Allied Health Media AudiologyOnline

An Evidence-Based Approach to Reporting Hearing Aid Benefit

Presenter: Ron Leavitt, AuD
Corvallis Hearing Center

Moderator: Gus Mueller, PhD
AudiologyOnline Contributing Editor

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Hearing Aid Month

- Advances in Implantable Amplification Devices (#24716)
  Brad A. Stach, PhD
- Hearing Aid Solutions for the Speech-in-Noise Problem (#24702)
  Joshua M. Alexander, PhD
- Vanderbilt Audiology's Journal Club (#24207)
  Todd A. Ricketts, PhD
- An Evidence-Based Approach to Reporting Hearing Aid Benefit (#24714)
  Ron Leavitt, AuD
- Hearing Aid Technology Industry Roundtable (#24717)
  moderated by Catherine Palmer, PhD

An evidence-based approach to reporting hearing aid benefit

Ron J. Leavitt, Au.D.
&
Nikki Clark

There was a competition

audioscan® Best Science. Best Fit. **Challenge**

"The Best Fit Challenge" contest asked *Hearing Review* readers, "Tell us what you do to get the best hearing aid fit."

audioscan® Best Science. Best Fit. **Challenge**

Manuscripts were blind-reviewed by Gus Mueller, PhD, of Vanderbilt University; Catherine Palmer, PhD, of the University of Pittsburgh; Wayne Staab, PhD, Executive Director Am. Auditory Society; Karl Strom, Editor in Chief *Hearing Review*; and Rebecca Younk, Au.D, Director Professional Development at Amplifon USA.

This was the winning article

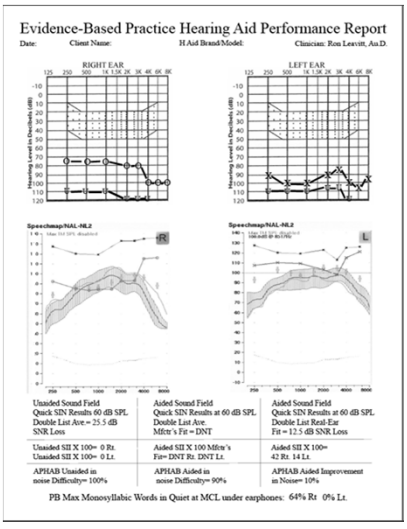
A Time-efficient Method and Form for Documenting Hearing Aid Benefit
An evidence-based approach to reporting hearing aid performance
By Ron J. Leavitt, Au.D, and Liza R. Knowles, MS, CRC

-

Ron J. Leavitt, AuD, is an audiologist who owns a practice in Corvallis, Ore, and is the founder of the Oregon Association for Better Hearing (OABH), a nonprofit consumer test group for hearing aid users. He has served as a consultant for the Teen Transition Project of the Hearing Loss Association of America (HLAA), the American Bar Association hearing loss access program, and the US Forest Service visitor center accessibility program. **Liza R. Knowles, MS, CRC**, is a longtime hearing aid user and product tester for the OABH and holds a Master's degree in Rehabilitation Counseling, with extra certification in Rehabilitation Counseling of Deaf and Hard of Hearing Adults.

The complete article can be found at: http://www.hearingreview.com/2013/11/a-time-efficient-method-and-form-for-documenting-hearing-aid-benefit/#sthash.sHH2GK2z.dpuf

Here is the form:



Evidence-Based Practice Hearing Aid Performance Report

Date: Client Name: H Aid Brand/Model: Clinician: Ron Leavitt, Au.D.

RIGHT EAR

LEFT EAR

Unaided Sound Field Quick SIN Results 60 dB SPL Double List Ave.= 25.5 dB SNR Loss	Aided Sound Field Quick SIN Results at 60 dB SPL Double List Ave. Mfctr's Fit = DNT	Aided Sound Field Quick SIN Results at 60 dB SPL Double List Real-Ear Fit = 12.5 dB SNR Loss
Unaided SII X 100= 0 Rt. Unaided SII X 100= 0 Lt.	Aided SII X 100 Mfctr's Fit= DNT Rt. DNT Lt.	Aided SII X 100= 42 Rt. 14 Lt.
APHAB Unaided in noise Difficulty= 100%	APHAB Aided in noise Difficulty= 90%	APHAB Aided Improvement in Noise= 10%

PB Max Monosyllabic Words in Quiet at MCL under earphones: 64% Rt 0% Lt.

What was our inspiration?

No third-party payer required "best-practice" proof that the hearing aids we were providing were of any benefit.

We saw this as an opportunity to teach third-party payers and hearing aid users something about our profession..

..and to show the work necessary to achieve an evidence-based hearing aid outcome.

We also hoped to achieve some other goals…

..like recognizing the growing consensus among audiologists in the following hearing-aid related areas…

- 1) The value of real-ear aided measurement [1-20];
- 2) The value of real-ear verified speech-cue audibility [1,2,3,5,6, 21-37];
- 3) The value of speech testing in noise[38-58] and
- 4) The value of scientifically validated hearing aid user surveys [59-94].

We also hoped to create a standardized platform for reporting hearing aid outcome

Rather than the current procedure for reporting hearing aid outcomes among clinics…

Clear information

By reading the form, physicians, allied health professionals, vocational rehabilitation (VR) counselors, and other concerned parties have objective and subjective measures of hearing aid performance/benefit.

Cost-efficacy:

It makes clear to third-party payers and to potential hearing aid users what they are getting for their money.

The form also supports and reinforces best audiological practices.

