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- Call 800-753-2160 (M-F, 8 AM-8 PM ET)
- Email customerservice@AudiologyOnline.com

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Pediatric Grand Rounds, presented in partnership with Boston Children's Hospital

Alison Leschinski, Briana Dornan, Cheryl Edwards, Derek Stiles

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The ABCDs of Approaching Behavioral Challenges in Diagnostics

Alison Leschinski
Briana Dornan
Cheryl Edwards
Derek Stiles

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Disclosure

- We are employees of Boston Children's Hospital.
- Our foundation received an honorarium from AudiologyOnline.
- Dr. Edwards is a member of the American Board of Audiology Board of Governors; views presented are her own.

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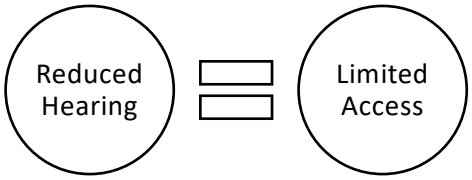
	Introduction
	Conditioned Play Techniques and Adaptations
	Visual Reinforcement Techniques and Adaptations
	Adaptations for Multiple Handicaps and Intellectual Impairments

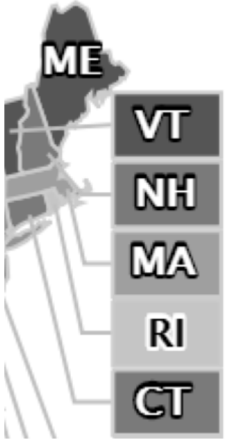
Why is it important?



Diagnosis should be

- as soon as possible
- as accurate as possible

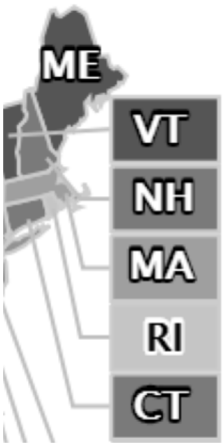
Why is it hard?



	2017	
Any disability	0-4 y	5-15 y
ME	0.3%	6.9%
VT	1.0%	6.5%
NH	0.6%	7.5%
MA	0.8%	5.1%
RI	1.0%	5.5%
CT	1.0%	4.7%

www.disabilitystatistics.org

Why is it hard?



2017	Hearing Loss		Cognitive Disability
	0-4 y	5-15 y	5-15 y
ME	0.1%	0.8%	6.1%
VT	0.6%	1.3%	4.9%
NH	0.4%	0.8%	6.6%
MA	0.7%	0.4%	4.2%
RI	0.3%	0.4%	5.0%
CT	0.7%	0.4%	3.9%

www.disabilitystatistics.org

Prevalence of Developmental Disabilities

- Between 1997 and 2008
  - 13.87% prevalence of developmental disability (1 in 6 children)
    - Learning disability: 7.7% prevalent
    - ADHD: 6.7% prevalent
    - Autism: 16.8% prevalent (in 2014)
  - Prevalence has increased by 17%
    - Prevalence of autism increased 290%
    - Prevalence of ADHD increased 33%

www.cdc.gov/ncbddd/developmentaldisabilities

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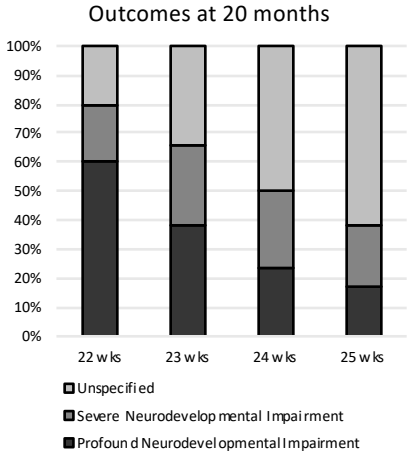
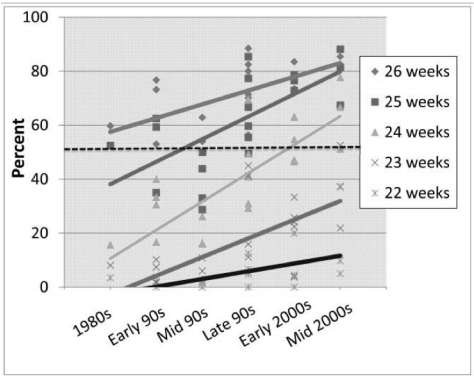
Premature Survival





