

1. This document is created for accessibility and is intended to be a supplemental resource. If you would like to print a hard copy of this document, please follow the general instructions below to print multiple slides on a single page or in black and white.
2. This handout is for reference only. Non-essential images have been removed for your convenience. Any links included in the handout are current at the time of the live webinar, but are subject to change and may not be current at a later date.
3. Copyright: Images used in this course are used in compliance with copyright laws and where required, permission has been secured to use the images in this course. All use of these images outside of this course may be in violation of copyright laws and is strictly prohibited.
4. Social Workers: For additional information regarding standards and indicators for cultural competence, please review the NASW resource: Standards and Indicators for [Cultural Competence in Social Work Practice](#)
5. Need Help? Select the “Help” option in the member dashboard to access FAQs or contact us.

How to print Handouts

On a Mac

- Open PDF in Preview
- Click File
- Click Print
- Click dropdown menu on the right “preview”
- Click layout
- Choose # of pages per sheet from dropdown menu
- Checkmark Black & White if wanted.

On a PC

- Open PDF
- Click Print
- Choose # of pages per sheet from dropdown menu
- Choose Black and White from “Color” dropdown

No part of the materials available through the continued.com site may be copied, photocopied, reproduced, translated or reduced to any electronic medium or machine-readable form, in whole or in part, without prior written consent of continued.com, LLC. Any other reproduction in any form without such written permission is prohibited. All materials contained on this site are protected by United States copyright law and may not be reproduced, distributed, transmitted, displayed, published or broadcast without the prior written permission of continued.com, LLC. Users must not access or use for any commercial purposes any part of the site or any services or materials available through the site.



The Devil is in the Defaults: How Different Signal Processing Strategies Influence Fine-Tuning Decisions in Older Adults

Brian Taylor, AuD and
Navid Taghvaei, AuD

Webinar FAQs

- **How to ask a question:**
 - Click Q&A, type your question and Send.
- **Where to get the handout:**
 - Resources in the classroom and under Pending Courses in your account
- **How to view captions:**
 - Click Live Transcript CC button
 - Click Show Subtitle
- **How to earn CEUs:**
 - After the webinar, go to your Pending Courses and pass the multiple-choice exam.
- **For assistance or tech support:**
 - Call 800-753-2160
 - customerservice@audiologyonline.com
 - Use the Q&A window

Risks/Benefits

- The applicability and accuracy of the course content may vary by the clinical, geographical, and cultural context; you should evaluate the course accordingly.
- As healthcare is rapidly evolving, new findings may change the validity of the information presented in this course. Providers should always consult the latest research and guidelines from professional associations.
- The interventions discussed in this course may be limited in generalizability, requiring practitioners to consider specific individual and population factors.
- The course may not cover all possible risk factors, diagnostic methods, or treatment options, and complex cases may require additional considerations.
- Healthcare providers should apply cultural competence and sensitivity to ensure effective and respectful care based on their patients' diverse needs.
- Providers should always evaluate the limitations of diagnostic and screening tools, considering their potential for false results as well as any ethical implications.
- It is the responsibility of course participants to critically evaluate the evidence from multiple sources to guide professional practice.



Learning Outcomes

After this course:

- 1) Participants will be able to describe the results of normal aging on the auditory system and its implications on hearing aid selection and fitting
- 2) Participants will be able to describe first-fit default settings from two leading hearing aid manufacturers and how these default settings differ across important parameters
- 3) Participants will be able to apply in their clinical practice recently published evidence-based hearing aid fitting guidelines for older adults