The form identifies those audiologists who are applying "Best Practices" as detailed by the American Academy of Audiology Task Forces on Adult and Pediatric Amplification.[1] This information is available at http://www.audiology.org/resources/documentlibrary/Documents/haguidelines.pdf for adults and for pediatric hearing aid fittings at http://www.audiology.org/resources/documentlibrary/Documents/PediatricAmplificationGuidelines.pdf.

AMERICAN ACADEMY OF AUDIOLOGY
www.audiology.org

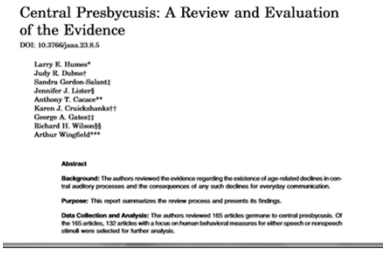
It also demonstrates user benefit in noise.

There is clear information for all concerned parties that the hearing aid wearer is functioning better with hearing aids in noise than without them.

It has been our experience that such a demonstration not only improves outcomes, but stops the user from reporting that he/she removes the hearing aid in noisy places as it provides no benefit.

Addresses APD.

This form suggests possible auditory processing problems that exist in conjunction with peripheral hearing loss as noted by Humes et al. [2]



Central Presbycusis: A Review and Evaluation of the Evidence

DOI: 10.3766/jaaa.23.8.5

Larry E. Humes*
Judy R. Dubno†
Sandra Gordon-Salant‡
Jennifer J. Lister§
Anthony T. Cacace**
Karen J. Cruickshanks††
George A. Gates‡‡
Richard H. Wilson§§
Arthur Wingfield***

Abstract

Background: The authors reviewed the evidence regarding the existence of age-related declines in central auditory processes and the consequences of any such declines for everyday communication.

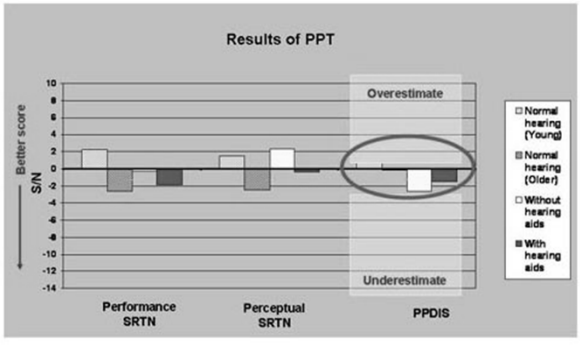
Purpose: This report summarizes the review process and presents its findings.

Data Collection and Analysis: The authors reviewed 165 articles germane to central presbycusis. Of the 165 articles, 132 articles with a focus on human behavioral measures for either speech or nonspeech stimuli were selected for further analysis.

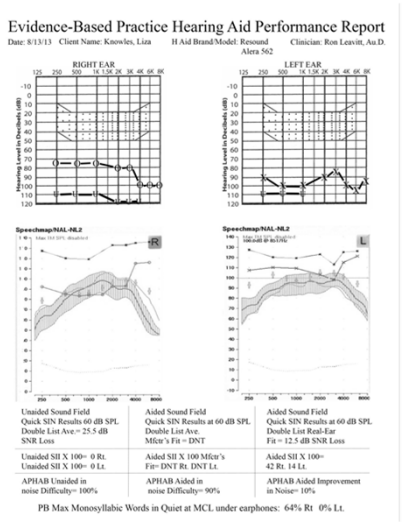
Identifies inaccurate patient perceptions.

This form identifies those patients/clients whose perception of their hearing problem is inaccurate.

For such patients/clients, Saunders and Forsline[3] and Saunders[4] have developed a counseling program that may facilitate hearing aid acceptance.



So let's talk about what's on this form…



Evidence-Based Practice Hearing Aid Performance Report

Date: 8/13/13 Client Name: Knowles, Liza H Aid Brand/Model: Resound Alera 562 Clinician: Ron Leavitt, Au.D.

RIGHT EAR

LEFT EAR

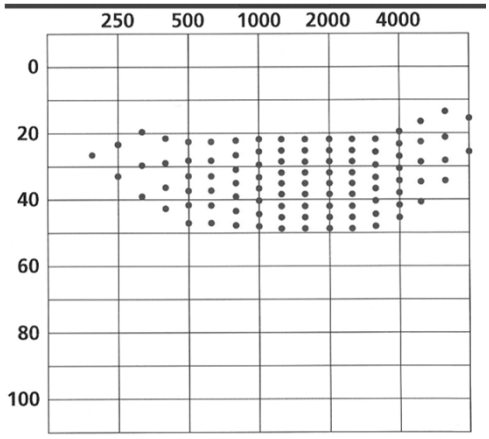
Speechmap/NAL-NL2

Unaided Sound Field Quick SIN Results 60 dB SPL Double List Ave.= 25.5 dB SNR Loss	Aided Sound Field Quick SIN Results at 60 dB SPL Double List Ave. Mfctr's Fit = DNT	Aided Sound Field Quick SIN Results at 60 dB SPL Double List Real-Ear Fit = 12.5 dB SNR Loss
Unaided SII X 100= 0 Rt. Unaided SII X 100= 0 Lt.	Aided SII X 100 Mfctr's Fit= DNT Rt. DNT Lt.	Aided SII X 100= 42 Rt. 14 Lt.
APHAB Unaided in noise Difficulty= 100%	APHAB Aided in noise Difficulty= 90%	APHAB Aided Improvement in Noise= 10%

PB Max Monosyllabic Words in Quiet at MCL under earphones: 64% Rt 0% Lt.

