
Pediatric Hearing Instrument Fitting in 2010: The Sound Foundations Cuper Project

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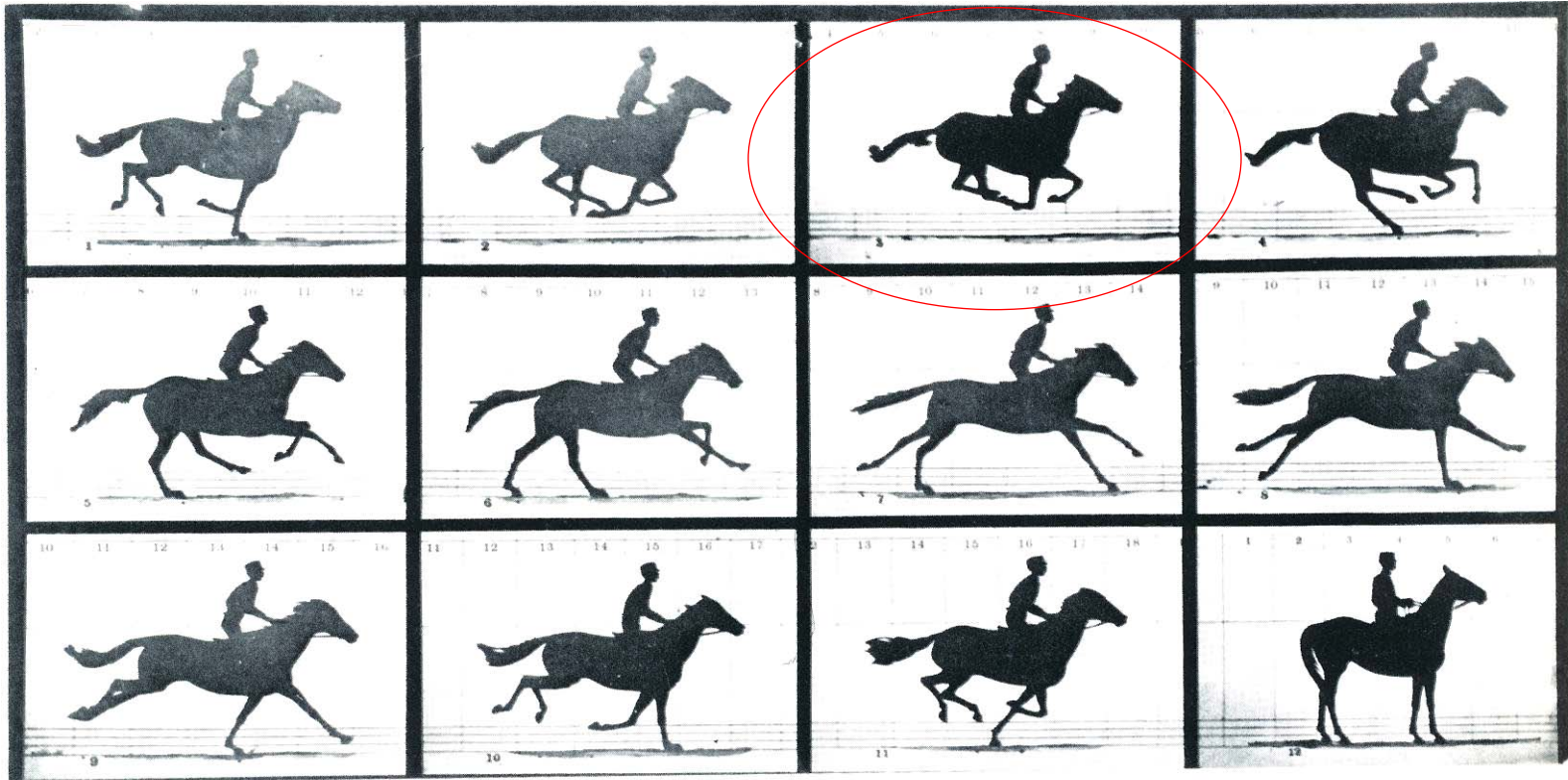


A Sound Foundation Through Early Amplification

Misconceptions



Tools to uncover the “myth” about horses



Copyright 1878 by MUYBRIDGE

MORSE S. Gallery, 41, Montgomery St., San Francisco.

THE HORSE IN MOTION.

Illustrated by
MUYBRIDGE.

ALFRED ATHERTON, PHOTOGRAPHER.

"SALLIE GARDNER," owned by LELAND STANFORD; running at a 1.40 gait over the Palo Alto track, 19th June, 1878.

The successive pictures of this gallop were made at intervals of twenty-six hundredths of a second, and about the twenty-fourth part of a second of time; they illustrate consecutive positions assumed in a gallop twenty-seven inches of progress covering a single stride of the mare. The vertical lines were twenty-six inches apart; the horizontal lines represent elevations of four inches each. The exposure of each negative was less than the two-thousandth part of a second.

Are there misconceptions about Pediatric HI fittings?



- How many hours do infants and toddlers wear instruments/day?
School aged? Teens?
- How often are children provided access to noise solutions?
- How often is DSL applied in pediatric instrument fittings?
- What is the average programming time for pediatric hearing instruments

Sound Foundations Cuper Project: Purpose

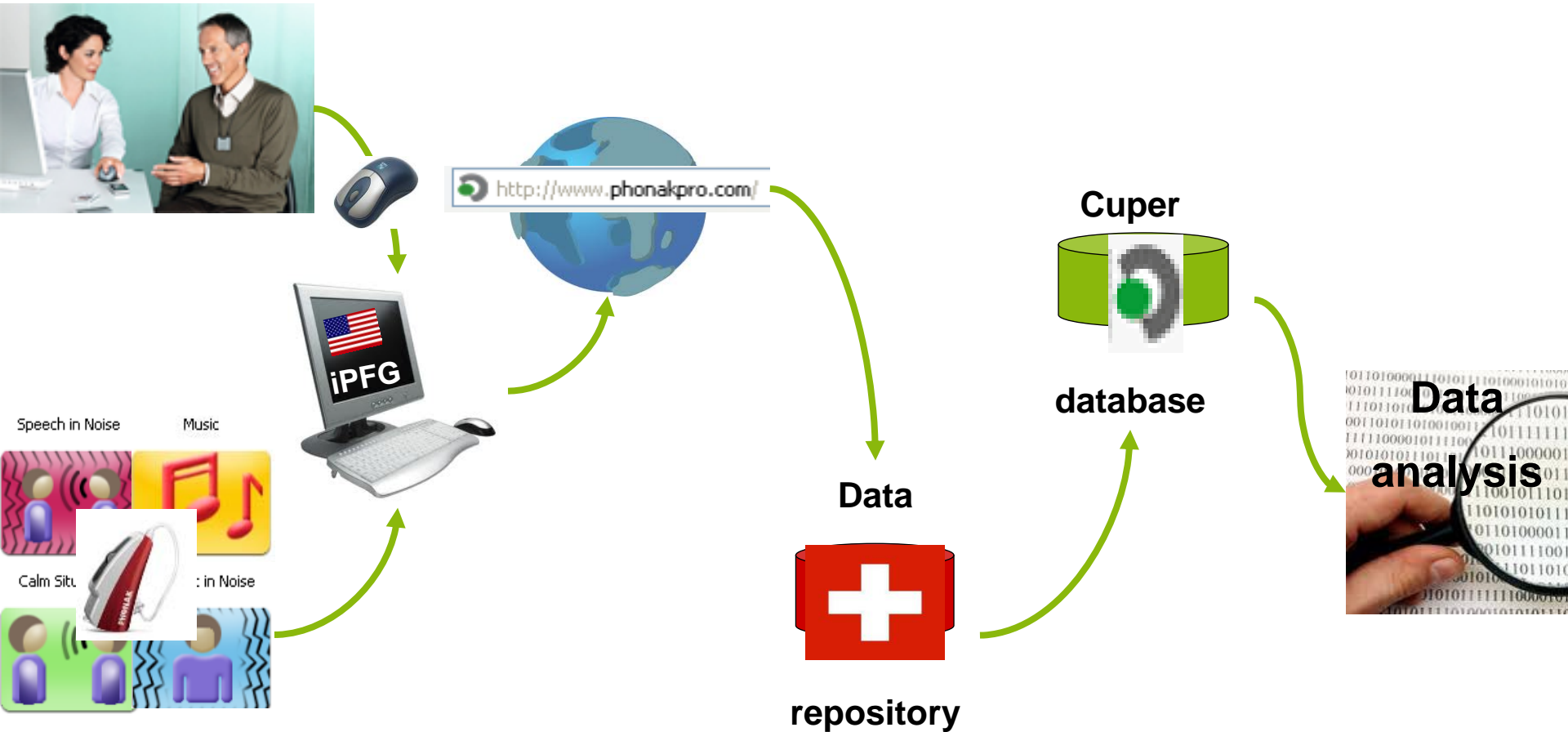
To understand pediatric hearing instrument fittings and usage by collecting data from a large number of pediatric hearing instrument fitting files

- Pediatric hearing instrument usage
- Technology selection and activation
- Class and model selection
- Prescriptive method
- Demographics of pediatric hearing instrument users
- Audiologists' workflow
- Pediatric instrument fitting and follow up practices
- Use of fitting tools

Project Scope

- Invited clinical and school pediatric audiologists to participate
- All participating workstations were activated in Jan 2010
- Data logging was uploaded to central server in May and September
- Data analyzed and presented at Sound Foundations
 - 100 workstations
 - 72 clinics
 - 28 schools
 - 8 months of logging
 - 4918 subjects
 - 8669 ears