Disclosures

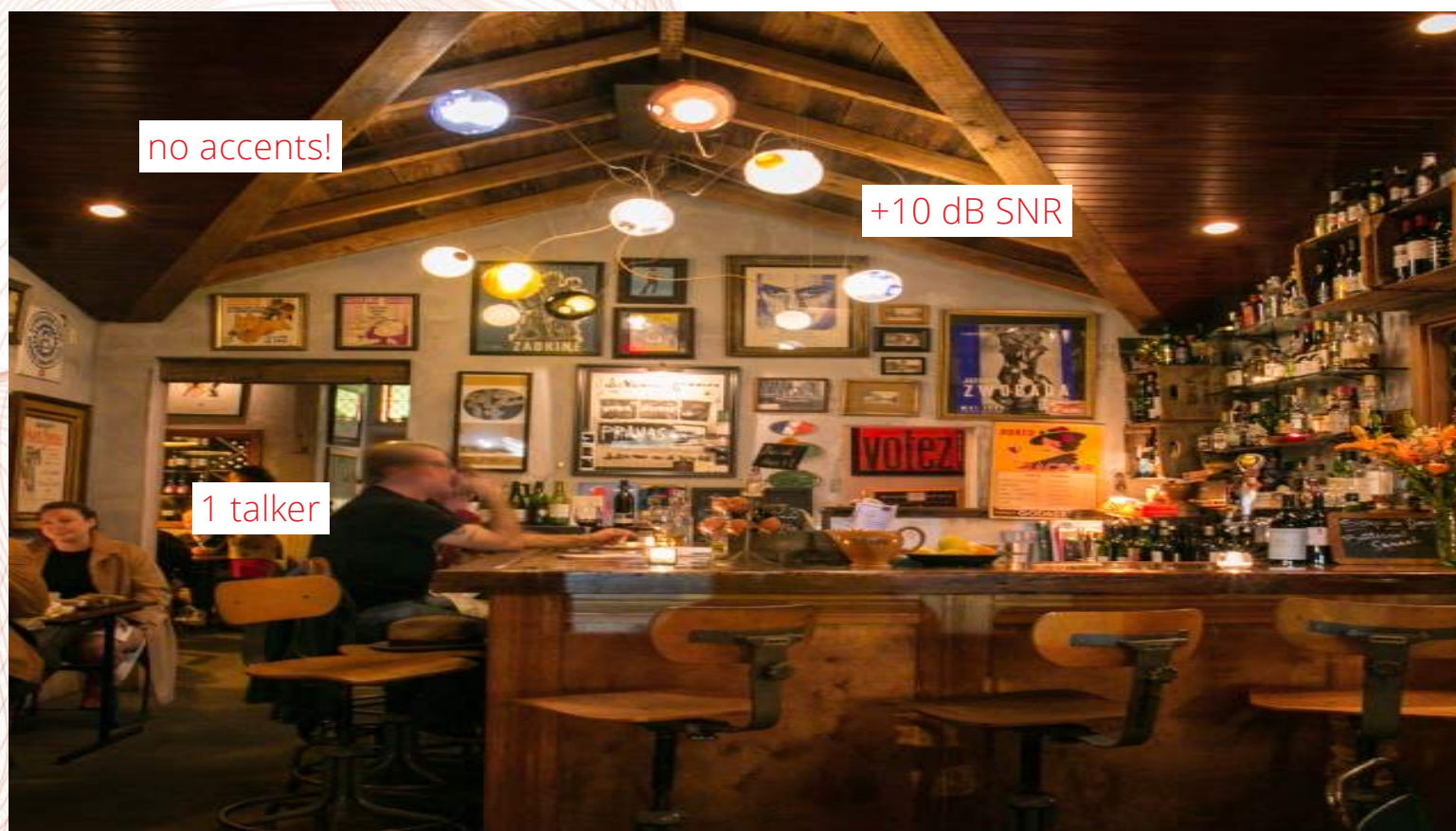
- Both presenters are employed by WS Audiology and receive a salary



It's 1975 and you're 25 years old socializing in your favorite gathering place



It's 2025 and you're 75 years old socializing in your favorite gathering place



Key points addressed in this 75-minute course

1. Normal aging and its implications on selecting & fitting hearing aids
2. Basic principles for assessing hearing aid parameters (compression, directionality, noise reduction) as stated in guidelines of Windle, et al (2023)
3. Compare default “out-of-the-box” signal processing strategies from two leading brands and how they compare to these guidelines
4. How and when the audiologist can adjust these defaults to achieve goals of the Windle et al (2023) fitting guidelines.