To make this form time efficient, several decisions were made that warrant discussion:

The audiogram templates used are based upon the "Count-the-Dots" audiogram of Killion and Mueller.[5]



We use the SII to describe the individual's hearing loss

Unaided SII X 100= 0 Rt. Unaided SII X 100= 0 Lt.	Aided SII X 100 Mfctr's Fit= DNT Rt. DNT Lt.	Aided SII X 100= 42 Rt. 14 Lt.

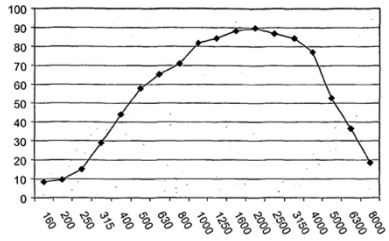


Table 2 *Values of the articulation index importance function for average speech at 1/3-octave center frequencies, taken from Pavlovic, 1987. The sum of the AI importance values is 1000.*

We believe the SII gives the most accurate global and comprehensible description of an individual's hearing loss

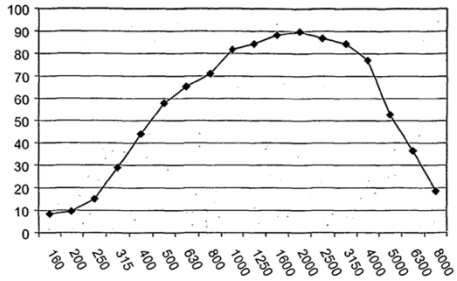
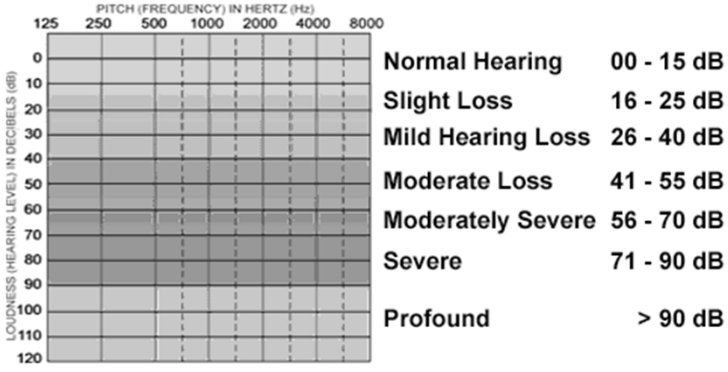


Table 2 *Values of the articulation index importance function for average speech at 1/3-octave center frequencies, taken from Pavlovic, 1987. The sum of the AI importance values is 1000.*

We prefer the SII classification to mild, moderate, severe and profound classifications

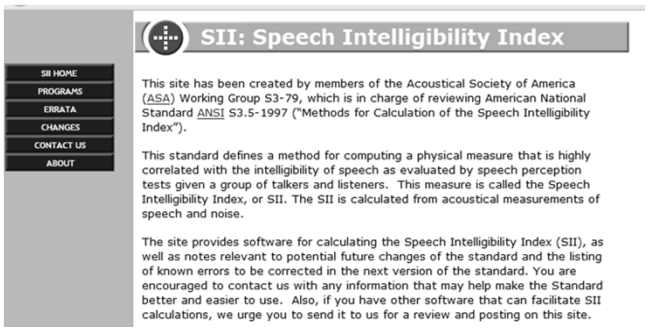


The traditional mild to profound classification systems hold little meaning to persons with hearing loss, their families or allied health professionals [110–114]…

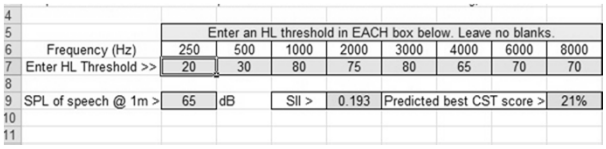
….and are riddled with mathematical, psychoacoustic errors [111]…

…and the Audioscan Axiom/Verifit and Otometrics real-ear systems compute unaided and aided SII automatically.

For those without these real-ear systems the SII can be computed using the spreadsheet from the Acoustical Society of America website at http://www.sii.to/



We report the SII value multiplied by 100 and discuss the patient's hearing loss in terms of percent of speech cues made inaudible by the hearing loss.



4									
5		Enter an HL threshold in EACH box below. Leave no blanks.							
6	Frequency (Hz)	250	500	1000	2000	3000	4000	6000	8000
7	Enter HL Threshold >>	20	30	80	75	80	65	70	70
8									
9	SPL of speech @ 1m >	65	dB	SII >	0.193	Predicted best CST score >			21%
10									
11									

Stiles et al (2012) reported children with mild to moderately severe hearing loss with aided SII less than 0.65 demonstrated greater delays in vocabulary development than children with hearing loss with better aided audibility.

Stiles D. J., Bentler R. A., Mcgregor K. K. (2012). The Speech Intelligibility Index and the pure-tone average as predictors of lexical ability in children fit with hearing aids. J Speech Lang Hear Res.

Further, research suggests the SII correlates better with a child's lexical abilities than the pure-tone average from which the hearing loss classification designators are derived.