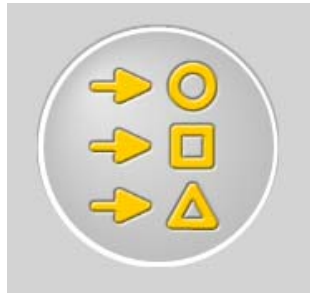
Cuper Data Collection



Objective Insights into Several Aspects of Fitting and Use



Wearers



Usage



Features



Process

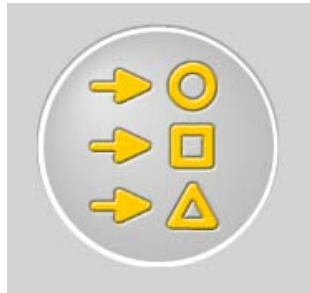


Impact

Outline



Wearers



Usage



Features



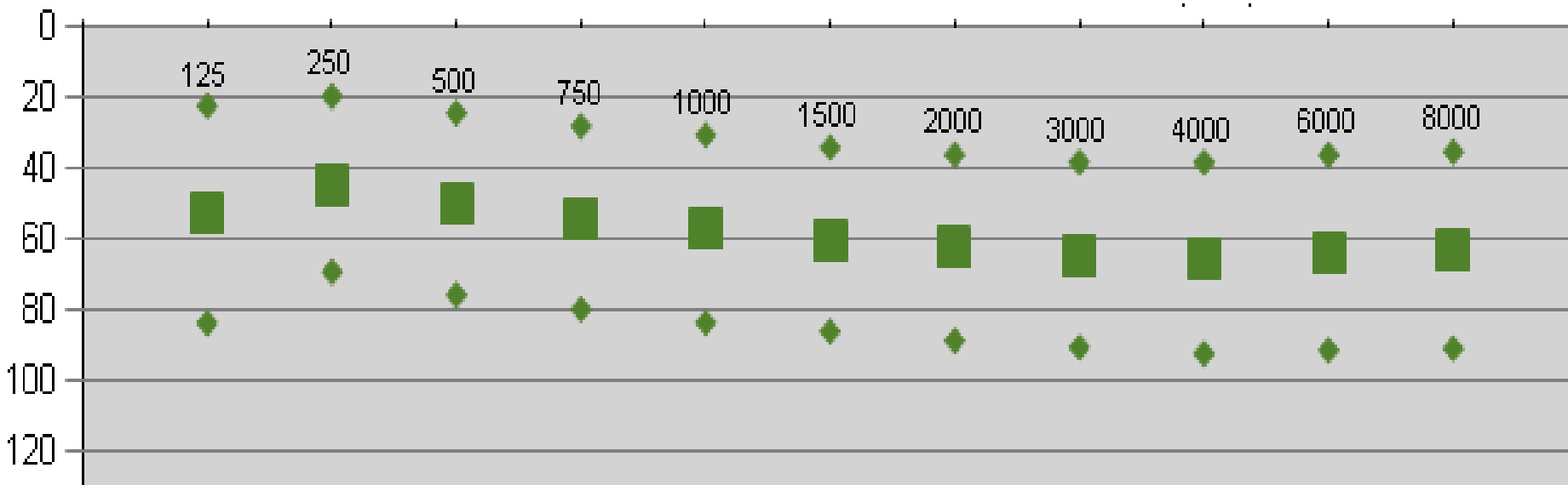
Process



Impact

Average AC hearing loss

56 dB with no gender effect



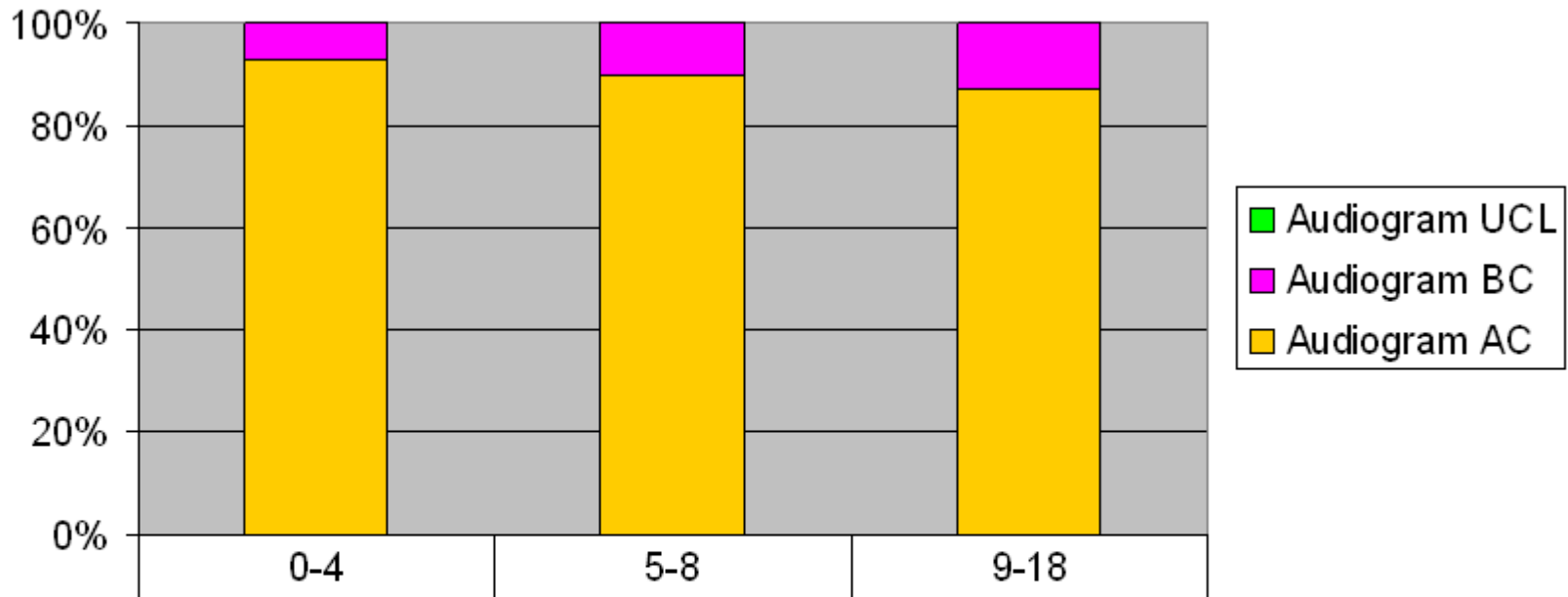
	0-4	5-8	9-18
all	63	56	57
male	63	58	58
female	63	55	56