New Selection and Fitting Guidelines for Older Adults

 **frontiers** | Frontiers in **Neurology**

TYPE Review
PUBLISHED 20 June 2023
DOI 10.3389/fneur.2023.1122420

 Check for updates

OPEN ACCESS
EDITED BY
Aaron Moberly,
Vanderbilt University Medical Center,
United States
REVIEWED BY
Kathryn Arehart,
University of Colorado Boulder, United States
Helen E. Nuttall,
Lancaster University, United Kingdom
*CORRESPONDENCE
Richard Windle
✉ richard.windle@nhs.net
RECEIVED 12 December 2022
ACCEPTED 02 June 2023
PUBLISHED 20 June 2023

A review of auditory processing and cognitive change during normal ageing, and the implications for setting hearing aids for older adults

Richard Windle^{1*}, Harvey Dillon^{2,3} and Antje Heinrich^{2,4}

¹Audiology Department, Royal Berkshire NHS Foundation Trust, Reading, United Kingdom, ²NIHR Manchester Biomedical Research Centre, Manchester, United Kingdom, ³Department of Linguistics, Macquarie University, North Ryde, NSW, Australia, ⁴Division of Human Communication, Development and Hearing, School of Health Sciences, University of Manchester, Manchester, United Kingdom

20Q: Changes to Auditory Processing and Cognition During Normal Aging – Should it Affect Hearing Aid Programming? Part 1 – Changes Associated with Normal Aging

Richard Windle, PhD, MSc, CS

January 8, 2024

[Articles](#) / [20Q with Gus Mueller](#) / [Geriatrics & Aging](#) / [Hearing and Hearing Loss](#)

/ [20Q: Changes to Auditory Processing and Cognition During Normal Aging – Should it Affect Hearing Aid Programming? Part 1 – Changes Associated with Normal Aging](#)

20Q: Changes to Auditory Processing and Cognition During Normal Aging – Should it Affect Hearing Aid Programming? Part 2 – Programming Hearing Aids for Older Adults

Richard Windle, PhD, MSc, CS

February 1, 2024

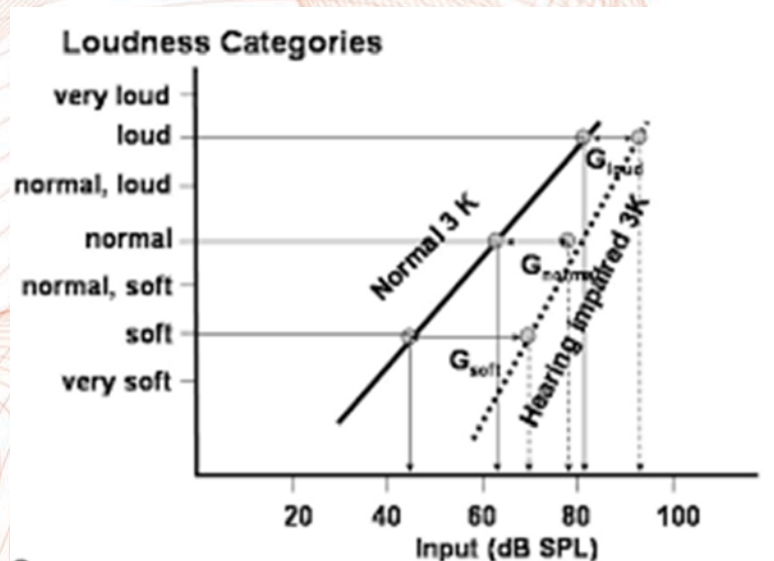
[Articles](#) / [20Q with Gus Mueller](#) / [Geriatrics & Aging](#) / [Hearing and Hearing Loss](#)

/ [20Q: Changes to Auditory Processing and Cognition During Normal Aging – Should it Affect Hearing Aid Programming? Part 2 – Programming Hearing Aids for Older Adults](#)

Back to the '90's

- "Friends" and "Seinfeld"
- MTV and Total Request Live
- Nirvana and grunge
- Tupac and Biggie
- Spice Girls and boy-bands
- Nintendo 64 and PlayStation1
- Monica and Bill

Back to the '90's



- Individual Loudness Growth
 - IHAFF
 - VIOLA
 - RAB
- Average Loudness Growth
 - Fig 6
 - DSL
- Gain Targets (soft, average, loud)
 - NAL-NL1 (1999)
- For Review:
 - Ricketts T. A. (1996). Fitting hearing aids to individual loudness-perception measures. *Ear and Hearing*, 17(2), 124-132.