https://www.nichd.nih.gov/about/org/der/branches/ppb/programs/epbo/dataShow

Glass et al, 2015

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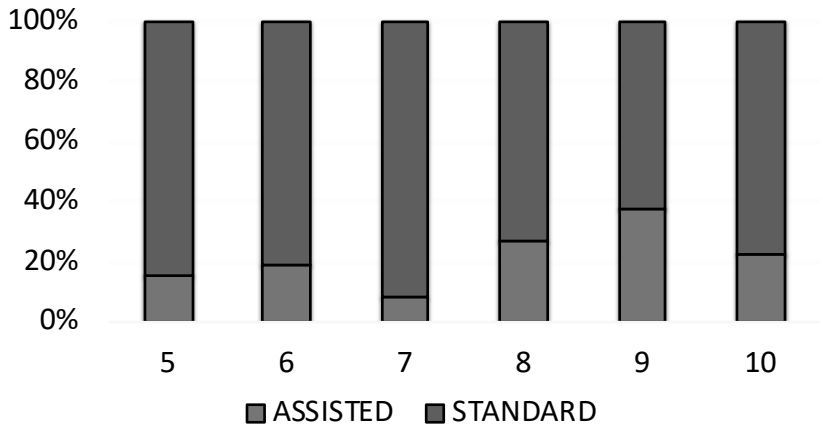
2018 New Patients



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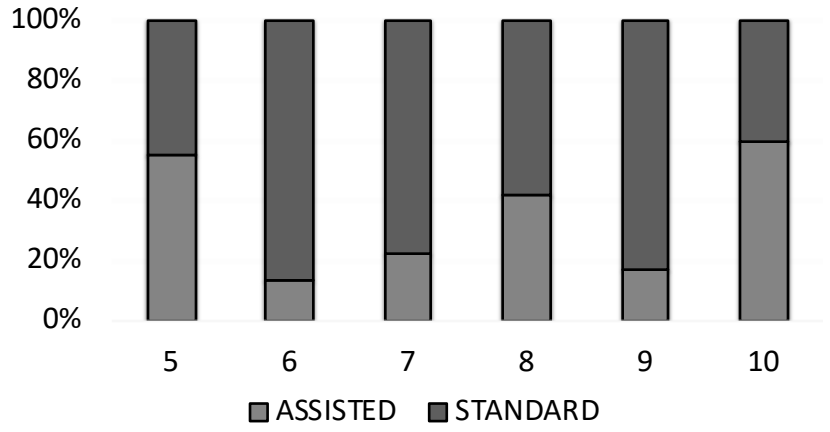
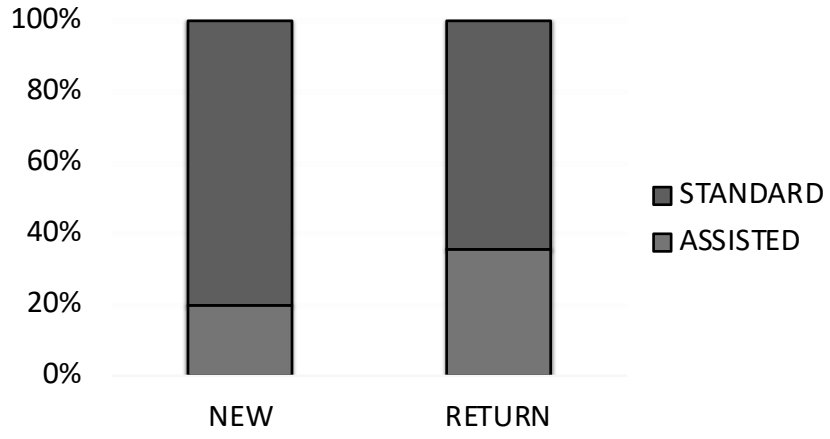
2018 Return Patients



2018 New and Return Patients
(5-10 years old)



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Why will it get harder?

App-based audiometry

More and better app-based hearing screeners will come to market

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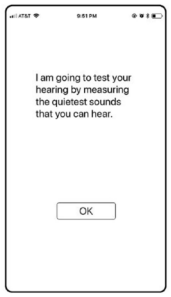
Kids Hearing Game: https://drive.google.com/file/d/1_ETSgISWD4KUeEa8sMUczEU5PxahKt5O/view

GSI AMTAS



Automated Smartphone Audiometry: A Preliminary Validation of a Bone-Conduction Threshold Test App DOI: (10.1177/0003489419828770)