Ear & Hearing:
November/December 2013 - Volume 34 - Issue 6 - p 701-710
doi: 10.1097/AUD.0b013e31828f1033
Research Articles

Characteristics of Hearing Aid Fittings in Infants and Young Children

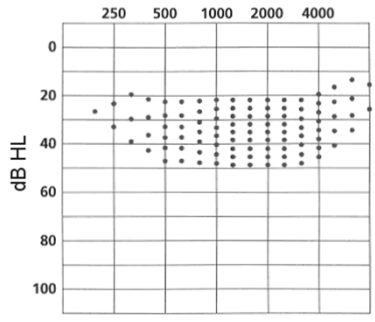
McCreery, Ryan W.[1]; Bentler, Ruth A.[2]; Roush, Patricia A.[3]

Abstract

Objectives:

Hearing aids (HAs) provide the basis for improving audibility and minimizing developmental delays in children with mild to severe hearing loss. Multiple guidelines exist to recommend methods for optimizing amplification in children, but few previous studies have reported HA fitting outcomes for a large group of children. The present study sought to evaluate the proximity of the fitting to prescriptive targets and aided audibility of speech, as well as survey data from pediatric audiologists who provided HAs for the children in the present study. Deviations from prescriptive target were predicted to have a negative impact on aided audibility. In addition, children who were fitted using verification with probe microphone measurements were expected to have smaller deviations from prescriptive targets and greater audibility than cohorts fitted without these measures.

The SII is not the same as percent hearing loss per AAO/AMA 1979



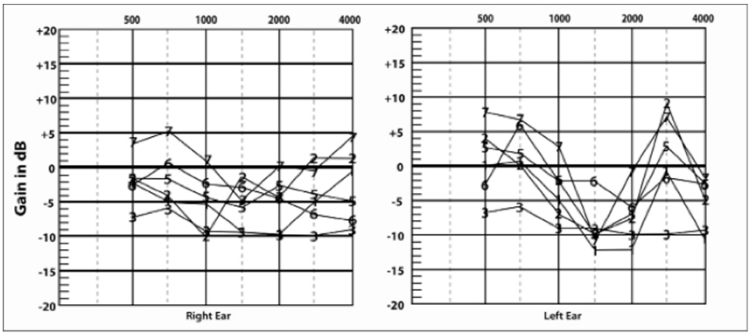
		Enter an HL threshold in EACH box below. Leave no blanks.						
Frequency (Hz)	250	500	1000	2000	3000	4000	6000	8000
Enter HL Threshold >>	20	30	80	75	80	65	70	70
SPL of speech @ 1m >	65	dB	SII >	0.193	Predicted best CST score >			21%

AAOO-1959	13.84	18.80	0 – 76.2
	15.70	20.48	0 – 76.2
NIOSH-1972	25.93	22.59	0 – 87.5
	23.85	23.86	0 – 87.5
CHABA-1975	18.52	21.25	0 – 85.5
	17.52	22.51	0 – 85.5
AMA-1979	20.84	20.07	0 – 81.2
	19.72	21.48	0 – 81.2
NIOSH-1997	40.30	30.20	0 – 100
	35.69	31.80	0 – 100
Oregon	29.79	22.52	0 – 96.5
	26.00	24.37	0 – 96.5
BE PTA (500, 1 k, 2 k)	-	-	-
BE PTA (1 k, 2 k, 4 k)	-	-	-
BE PTA (500, 1 k, 2 k, 3 k)	-	-	-
BE PTA (500, 1 k, 2 k, 4 k)	-	-	-
WE PTA (500, 1 k, 2 k)	-	-	-
WE PTA (1 k, 2 k, 4 k)	-	-	-
WE PTA (500, 1 k, 2 k, 3 k)	-	-	-
WE PTA (500, 1 k, 2 k, 4 k)	-	-	-

Data for the subgroup of participants under age 65 (n=91) are in italics. A correlations were significant ($P<.001$)

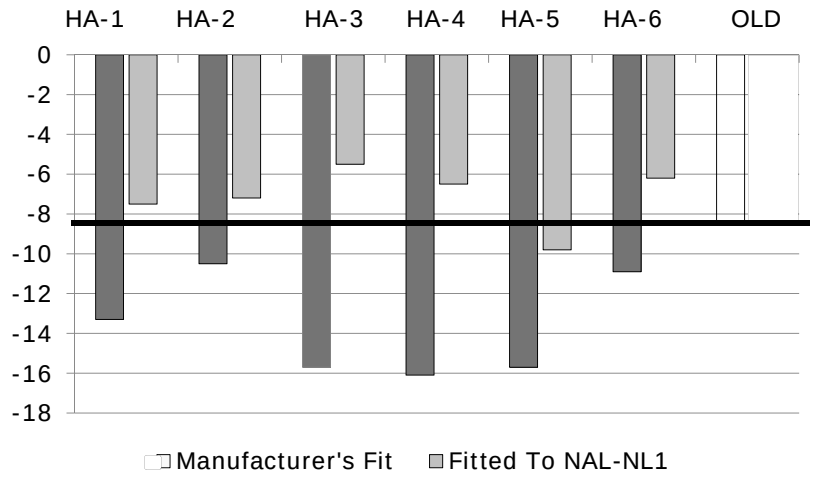
The SII is also useful when selecting appropriate amplification for people

We believe real-ear aided response is essential to optimize aided speech audibility…

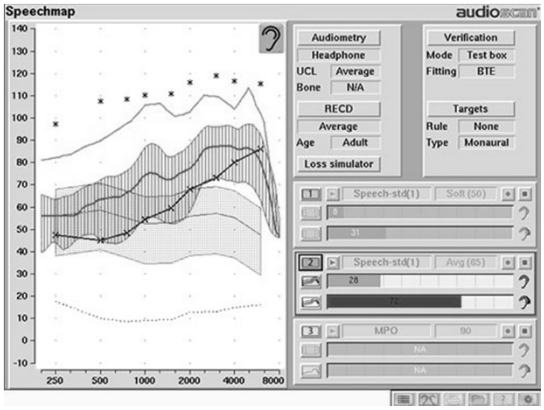


Leavitt R., & Flexer, C. (2012). The importance of audibility in successful amplification of hearing loss. *Hearing Review, 19*(13), 20-23.

..and aided speech recognition in noise.