Instrument users by audiogram type and age

6% conductive or mixed



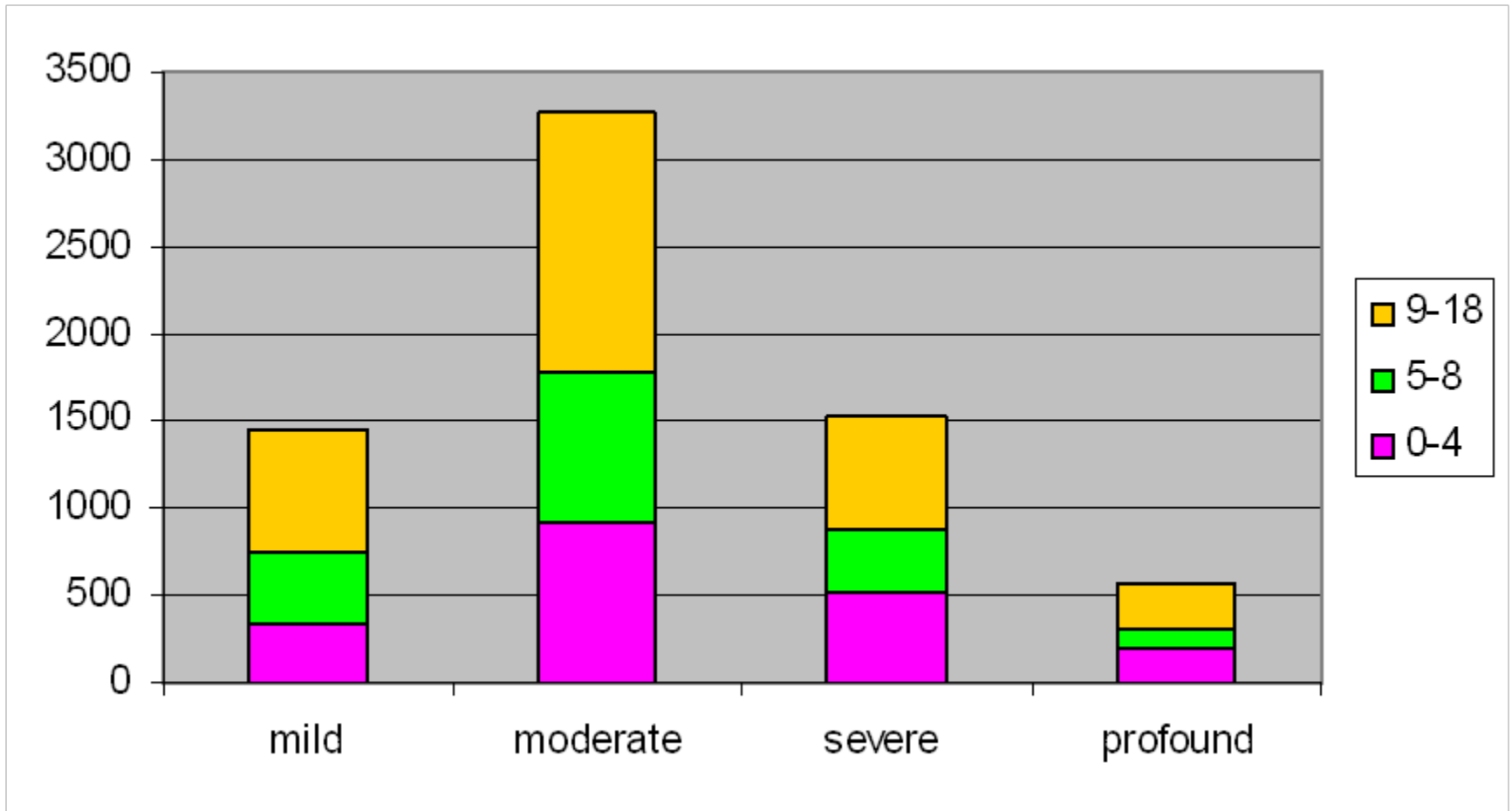
* 9% mixed or CHL by teens



age groups

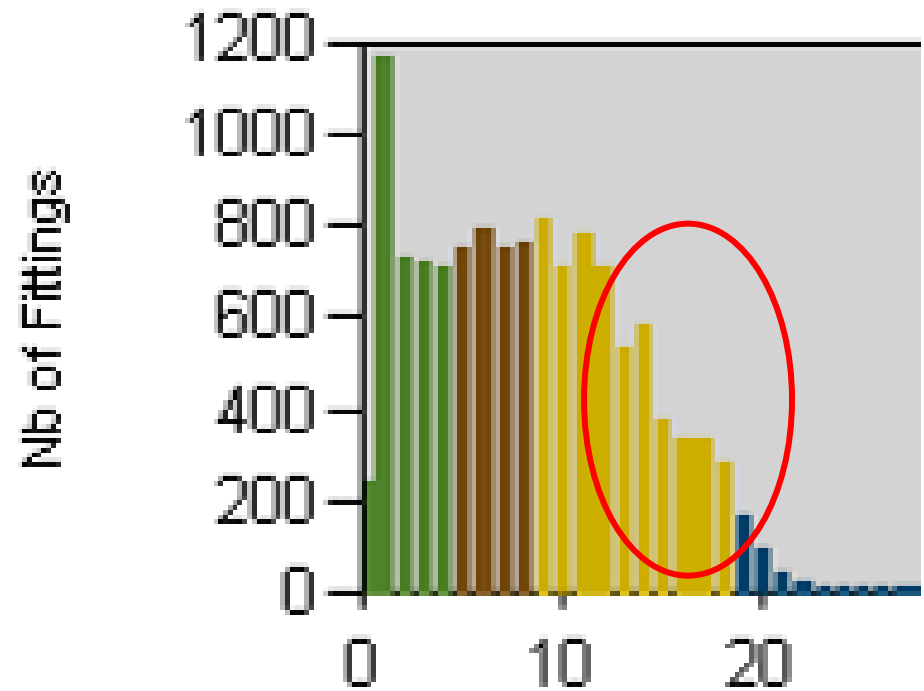
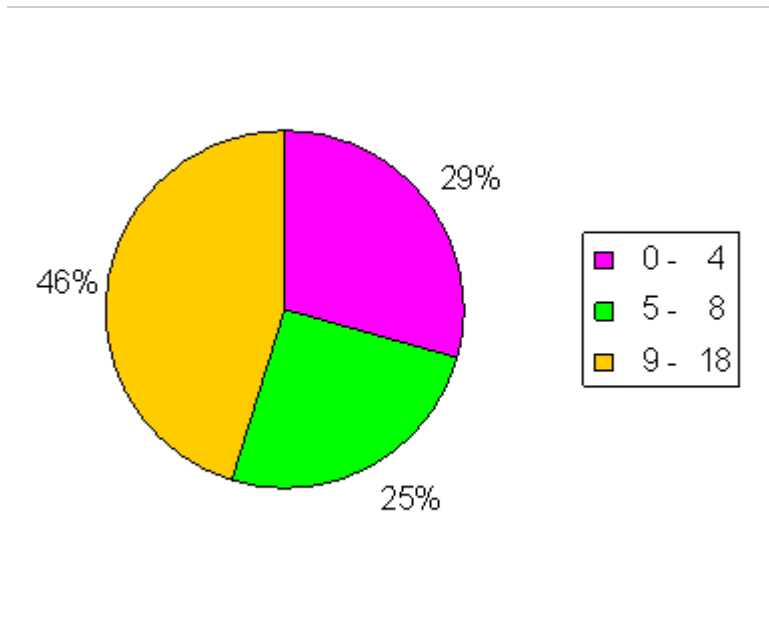
Audiogram UCL	0	2	7
Audiogram BC	169	224	538
Audiogram AC	2127	2006	3634

Hearing loss by degree and age



Distribution of Fittings by Age

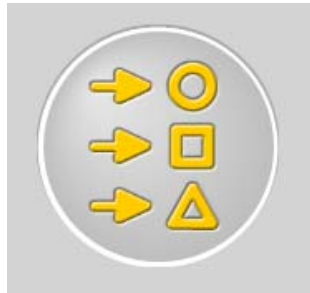
are we losing the interest of teens?



Outline



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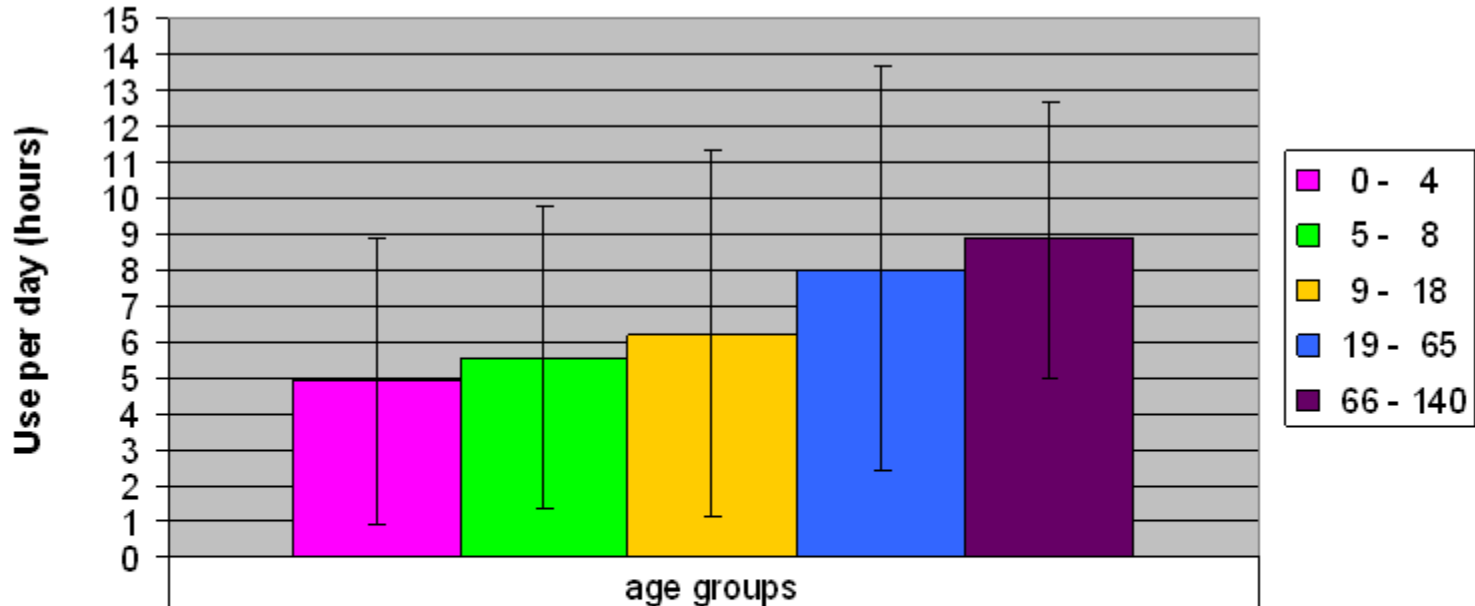
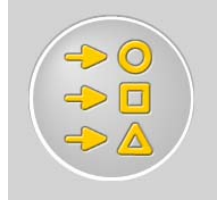
Process