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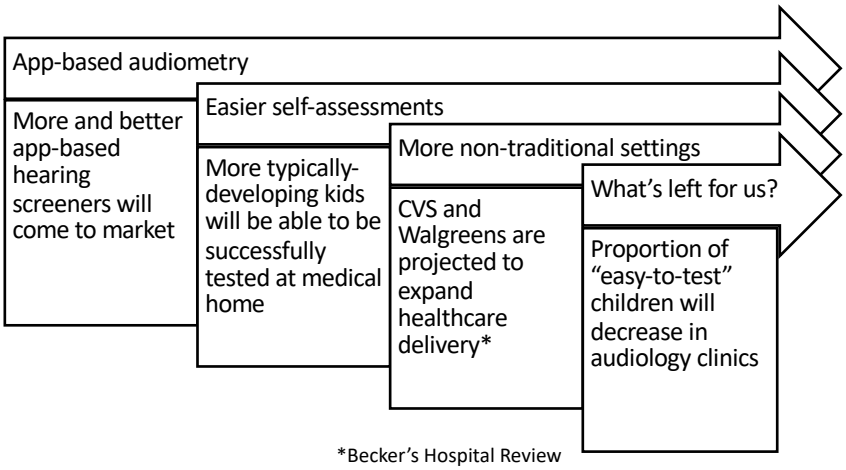
Why will it get harder?



*Becker's Hospital Review

CONTINUED

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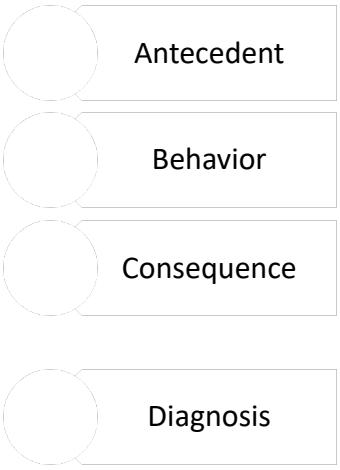
What can we do?

- Adapt to the patient's presentation
- Broaden your inventory of toys and tools
- Create ways to elicit reliable responses
- Distinguish responses from noise



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Conditioned Play Techniques and Adaptations

Case 1

Toddlers and children with developmental delays are often our toughest customers.

Why?

- Nervous?
  - Not sure what to expect
- Medical anxiety?
- Trying to control the environment?
- Delays in expressive language?
- Delays in receptive language?
- Delays/disorders of cognitive functioning?
- May have undiagnosed hearing loss?
  - Which puts them in a daily position of not knowing what is going to happen

Ideas for Successful CPA testing

- If you don't have an assist available
- If the child is not succeeding in a two-audiologist test paradigm
- If you are not sure if the child doesn't understand the task or if they do not hear the stimuli

2 Year 4 Month Old

- Routine evaluation: First attempt at CPA
- Unilateral Atresia

Start with Vibrotactile Training

Why is it a good idea?

- I am 100% confident that I ***do not*** know how any child hears.
- I am 100% confident that I ***do*** know what the child can feel
- This activity allows me to fully understand if the child has the developmental ability to participate in the task

Vibrotactile Training

Total training time took 1 minute 30 sec

Moving Quickly to Bone Conduction

Why is it a good idea?

- Easy transition from the vibrotactile task
- Already comfortable with feeling the headband on their hand
- Quick way to know if there is a sensorineural or mixed component
- Responses to bone conduction are often more clear than via air conduction

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Bone Conduction

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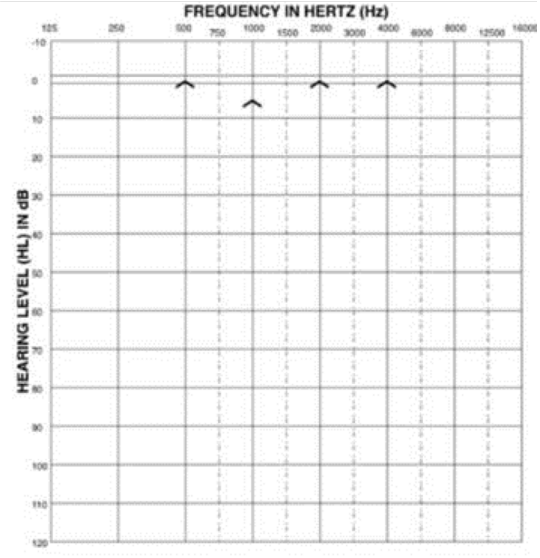

- Total time for unmasked bone: 2 minutes 2 seconds

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Moving on to Air Conduction

Moving on to Air Conduction

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Unmasked Air Conduction

- Total time for unmasked air "Thresholds": 3 minutes 7 seconds
- Set priorities for most important information to obtain first