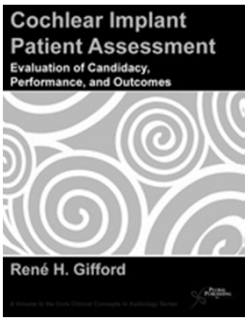
The real-ear aided response graphics are those obtained from Audioscan Verifit and Axiom systems.



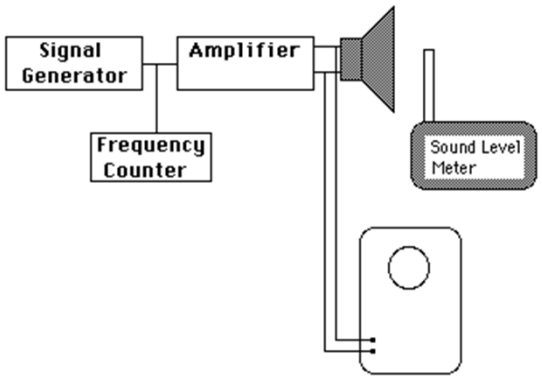
We also use the Quick Speech in Noise Test (Q-SIN).

Unaided Sound Field	Aided Sound Field	Aided Sound Field
Quick SIN Results 60 dB SPL	Quick SIN Results at 60 dB SPL	Quick SIN Results at 60 dB SPL
Double List Ave.= 25.5 dB	Double List Ave.	Double List Real-Ear
SNR Loss	Mfctr's Fit = DNT	Fit = 12.5 dB SNR Loss

We recommend a 60 dB SPL output for sound field Quick SIN testing consistent with Dr Gifford's recommendations for candidacy evaluation for CI USERS..



We expect this 60 dB SPL sound field presentation level will become more standardized in the near future.



Consistent with data from McArdle and Wilson double lists should be used.

Further only lists 1, 2, 6, 8, 10, 11, 12, 15, and 17 of the Quick SIN are equivalent.

For children, the BKB-SIN test should be substituted for the Q-SIN. Ng et al reported successfully using their adapted BKB-SIN on children as young as 5 years of age [47].

However, the authors noted the traditional BKB-SIN norms did not apply and the data should be used only on a case-by-case basis until validated norms become available.

Table 2 BKB-SIN Test Norms (List Pairs 1-8)

	Adults		Children by Age		
	Normal Hearing	CI Users	Ages 5-6	Ages 7-10	Ages 11-14
Mean SNR-50	-2.5	*	3.5	0.8	-0.9
Standard Deviation	0.8	1.6	2.0	1.2	1.1

*Compare to normal-hearing adult value to determine SNR Loss.

We recognize numerous speech-in-noise (SIN) tests exist, and several are validated in the literature. We find the Quick SIN time-efficient.

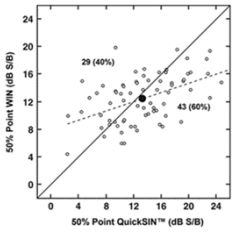


Figure 2.
Bivariate plot of 50% points (decibel speech-to-babble [S/B] ratio) on Words in Noise (WIN) test (ordinate) and Quick Speech-in-Noise Test (QuickSIN™) (abscissa). Diagonal line represents equal performance, and larger filled symbol (●) indicates mean-datum point. Dashed line is the linear regression fit to data. Numbers within the plot are number of performances (percent) above and below line of equal performance.

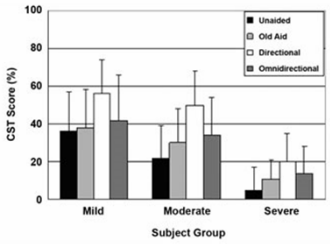


Figure 9.
Connected Speech Test (CST).

Further Wilson, McCardle and Smith found the Q-SIN and WIN were equivalent, but that the HINT and BKB SIN were not as sensitive to speech comprehension in noise problems.

J Speech Lang Hear Res. 2007 Aug;50(4):844-56.

An Evaluation of the BKB-SIN, HINT, QuickSIN, and WIN Materials on Listeners With Normal Hearing and Listeners With Hearing Loss.

Wilson RH[1], McArdle RA, Smith SL.

⊕ Author information

Abstract

PURPOSE: The purpose of this study was to examine in listeners with normal hearing and listeners with sensorineural hearing loss the within- and between-group differences obtained with 4 commonly available speech-in-noise protocols.

METHOD: Recognition performances by 24 listeners with normal hearing and 72 listeners with sensorineural hearing loss were compared for 4 speech-in-noise protocols that varied with respect to the amount of contextual cues conveyed in the target signal. The protocols studied included the Bamford-Kowal-Bench Speech-in-Noise Test (BKB-SIN; Etymôtic Research, 2005; J. Bench, A. Kowal, & J. Bamford, 1979; P. Niquette et al., 2003), the Quick Speech-in-Noise Test (QuickSIN; M. C. Killion, P. A. Niquette, G. I. Gudmundsen, L. J. Revit, & S. Banerjee, 2004), and the Words-in-Noise test (WIN; R. H. Wilson, 2003; R. H. Wilson & C. A. Burks, 2005), each of which used multitalker babble and a modified method of constants, as well as the Hearing in Noise Test (HINT; M. Nilsson, S. Soli, & J. Sullivan, 1994), which used speech-spectrum noise and an adaptive psychophysical procedure.

RESULTS: The 50% points for the listeners with normal hearing were in the 1- to 4-dB signal-to-babble ratio (S/B) range and for the listeners with hearing loss in the 5- to 14-dB S/B range. Separation between groups was least with the BKB-SIN and HINT (4-6 dB) and most with the QuickSIN and WIN (8-10 dB).