Impact

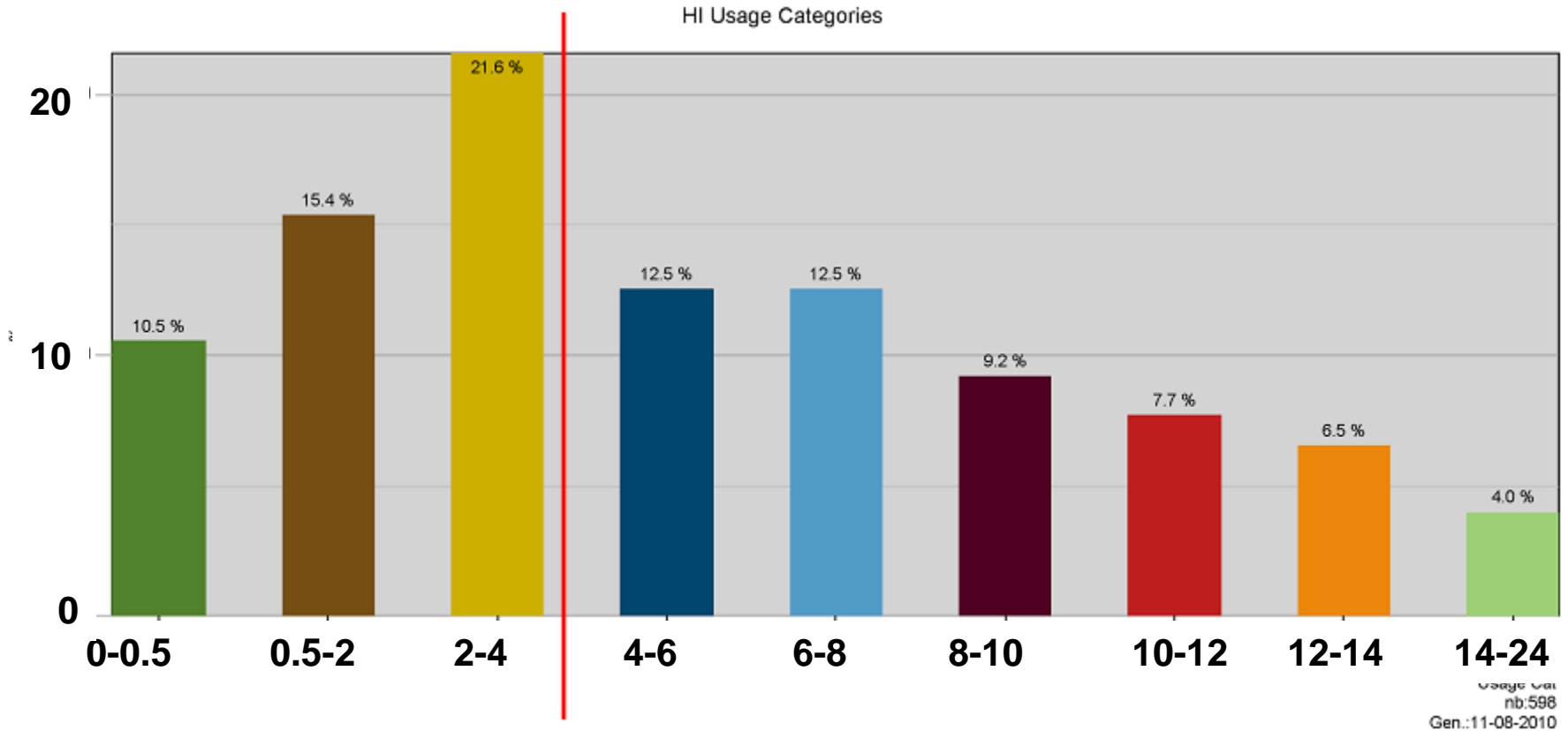
HI use/day increases with age

children wear their HI on avg. 5.5hr/day



0 - 4	4.90
5 - 8	5.57
9 - 18	6.23
19 - 65	8.03
66 - 140	8.84

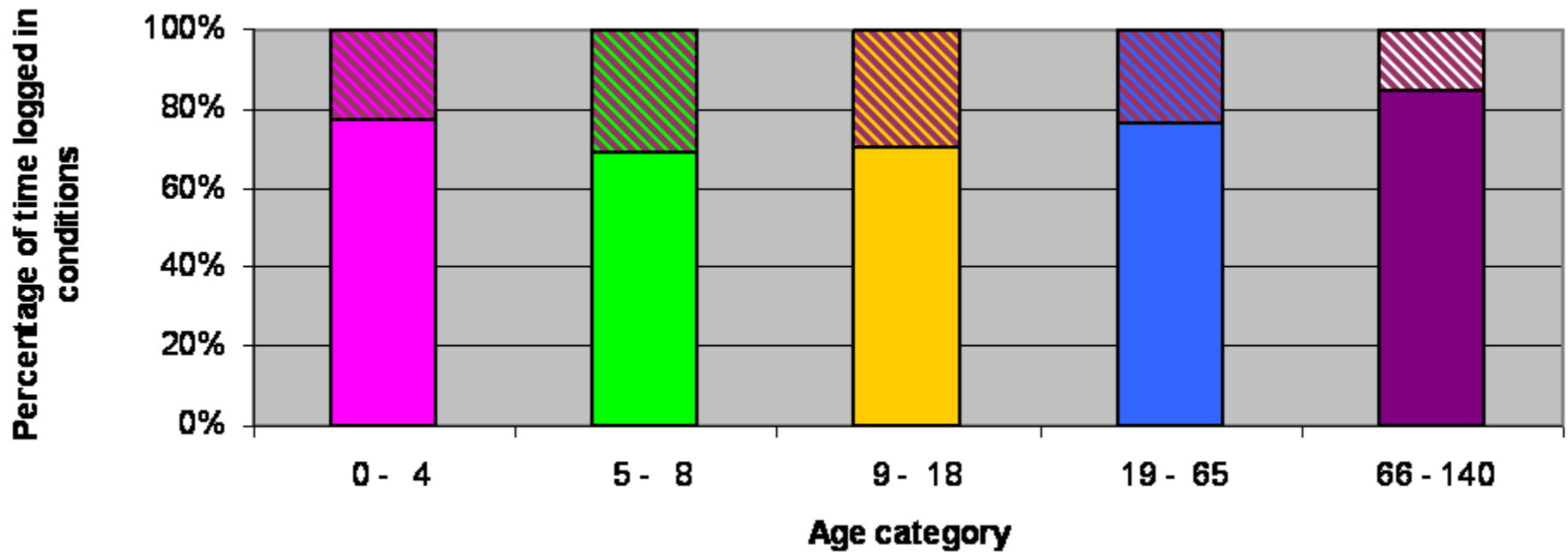
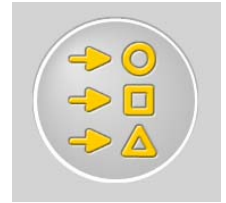
HI Usage Categories: percentiles / usage time



40%

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Listening Environment

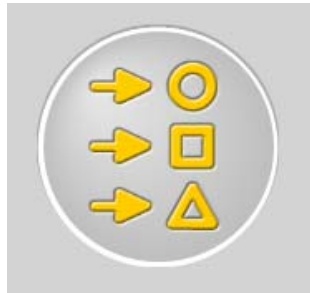


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Outline



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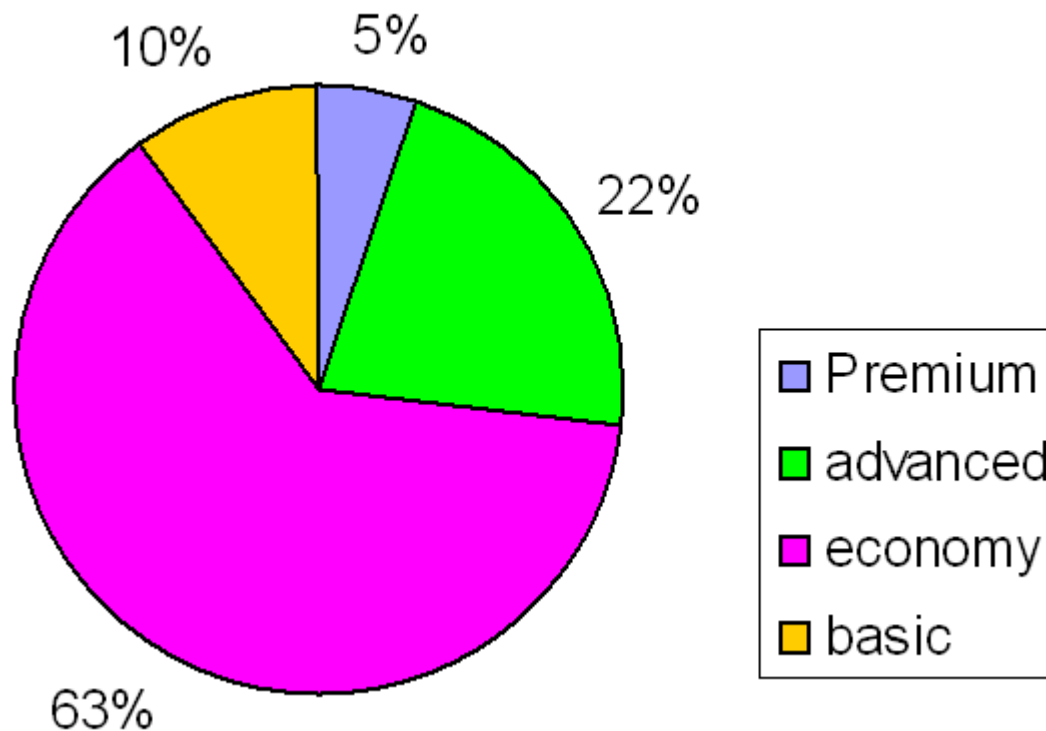


Impact



Technology Class Selected in Pediatric Fittings

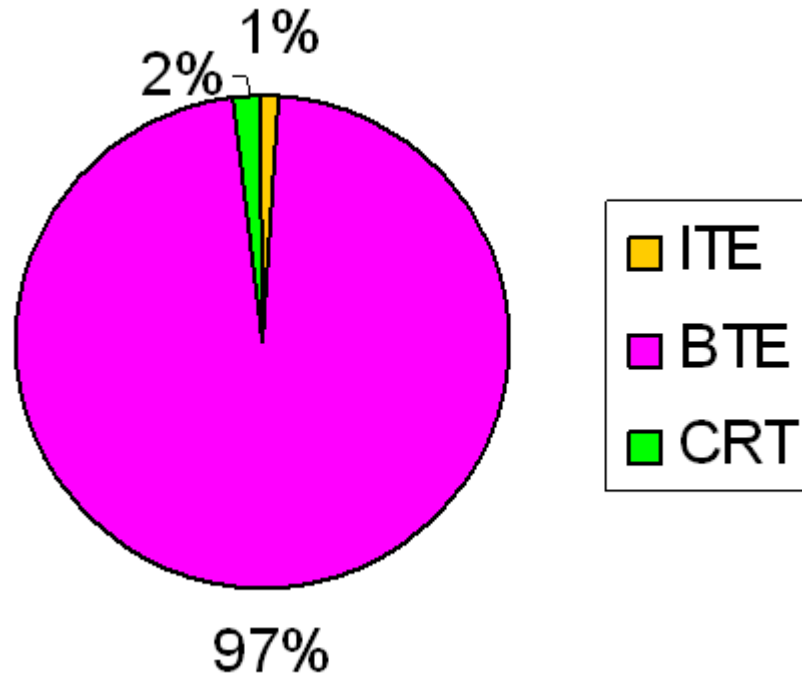
children fitted with economy 63% of time