You might be surprised to know

- An older adult is defined as aged 55 or older
- ~90% of caseloads in most clinics
- Some of the most complex cases
- Aging effects are seen as early as third decade of life



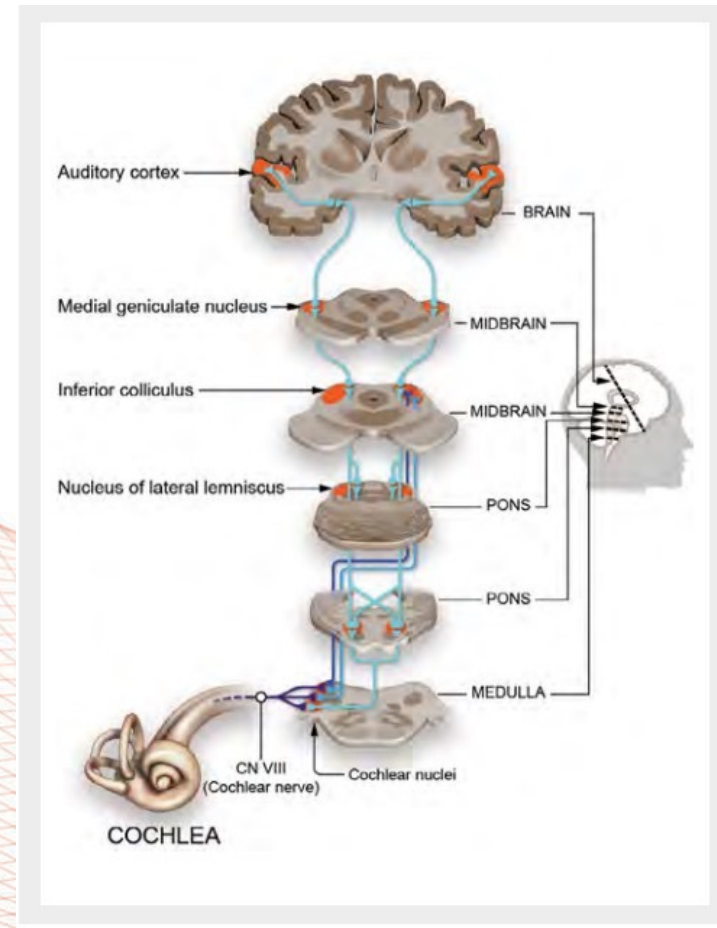
You might be surprised to know

- An older adult is defined as aged 55 or older
- ~90% of caseloads in most clinics
- Some of the most complex cases
- Aging effects are seen as early as third decade of life