CONCLUSION: The QuickSIN and WIN materials are more sensitive measures of recognition performance in background noise than are the BKB-SIN and HINT materials.

..and Birath and Cox concluded…

Given that there is essentially no difference between the QSIN and the WIN as related to difficulty of administration or scoring, amount of time needed for administration, or in obtained results, it makes no difference which one you use with a hearing aid candidate in the age range of those included in this project.

Birath, AL and Cox RM (2006). Comparison of Two Speech-in-Noise Tests for Younger and Older Listeners. HARL Report, Memphis University

Further Grant and Walden[42] noted, the Quick SIN has some (but not perfect) predictive ability in "identifying a patient's suprathreshold deficit and its impact on understanding speech-in-noise."

We use data from the Q-SIN to guide and support aural rehabilitation recommendations

Specifically, when adult hearing aid user's 2-list averaged Quick SIN scores are 10.5 dB or worse, we recommend hearing aids with remote microphone capabilities…

…as data from Olsen show that many listening environments have a 10 dB signal-to-noise ratio (SNR) or worse.

TABLE 3. Mean speech and background levels in dBA in hospitals and department stores. Standard deviations in ( ).

	Background Noise	Speech 1 m	Speech Conversation Distance	
Hosp. Patient's Room	45 (2)	56 (2)	55 (1)	+11
Hosp. Nurses' Station	52 (5)	56 (3)	57 (4)	+4
Department Store	54 (3)	58 (3)	61 (3)	+4

Note. All values are rounded to the nearest dB. From Table II in Pearsons et al. (1977).

…more from Olsen (1998)..

TABLE 2. Mean speech and background levels in dBA, indoors and outdoors, for urban and suburban homes. Standard deviations in ( ).

	Background Noise		Speech 1 m		Speech Conversation Distance	
	Urban	Suburban	Urban	Suburban	Urban	Suburban
Outside	61 (5	48 (4)	65 (4)	55 (5)	66 (4)	5 (5)
Inside	48 (2)	41 (3)	57	55 (5)	57 (6)	55 (5)

+9

Note. All values are rounded to the nearest dB. From Table II in Pearsons et al. (1977).

TABLE 4. Mean speech and background levels in dBA in trains and airplanes. Standard deviations in ( ).

	Background Noise	Speech 1 m	Speech Conversation Distance	
Train	74 (3)	66 (2)	73 (3)	-8
Airplanes	79 (3)	68 (4)	77 (4)	-11

Note. All values are rounded to the nearest dB. From Table II in Pearsons et al. (1977).

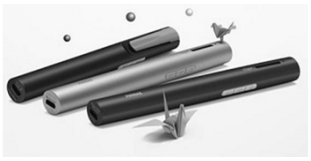
For school-aged children, this criterion should be set even lower according to data from several studies[96–102] showing classroom SNRs as poor as −6 to −3 dB.

TABLE 3. Mean child group noise intensities (dBA) in 4 elementary school classrooms when class was in session. Also, mean unamplified and amplified teacher speech intensity values are reported. The SNR (in dB) of the teacher's voice as compared to the average intensity of the child group noise in each of the 4 classrooms for both the unamplified and the amplified conditions are also shown. Standard deviations of each mean are reported in parentheses next to their corresponding mean value.

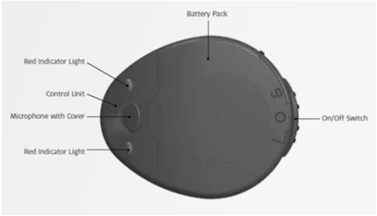
Measurement	*Classroom 1*	*Classroom 2*	*Classroom 3*	*Classroom 4*
Child group noise average (dBA)	58 (4.2)	58 (6.1)	59 (4.9)	64 (5.9)
Unamplified mean teacher speech (dBA)	61 (3.0)	62 (6.5)	65 (4.9)	65 (3.4)
Amplified mean teacher speech (dBA)	71 (4.1)	71 (3.5)	70 (4.6)	79 (5.1)
Unamplified SNR (dB)	+3	+4	+6	+1

Larsen, JB and Blair, JC (2008). The Effect of Classroom Amplification on the Signal-to-Noise Ratio in Classrooms While Class Is in Session. *Language, Speech, and Hearing Services in Schools*, 39, 451-460.

In addition to identifying those who require a remote microphone…



…this form also identifies those who need other types of assistance such as a cochlear implant, real-time remote captioning, or other auditory-visual enhancement technology to be functional in the workplace and in family and social environments

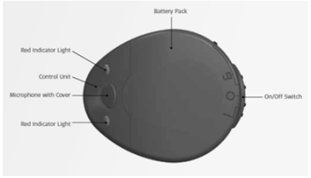


Recall how rarely there exists a 20.5 dB SNR in the real world ..

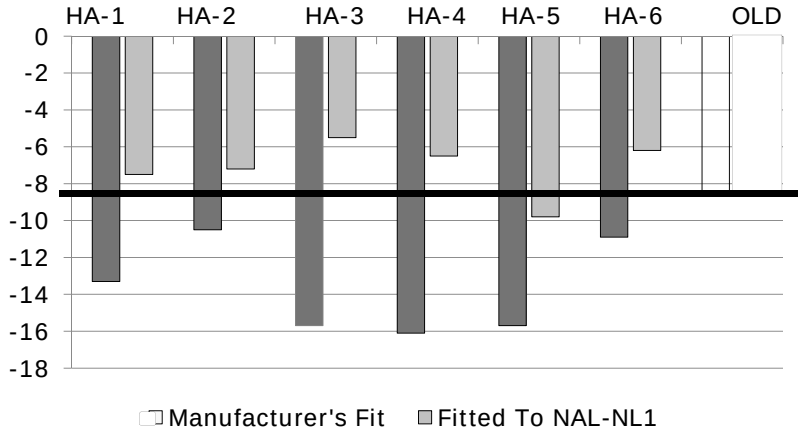
Recall the academic/language difficulties experienced by children who cannot achieve an aided SII of .65 at 60 dB SPL

Recall the limitations imposed by a corner audiogram for any hearing aid fitting strategy..