No age related differences were seen in class selection

Style Selected

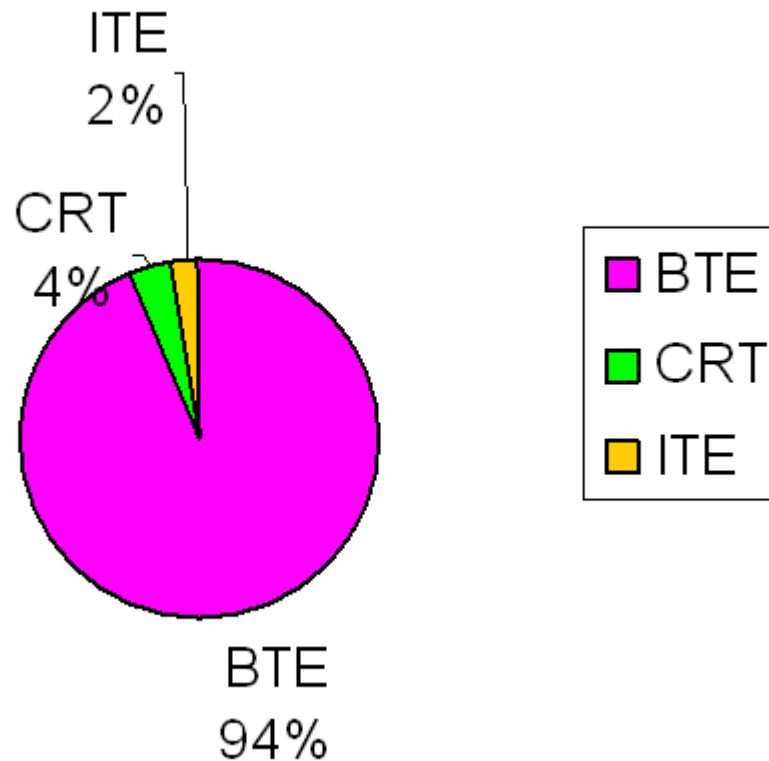
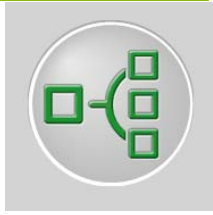
97% of children wear BTEs



Rx's BTE based on potential for growth

Style Selected

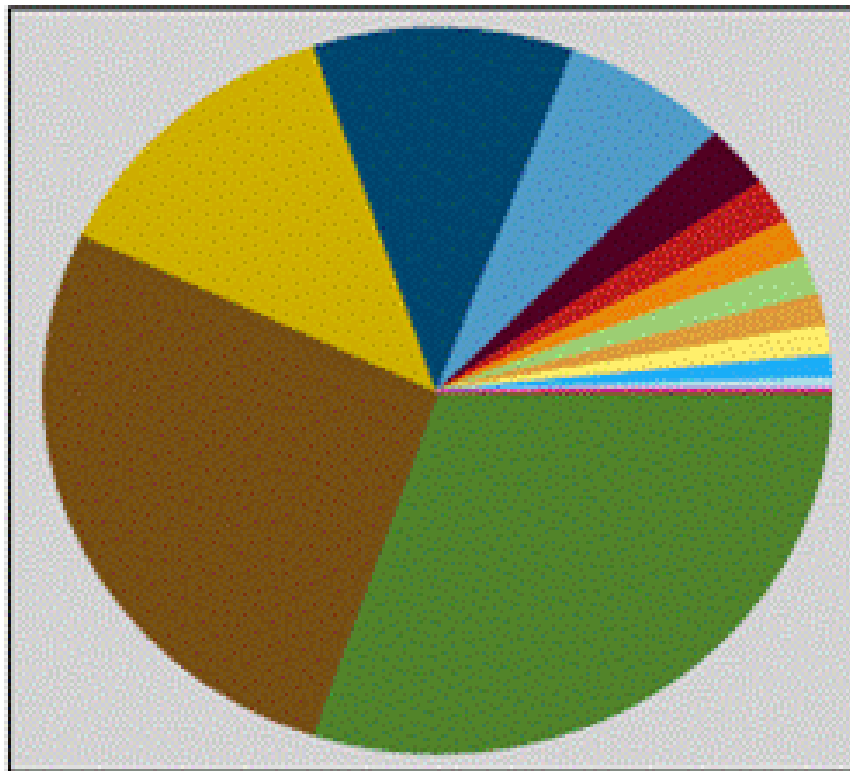
little difference with teens, preference for CRT over ITE



Custom products may be an option for older children

Accessible Programs

FM+M, automatic and calm



program name	#install.	in % (HI)
FM + Mic	3235	51.12%
SoundManager	2889	45.65%
Calm Situations	1375	21.73%
TriPilot	1144	18.08%
Speech in Noise	734	11.60%
T-Coil + Mic	299	4.73%
SoundFlow	214	3.38%
T-Coil	190	3.00%
Custom	184	2.91%
Music	151	2.39%
FM	140	2.21%
Comfort in Noise	109	1.72%
Acoustic Telephone	53	0.84%
ZoomControl	3	0.05%



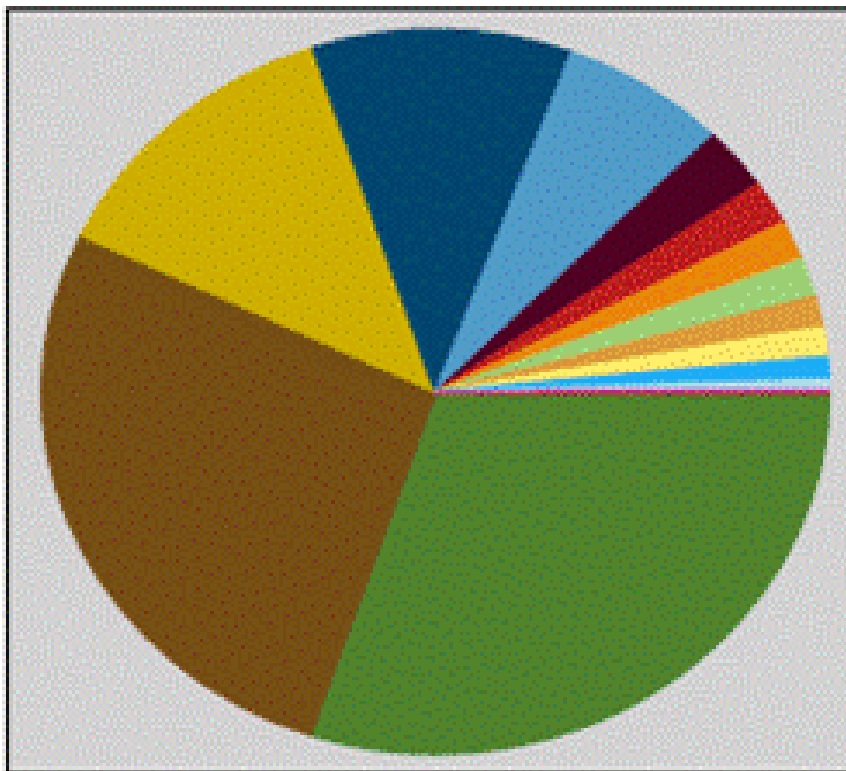
“...benefits and limitations of this technology are unknown”

- Chicago - November 8-10, 2010

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Accessible Programs

FM ready calm, automatic and calm are most common



program name	#install.	in % (HI)
FM + Mic	3235	51.12%
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"it is essential that the audiologist provide phone access even for the youngest HI wearers.."

- Chicago - November 8-10, 2010

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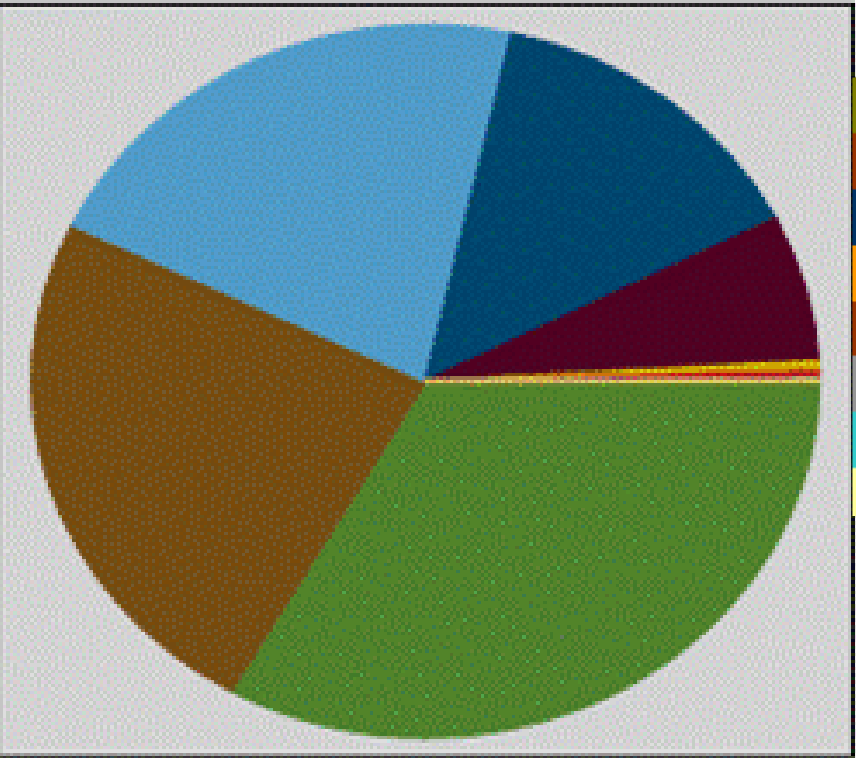
Feature guidance by AAA