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Masked Air Conduction

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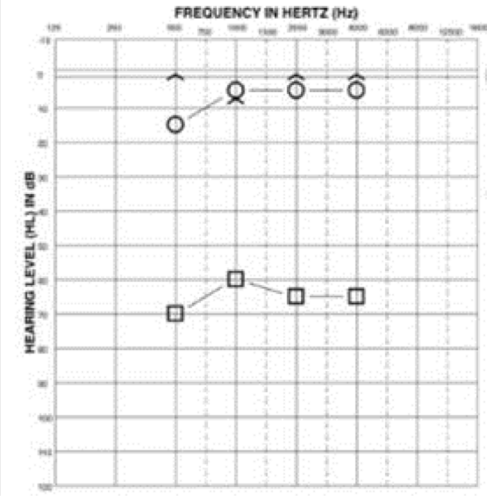
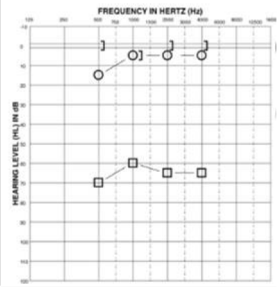
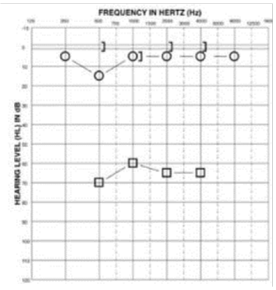
Masked Air Conduction



- Keeping priorities in mind.
- Complete bilateral speech frequencies are generally my first priority

Making it to Masked Air/Bone… and Beyond





SPEECH AUDIOMETRY

	Ear. SII	PTA	SRT (dB HL)	SAT (dB HL)	Masking (dB HL)	Word Recognition %	Word Recognition dB HL	Word Recognition Masking (dB HL)
R	100	8		5		100	50	
L	0	65		50	40	96	90	40
BC	---	---						
SF	---	---						

Speech Reception Threshold (SRT):

Speech Awareness Threshold (SAT): put it in/on

Word Recognition: ESP Monosyllables

Presentation: ☐ Male ● Female ■ Live Voice ☐ Recorded

IMMITTANCE MEASURES

TYMPANOMETRY			PROBE FREQUENCY ■ 226 Hz ☐ 1000 Hz			
EAR	EQUIV CANAL VOL (cc)	PEAK PRESSURE (daPa)	STATIC ADMITTANCE (mmho)	GRADIENT (daPa)	DIAGNOSTIC	
RIGHT	0.6	-50	0.2	Clear peak	☐	☐
LEFT	-	-	-		☐	☐

Once I had air and masked bone conduction for both ears, I was able to use my right earphone which was in place to provide masking for bone, to obtain 250 and 8000 Hz.

Total test time for pure tones = 13 minutes 7 seconds

We still had time and attention to complete separate ear speech discrimination with the help of an assist.

Tester Behaviors That Help

- Use simple language
  - This entire evaluation can be completed only with gesture if necessary
- Frequent positive reinforcement
- No attention provided for "undesired" non-test related behaviors
- Frequent change in test activity
  - Activities should be connected to scaffold so retraining is unnecessary
- Placing just a finger on the hand holding the toy is often enough to ward off impulsivity
- Presenting stimuli only when the child is ready

Visual Reinforcement Techniques and Adaptations

Case 2

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Magic Button

CONTINUED

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The Magic Button…

…can be anything!






CONTINUED

Versatile

- Transition between VRA and play
- For children who are bored with traditional play tasks
- For patients with high false positive rates

Magic Button

Versatile

- Transition between VRA and play
- For children who are bored with traditional play tasks
- For patients with high false positive rates
- Can be modified for one tester

Testing Solo

- Parent as the assist
  - Clear instructions
  - On lap or child in own chair
- Two parents
  - One sitting with child, one in front as assist

Testing Solo

- Additional reinforcer/light bar for centering
- Rope light/wireless remote control plug

Testing Solo

- Examiner as own assist

Keeping Them Happy
(when possible!)

- Test order
  - "How is she when people look in her ears?"
- "Can he have his binkie/blanket/animal?"