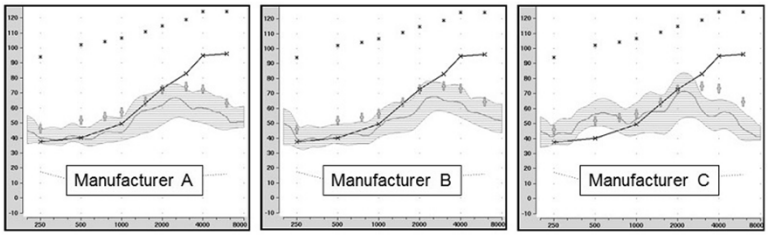
For such patients we must look beyond hearing aids to CI



We continue to collect data on the performance differences between manufacturer's best-fit and real-ear aided data in terms of both Q-SIN scores and aided SII values.

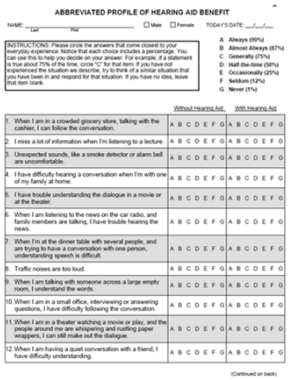


However, when pressed for time, we omit the manufacturer's best-fit information on this form as research has shown manufacturer's best-fit algorithms generally provide lower aided SII values.



From Stangl, 2014

We use the unaided Abbreviated Profile of Hearing Aid Benefit (APHAB) to get a sense of the individual's self-perception of hearing loss.



ABBREVIATED PROFILE OF HEARING AID BENEFIT

NAME: _____ (Last, First) ☐ Male ☐ Female TODAY'S DATE: __/__/__

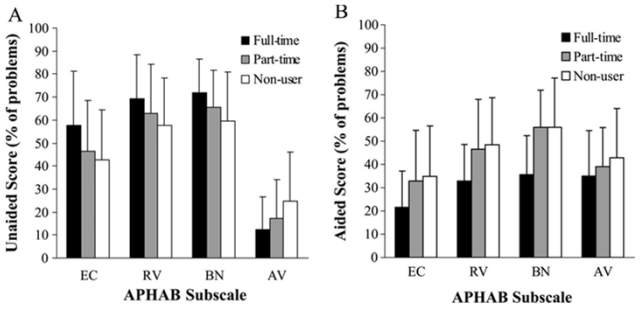
INSTRUCTIONS: Please circle the answers that come closest to your everyday experience. Notice that each choice includes a percentage. You can use this to help you decide on your answer. For example, if a statement is true about 75% of the time, circle "C" for that item. If you have not experienced the situation we describe, try to think of a similar situation that you have been in and respond for that situation. If you have no idea, leave that item blank.

A Always (99%)
B Almost Always (87%)
C Generally (75%)
D Half-the-time (50%)
E Occasionally (25%)
F Seldom (12%)
G Never (1%)

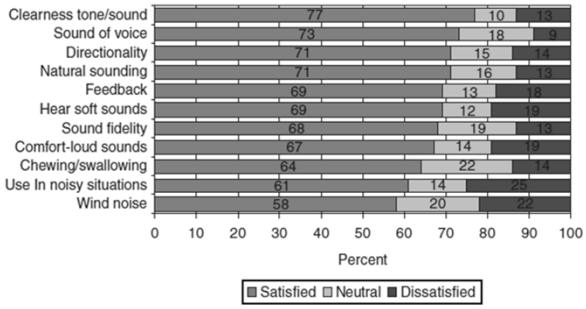
	Without Hearing Aid	With Hearing Aid
1. When I am in a crowded grocery store, talking with the cashier, I can follow the conversation.	A B C D E F G	A B C D E F G
2. I miss a lot of information when I'm listening to a lecture.	A B C D E F G	A B C D E F G
3. Unexpected sounds, like a smoke detector or alarm bell are uncomfortable.	A B C D E F G	A B C D E F G
4. I have difficulty hearing a conversation when I'm with one of my family at home.	A B C D E F G	A B C D E F G
5. I have trouble understanding the dialogue in a movie or at the theater.	A B C D E F G	A B C D E F G
6. When I am listening to the news on the car radio, and family members are talking, I have trouble hearing the news.	A B C D E F G	A B C D E F G
7. When I'm at the dinner table with several people, and am trying to have a conversation with one person, understanding speech is difficult.	A B C D E F G	A B C D E F G
8. Traffic noises are too loud.	A B C D E F G	A B C D E F G
9. When I am talking with someone across a large empty room, I understand the words.	A B C D E F G	A B C D E F G
10. When I am in a small office, interviewing or answering questions, I have difficulty following the conversation.	A B C D E F G	A B C D E F G
11. When I am in a theater watching a movie or play, and the people around me are whispering and rustling paper wrappers, I can still make out the dialogue.	A B C D E F G	A B C D E F G
12. When I am having a quiet conversation with a friend, I have difficulty understanding.	A B C D E F G	A B C D E F G

(Continued on back)

We omitted the aversive (AV), reverberation (RV), and ease-of-communication (EC) data.