- Multiple channels 100%
- Expansion 100%
- Compression 100%
- Frequency compression/transposition (5030/7813 @90%) 60%

“should be considered viable unless data becomes available to exclude”

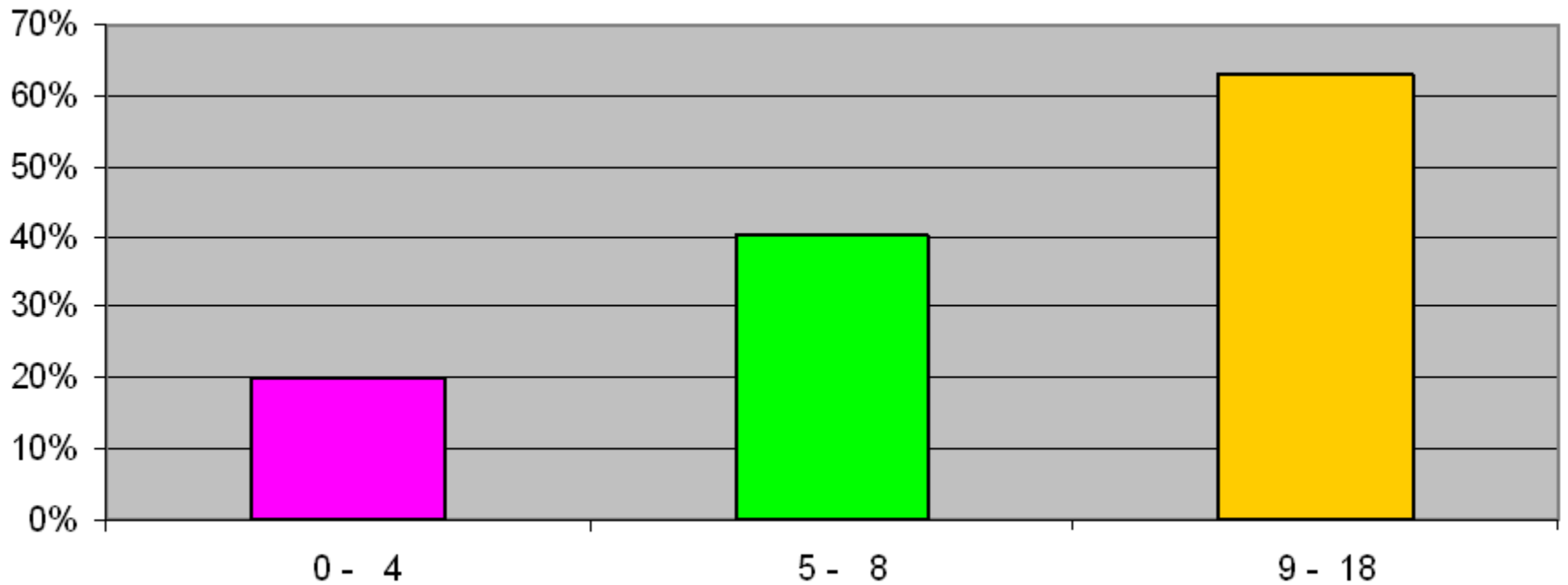
Start-up program



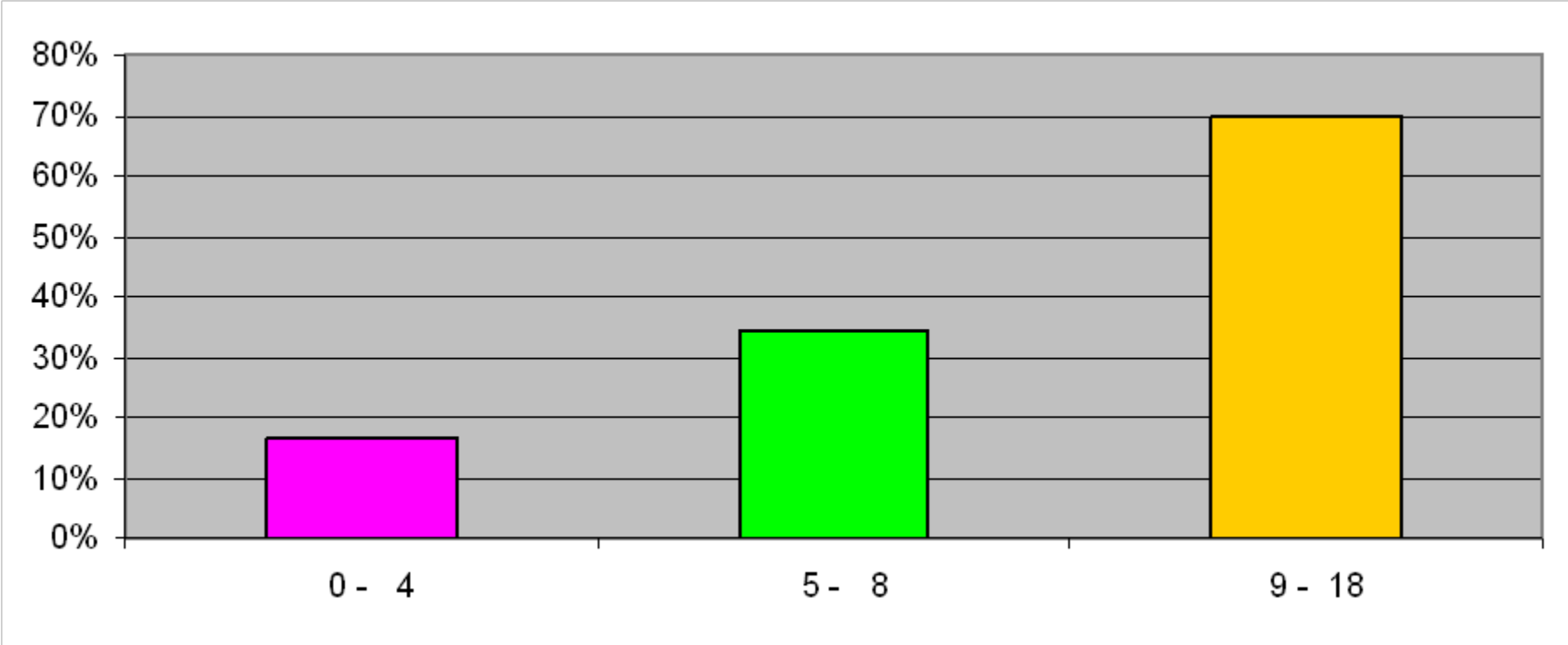
program name	#install.	in %
FM + Mic	2584	40.83%
SoundManager	2054	32.46%
TriPilot	856	13.53%
Calm Situations	608	9.61%
SoundFlow	161	2.54%
Custom	27	0.43%
Speech in Noise	21	0.33%
FM	6	0.09%