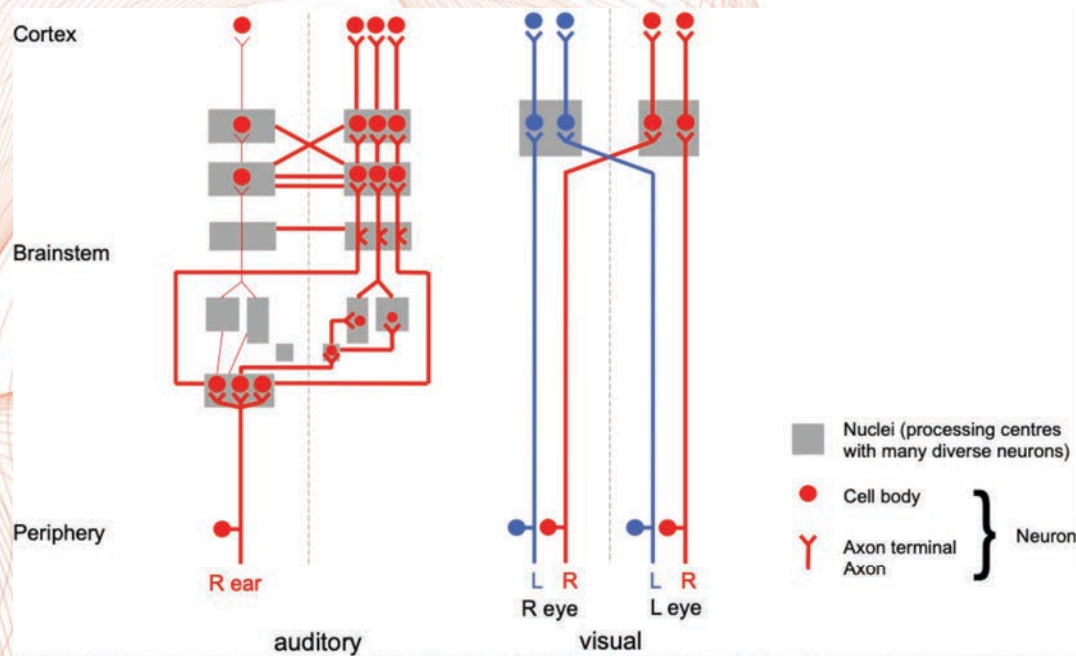


Normal Aging and Auditory Processing Pathways

Bottom-up processing
+
Top-down processing



Auditory vs. Vision

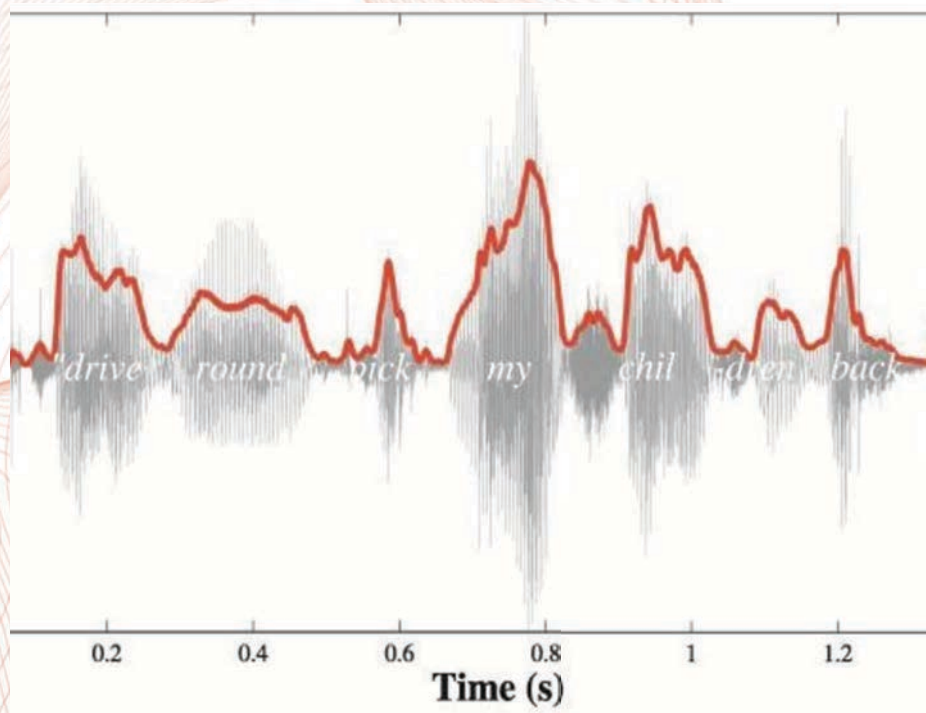


- Auditory system is more complex and much faster than visual system
- Only ascending connection from one ear are shown due to this complexity
- Because of this complexity, auditory system requires significantly more energy to run, making it more prone to aging effects.