We believe the unaided vs aided background-noise data will suffice as studies continue to show that word recognition in noise is a major concern of people with hearing loss.



Kochkin S. (2010). MarkeTrak VIII: Consumer satisfaction with hearing aids is slowly increasing. *Hearing J.* 63(1):19-32.

While we recognize there are numerous other user-based surveys available, we continue to use the APHAB in part due to its near universal accessibility to clinicians using Noah software.

Noah 4

Further, we have found the unaided APHAB gives valuable information about the individual's perception of hearing difficulty.

For example, a person who scores a 25.5 dB SNR loss on the unaided sound field Quick SIN at 60 dB SPL while reporting virtually no unaided listening difficulty in noise on the APHAB, presents a noteworthy counseling challenge to the clinician.

This difference in perception can be highlighted at times by having the patient's spouse complete the APHAB based on spousal observations.

We also report PB-Max word recognition scores in quiet at MCL under earphones..

PB Max Monosyllabic Words in Quiet at MCL under earphones: 64% Rt 0% Lt.

By comparing residual hearing to word recognition in quiet to word recognition in noise we may see indication of apd…

To quote Dr. Humes and colleagues…

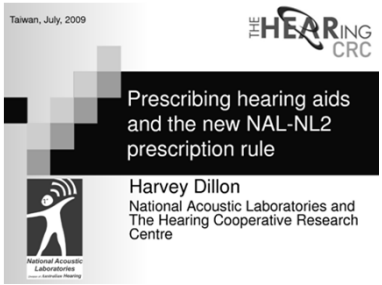
"Those individuals of a certain age, having a specified amount of hearing loss and, perhaps, a specified level of cognitive function, who perform "worse than expected" would likely receive the same intervention whether the factors underlying the poor performance were peripheral, central auditory, or cognitive in nature."

To again quotes Humes et al (2012)

"Perhaps using reliable measures that incorporate broadband speech stimuli in speech competition is a desirable approach precisely because these measures are subject to peripheral, central auditory, and cognitive influences on performance."

caveats….

We do not expect that the high aided SII values obtained from an NAL NL-1/2 or DSL I/O fitting will consistently result in high aided performance ratings on the APHAB,



..nor will the hearing aid user consistently report they are satisfied with the hearing aids

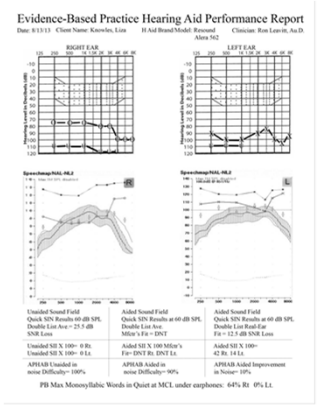
As Cox, Alexander, and Gray [69] have noted, some hearing aid users may "continue to experience unpleasant emotions, even with effective hearing aid treatments, because (for some individuals) their psychological discomfort is dispositional as well as situational."

We also do not expect that Quick SIN scores showing excellent aided function in noise will necessarily produce high satisfaction scores on the aided APHAB.

As Cox, Alexander, and Xu [70] noted, "There are no existing questionnaires that are known to be primarily device-oriented and relatively free of personality influence.

While we recognize that Cox and co-workers are developing a Device Oriented Subjective Outcome (DOSO) Scale for hearing aid performance that appears relatively free of confounding personality variables, we find the user's perception of unaided and aided difficulty as measured by the APHAB to be valuable as noted above.

In the interim, this form has provided important information in several areas as discussed above….


Evidence-Based Practice Hearing Aid Performance Report

Date: 8/13/13 Client Name: Knowles, Lizz H Aid Brand/Model: Resound Alera 562 Clinician: Ron Leavitt, Au.D.

RIGHT EAR

LEFT EAR

Unaided Sound Field Quick SIN Results 60 dB SPL Double List Ave = 25.5 dB SNR Loss	Aided Sound Field Quick SIN Results at 60 dB SPL Double List Ave. Mlitr's Fit = DNT	Aided Sound Field Quick SIN Results at 60 dB SPL Double List Read-Ear Fit = 12.5 dB SNR Loss
Unaided SII X 100= 0 Rt. Unaided SII X 100= 0 Lt.	Aided SII X 100 Mlitr's Fit= DNT Rt. DNT Lt.	Aided SII X 100= 42 Rt. 14 Lt.
APHAB Unaided in noise Difficulty= 100%	APHAB Aided in noise Difficulty= 90%	APHAB Aided Improvement in Noise= 10%

PB Max Monosyllabic Words in Quiet at MCL under earphones: 64% Rt 0% Lt.

We offer this form in its current iteration to audiologists, VR counselors, and other professionals who need a time-efficient method for reporting results that conform to many of the "Best Amplification Fitting Practices" for children and adults as outlined by the American Academy of Audiology.

AMERICAN ACADEMY OF AUDIOLOGY
www.audiology.org

We have found this form to be a convenient shorthand system for illuminating hearing aid benefit, counseling needs, and suspected central auditory problems.

This form will continue to evolve as published research highlights new areas of relevant data.

Allied Health Media AudiologyOnline

Hearing Aid Month

- Advances in Implantable Amplification Devices (#24716)
  Brad A. Stach, PhD
- Hearing Aid Solutions for the Speech-in-Noise Problem (#24702)
  Joshua M. Alexander, PhD
- Vanderbilt Audiology's Journal Club (#24207)
  Todd A. Ricketts, PhD
- An Evidence-Based Approach to Reporting Hearing Aid Benefit (#24714)
  Ron Leavitt, AuD
- Hearing Aid Technology Industry Roundtable (#24717)
  moderated by Catherine Palmer, PhD