Thinking About Seating

We want the child to be:

- Happy
- **Comfortable**
- **Safe**
- In the correct spot in the booth

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38 Seconds into the Appointment…

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Seating

- Lap
- Own chair (maybe)
- Standing
- Floor
- Stroller
- Rifton

Rifton Chair

Headphones/inserts

- Instructions to parent
- Wires behind the child
- Move quickly

Non-traditional Speech Stimuli

- When all else fails…
  - Favorite music
  - Sound from a favorite toy
  - Parent or sibling's voice
- Adjust test mic so VU peaks at 0 dB

In Case of Emergency…
(Tymps, OAEs*)

* and sometimes VRA

Adaptations for Multiple Handicaps and Intellectual Impairments

Case 3

Special needs population

- We tend to utilize methods used in Applied Behavior Analysis (ABA) when working with children with special needs.
- Some of the most valuable methods are:
  - Positive Reinforcement: encouraging the behavior we want
- Prompting: visual and verbal cues to encourage behavior with gentle reminders (pointing, tapping)
- In addition, we continue to exercise flexibility, patience, redundancies and creative technique, as we do with all of our pediatric patients.

PROMPTS

- Prompts are supports that are used to teach a new skill.
- Prompt types:
  - Gesture - basic gestures like pointing to the next step
  - Model - demonstrating how to complete the task for the learner to imitate
  - Physical - guiding the learner to do the task through touch
  - Visual - picture or written instructions
  - Verbal - saying the instructions, a specific verbalization
- Prompts are initially utilized to teach a skill and then lessened or stopped when the learner can do the task.

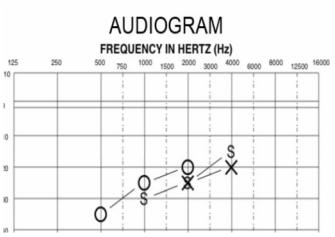
Case 1, JM

- 8 year old boy
- Known to BCH Audiology department
- Patient of BCH Down Syndrome Program
- Hx of bilateral hearing loss (fluctuating)
- Hx of amplification
- Dx of ADHD
- Hx of middle ear dysfunction, tube placement

JM, video

JM, techniques

- Assist utilized
- Flexibility (moving around the room, removing headphone from band)
- Time and patience!
- Positive reinforcement (play task, verbal)
- Prompting (pointing to speaker)
- Applied Behavior Analysis (ABA) techniques (first this, than ____)
- Consistent responses obtained



SPEECH AUDIOMETRY								
	Est. SII	PTA	SRT (dB HL)	SAT (dB HL)	Masking (dB HL)	Word Recognition %	dB HL	Masking (dB HL)
R	91	27		≤20				
L	96	---		≤20				
BC	---	---						
SF	---	---		≤20				

Case 2, KK

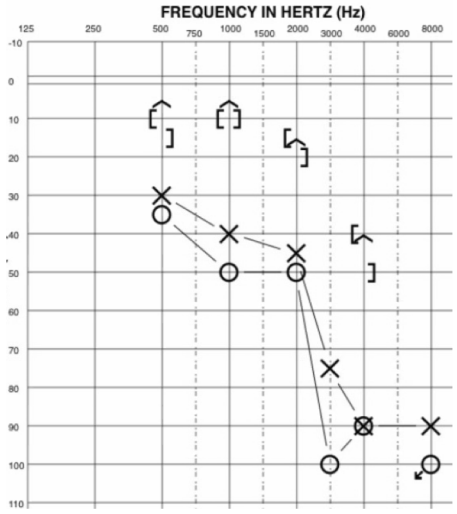
- 14 year old boy
- Down syndrome
- Known bilateral, conductive hearing loss
- Previous trial with amplification, unsuccessful in light of sensory issues
- Entering high school
- Parents report recent hearing concerns
- History of middle ear dysfunction, infection (middle and external), fluid and drainage
- Verbally expressive

KK, video

KK, techniques

- Assist with CPA
- Positive reinforcement
- Prompting
- Highly structured
- Use of assist for reading patient behaviors (eye shift, smile)
- Gentle reminders
- Modeling of test task
- ABA strategies
- Consistent responses obtained

KK audio



	Est. SII	PTA	SRT (dB HL)	SAT (dB HL)
R	26	45		35
L	42	38		40
BC	- - -	- - -		
SF	- - -	- - -		

Case 3, KR

- 6 year old girl
- Older brother with same diagnosis
- Mucopolysaccharidosis, Sanfilippo syndrome
- Significant developmental delay
- Behaviorally challenging
- Bilateral SNHL, aided
- Intellectual impairment

KR, video

KR, Techniques

- Assist utilized
- Flexibility, creative games
- Time and patience
- Positive reinforcement (verbal praise, stickers)
- Prompting (pointing to speaker)
- Applied Behavior Analysis (ABA) techniques
- Consistent responses obtained

Summary

Thank you to the families and children who agreed to be filmed for this presentation.

And thanks to the great audiologists at BCH who help these kids everyday.

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References

- Centers for Disease Control and Prevention (2017). Developmental Disabilities. https://www.cdc.gov/ncbddd/developmentaldisabilities
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