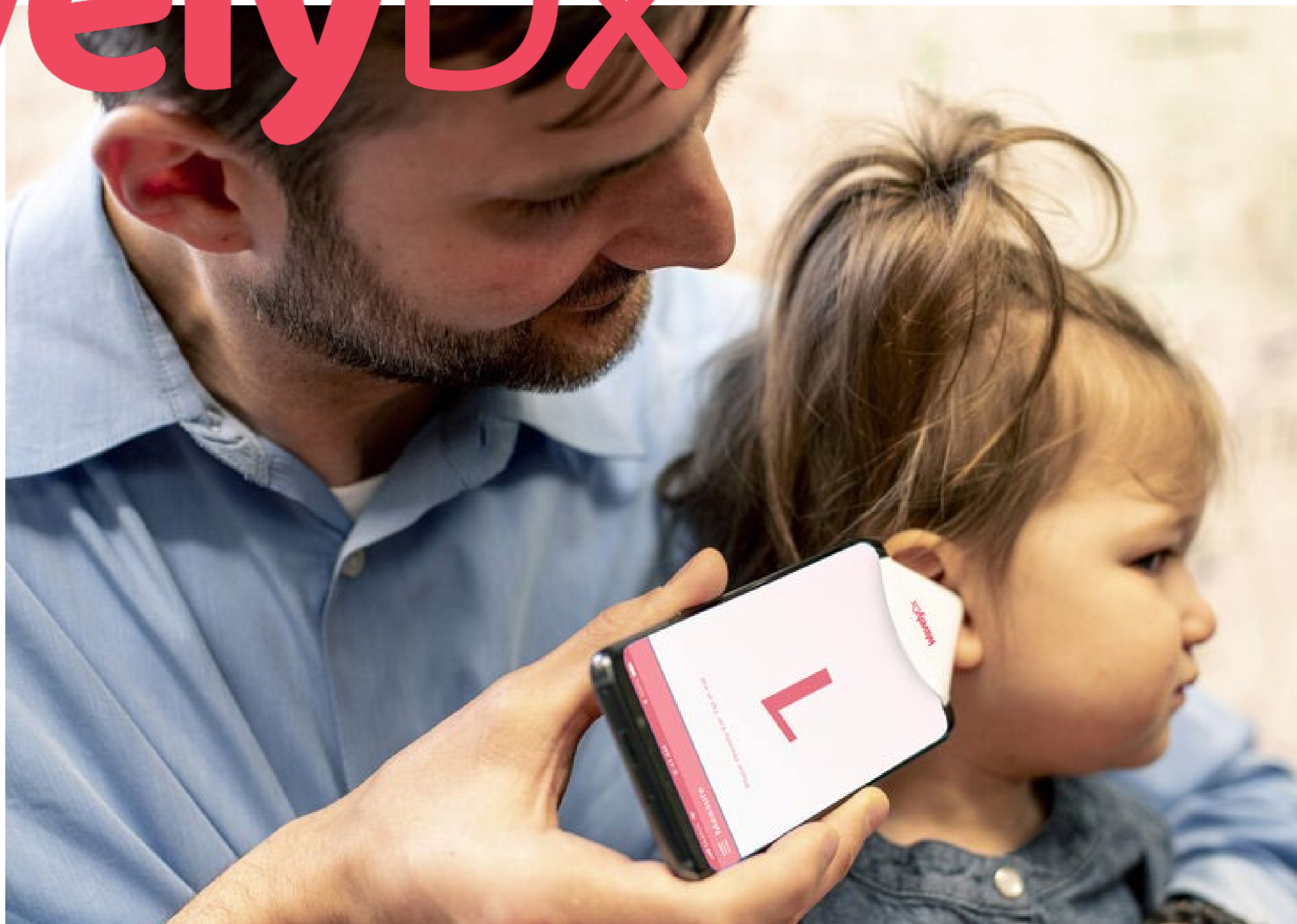


Initial Findings of study

REFERS	URBAN	RURAL	AVG	
Middle Ear Pathology	34%	39%	37%	37%
Pure Tone Thresholds • those with ME Pathology	46% 21%	44% 27%	45% 24%	24%
OAEs • those with ME Pathology	50% 30%	26% 13%	38% 21%	21%
Sound Scouts • those with ME Pathology	39% 18%	40% 17%	40% 18%	18%
Rhythmicity	117	119	118	118

WavelyDx[®]

FDA



Theory

K-3rd Grade + SPED

Sound Scouts (iPad internet, headphones, app) \$400

Results = approximately \$8-\$10 per student

High Frequencies at 4, 6, and 8kHz

Tympanometry (\$1.00 per student)

- *used current research on testing speech
- *cost effective
- *accurate
- *screens auditory pathway as a whole
- *functional
- *easy to use
- *easy to engage kids
- *can be managed remotely by an audiologist

Middle & Senior High

Pure tone frequencies to include 6 & 8 kHz

- *Focus on finding high frequency hearing loss



Hearing conservation education



Thank you!