Activation of Program Button

children <9 typically not given multiple program access

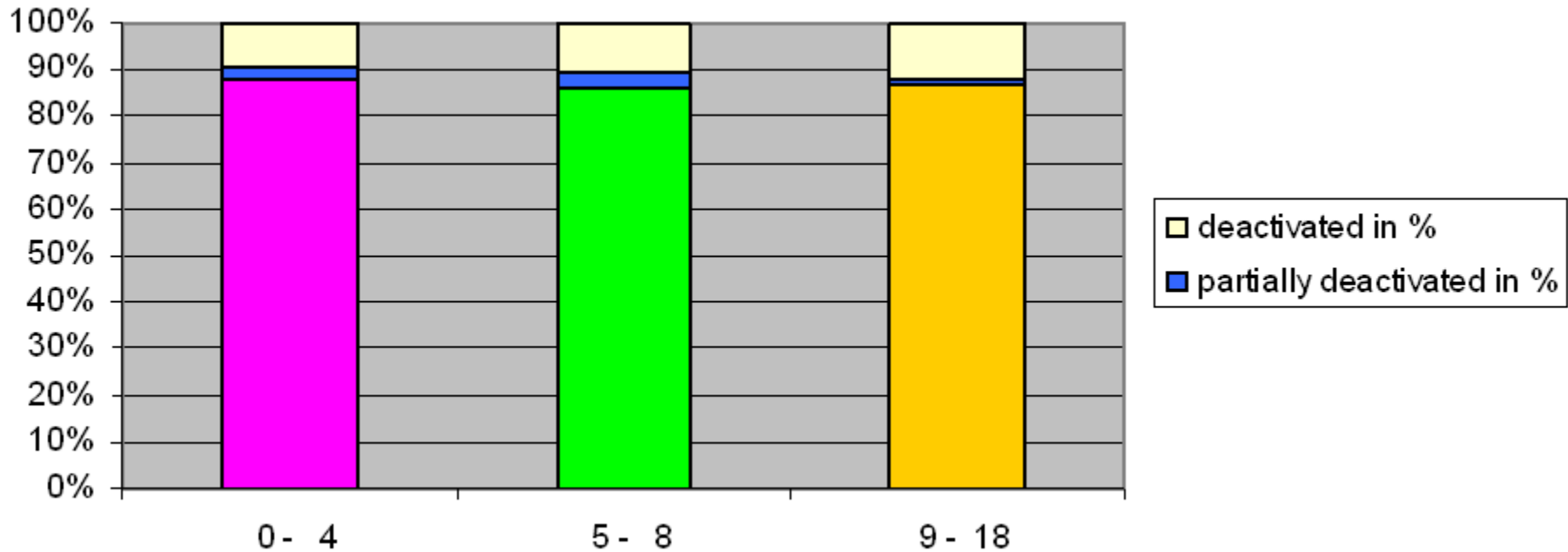


Activation of Volume Control



Sound Recover

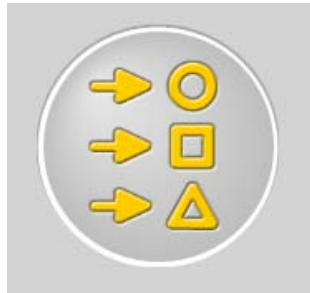
active in 90% of available time



Outline



Wearers



Usage



Features

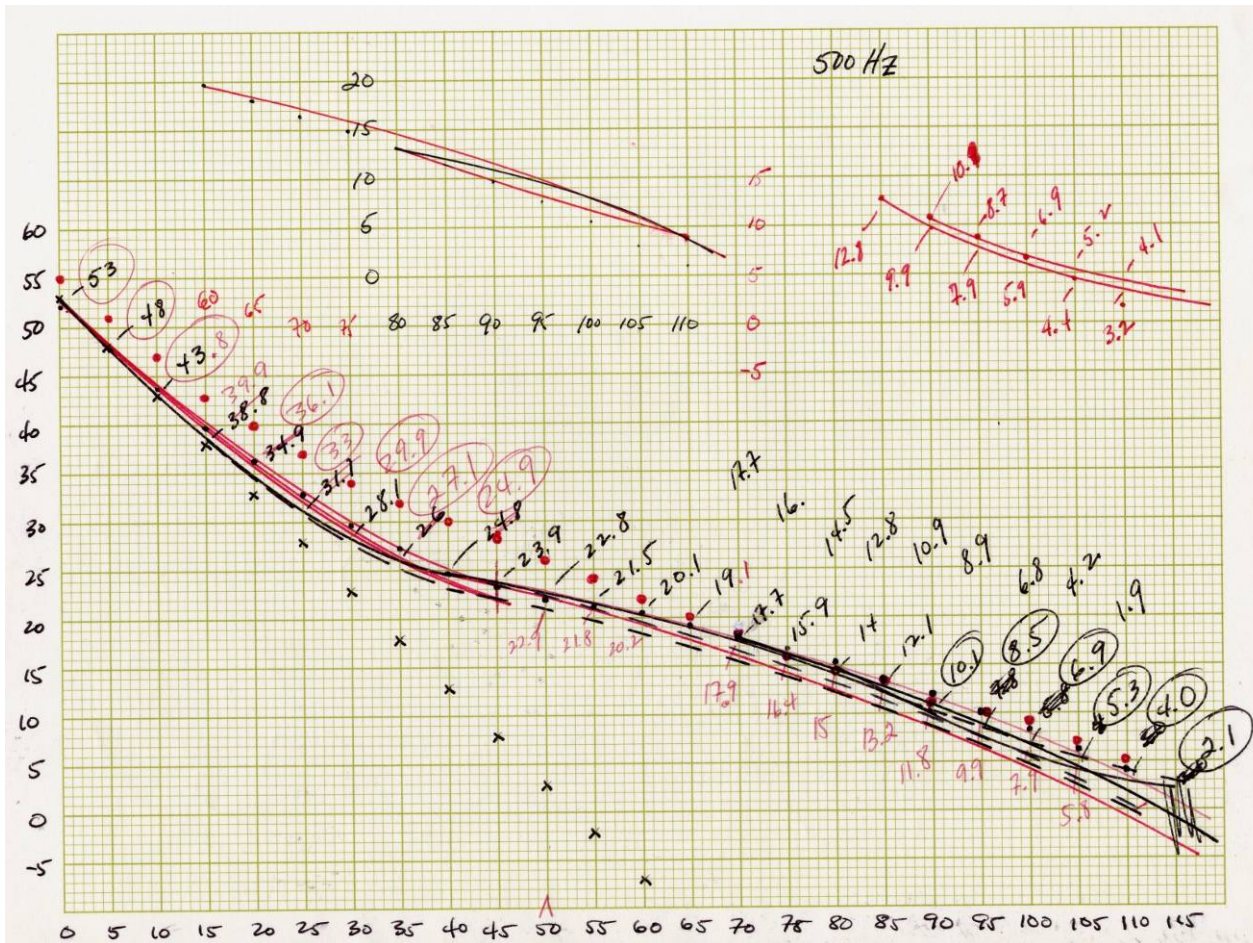


Process



Impact

1980s: DSL Algorithm Development – in the Seewald basement



1990s -

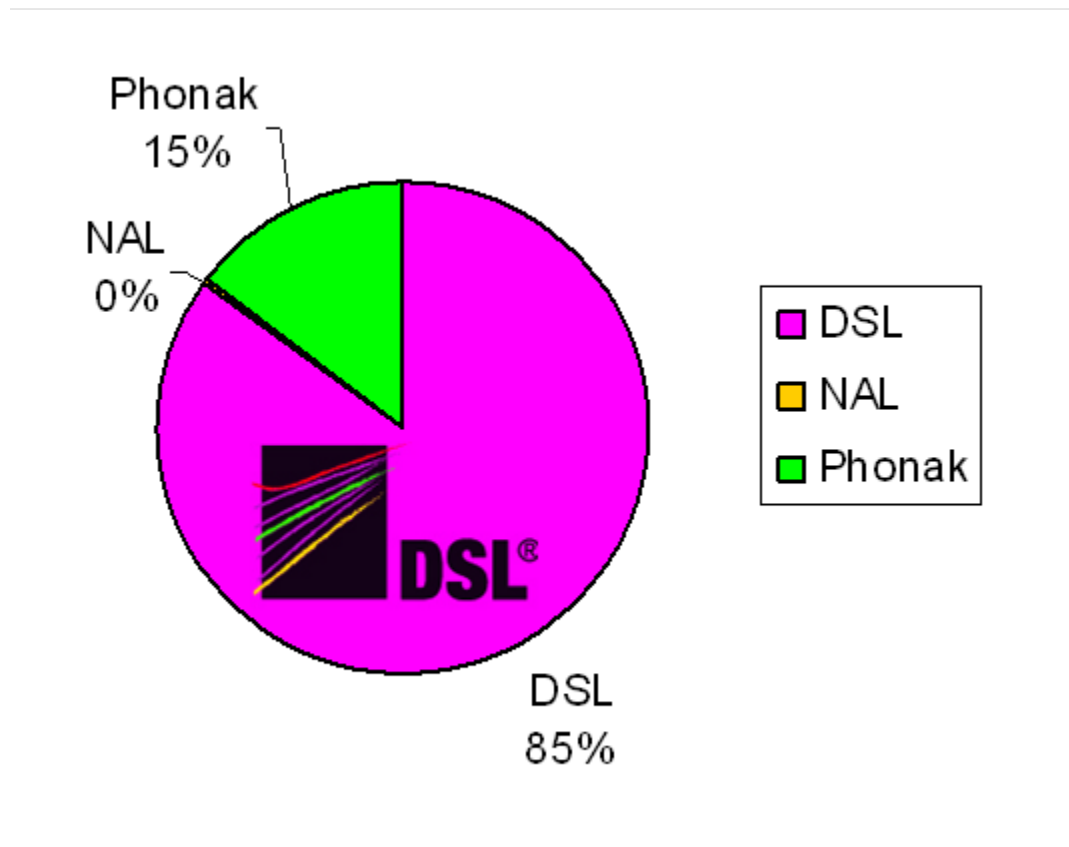


- Almost half of the respondents reported using a “personal fitting strategy” 75-100% of the time
- Greater than 90% of responding audiologists reported that they used the DSL approach 0-24% of the time

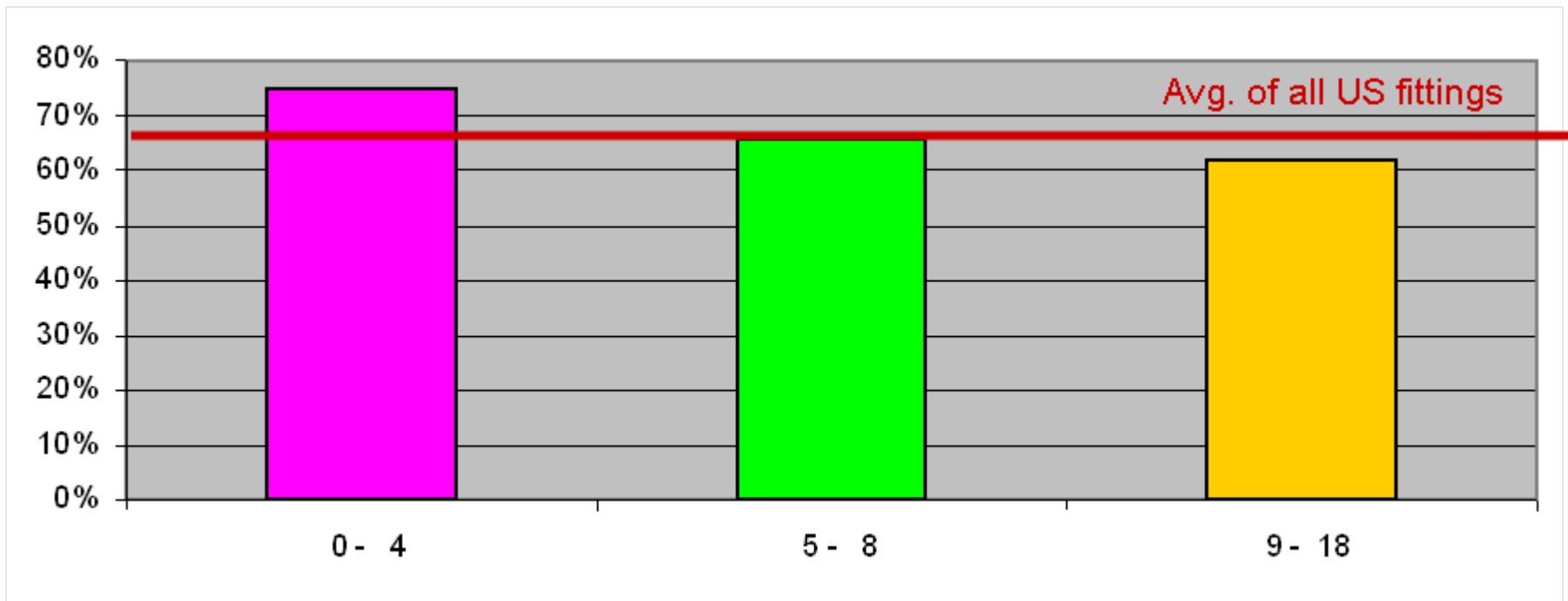
Hedley-Williams, Tharpe, Bess 1996

2010- Professor Seewald, I think we got the message!

Fitting formula chosen by percentage in pediatric fittings



Binaural fit rates



Workflow

no standard pathway through software



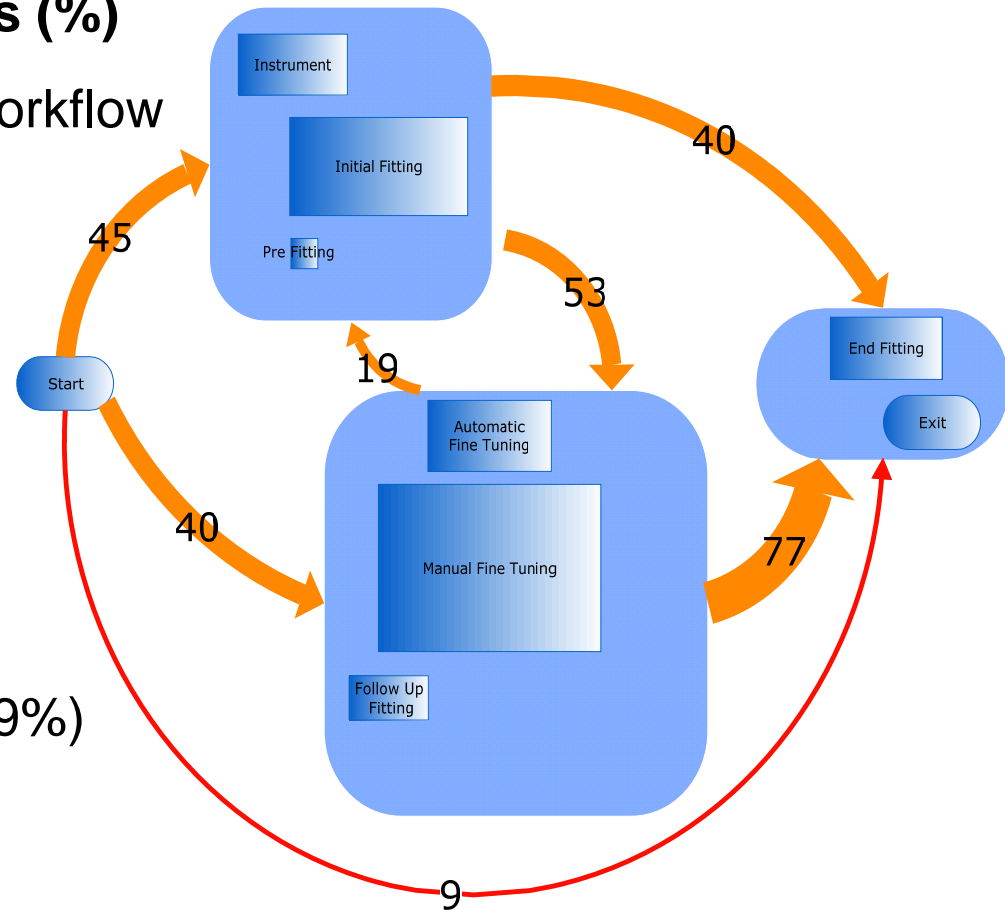
Tracking “hot domain transitions (%)”

Revealed that there is no typical workflow

- search/ try and error
- first fitting/follow up fitting
- what was the task

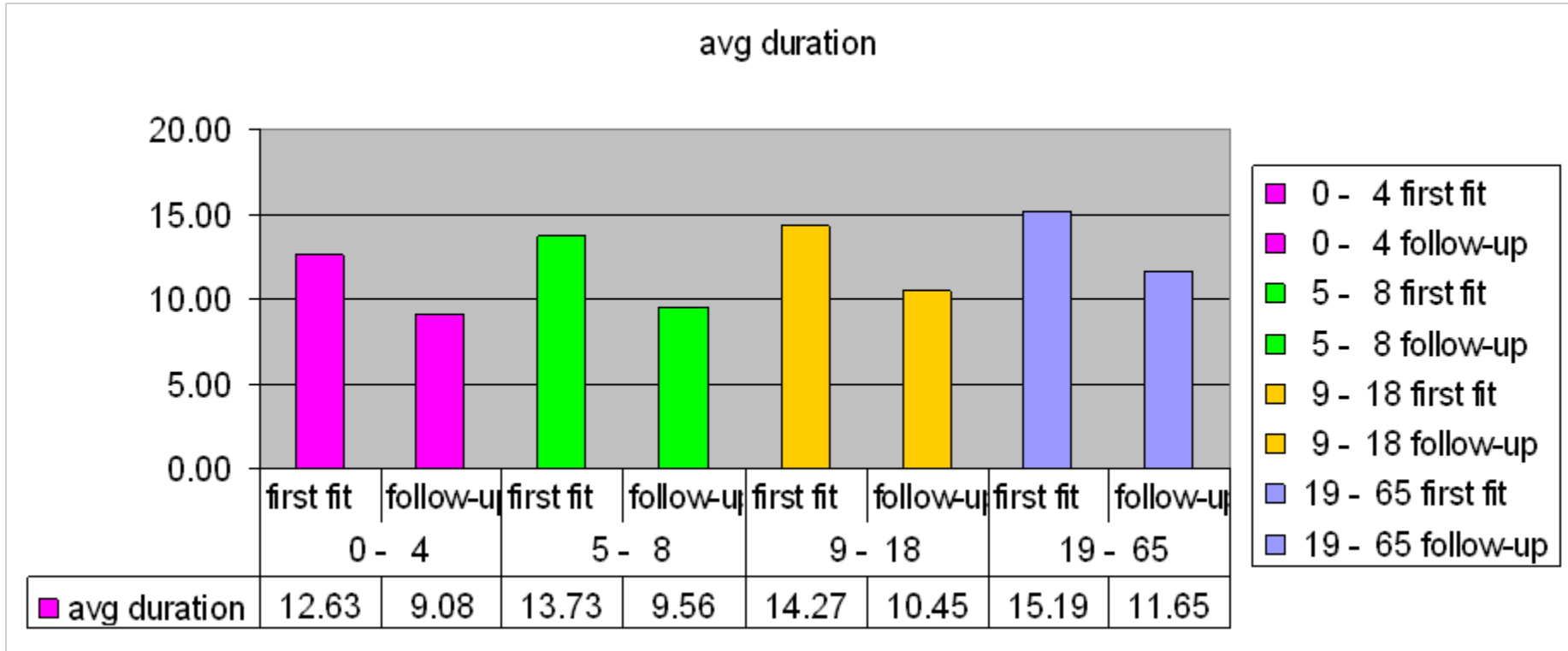
•Some typical paths

- Start ⇒ Tuning ⇒ End(34%)
- Start ⇒ Initial ⇒ Tuning ⇒ End(19%)
- Start ⇒ Initial ⇒ End(17%)
- Start ⇒ End(9%)



Hearing Instrument Programming Time

10-15 mins, follow-up about 2 mins shorter

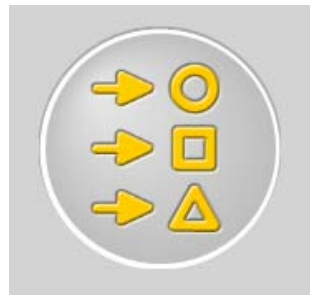


N=13,466

Outline



Wearers



Usage



Features



Process



Impact

Objective findings

- Almost 40-50 % of kids use the devices less than 4 h / day
On average, children wear hearing instruments for 5.5 hours/day
- School-aged children are in background noise for about 30% of their listening hours. Infants are in noise for about 20% of their listening hours
- The DSL formula is applied to 85% of pediatric fittings of specialty centers and schools
- Kids: typically economy class products
- AAA Guidelines fulfilled in general
 - Automatic switching used rather often
- Workflow, usage of fitting tools, fitting process
- Pediatric programming sessions take 10-15 minutes

Value of Cuper

- We don't have an APGARs for predicting performance of pediatric hearing instrument users. We continue to study performance outcomes with the intention of isolating those circumstances and actions which are most likely to product the desired results.
- As we develop a more robust evidence basis for clinical decision making, we first need to understand objectively what the variables in play are.
- Getting **Better** through a dogged analysis of the details (Gewande, 2007)
- Cuper presents an objective, large scale analysis of the application of technology and usage which can be tied to product improvement, performance outcomes

Acknowledgments

- All participating clinics and schools
- Phonak Pediatric Team- Dave Wessell, Dawn Ruley, Megan Quilter, Miranda Weidle, Deborah Edwards, Solange Anderson, Shannon Motsett, Dawn Ruley
- Phonak Headquarters Cuper project managers – Daniel Meier, Ulrike Lemke



Thank You