Effects of Normal Aging on Hearing and Auditory Processing

- 4 Considerations

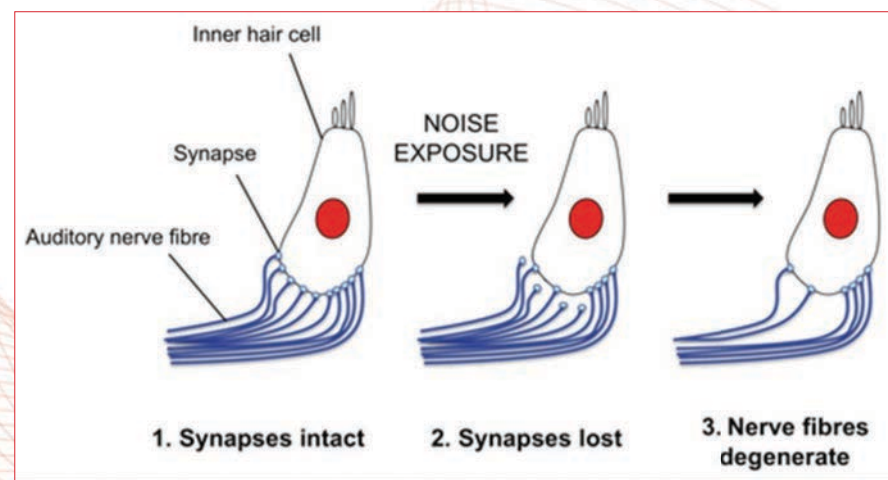
1. Loss of Temporal Fine Structure (TFS)



- ENV = speech or amplitude envelope
- TFS = temporal fine structure
- TFS is the rapid oscillations within a sound's frequency bands, providing information about pitch and subtle shifts in sound patterns – critical for understanding speech in noisy places
- Normal aging involves a gradual decline in the ability to effectively process Temporal Fine Structure (TFS) cues
- Pitch perception, localization and speech understanding in noise all affected by loss of TFS

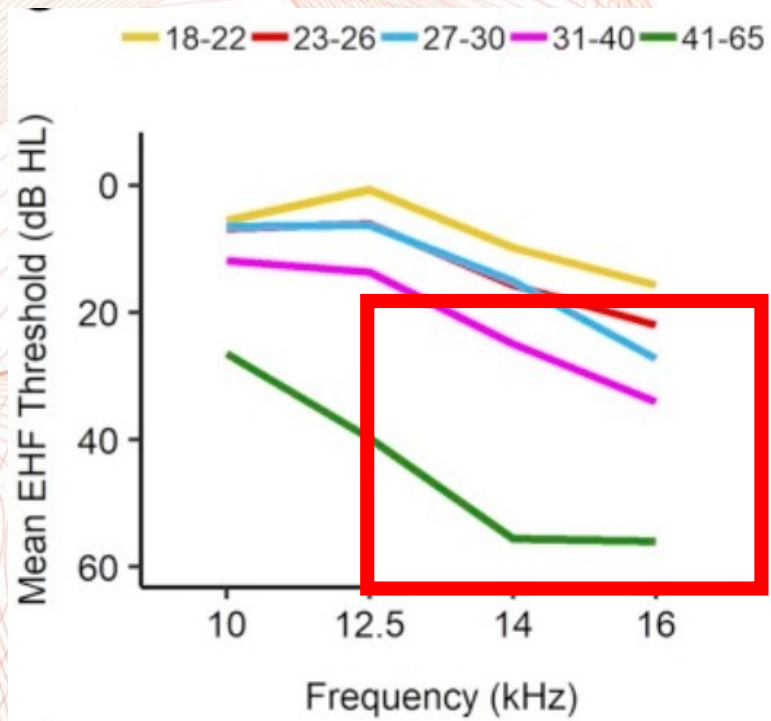
Underlying cause of TFS loss (a leading theory)

- Cochlear synaptopathy: Loss of synapses between IHCs and cochlear nerve fibers before elevation of thresholds occurs



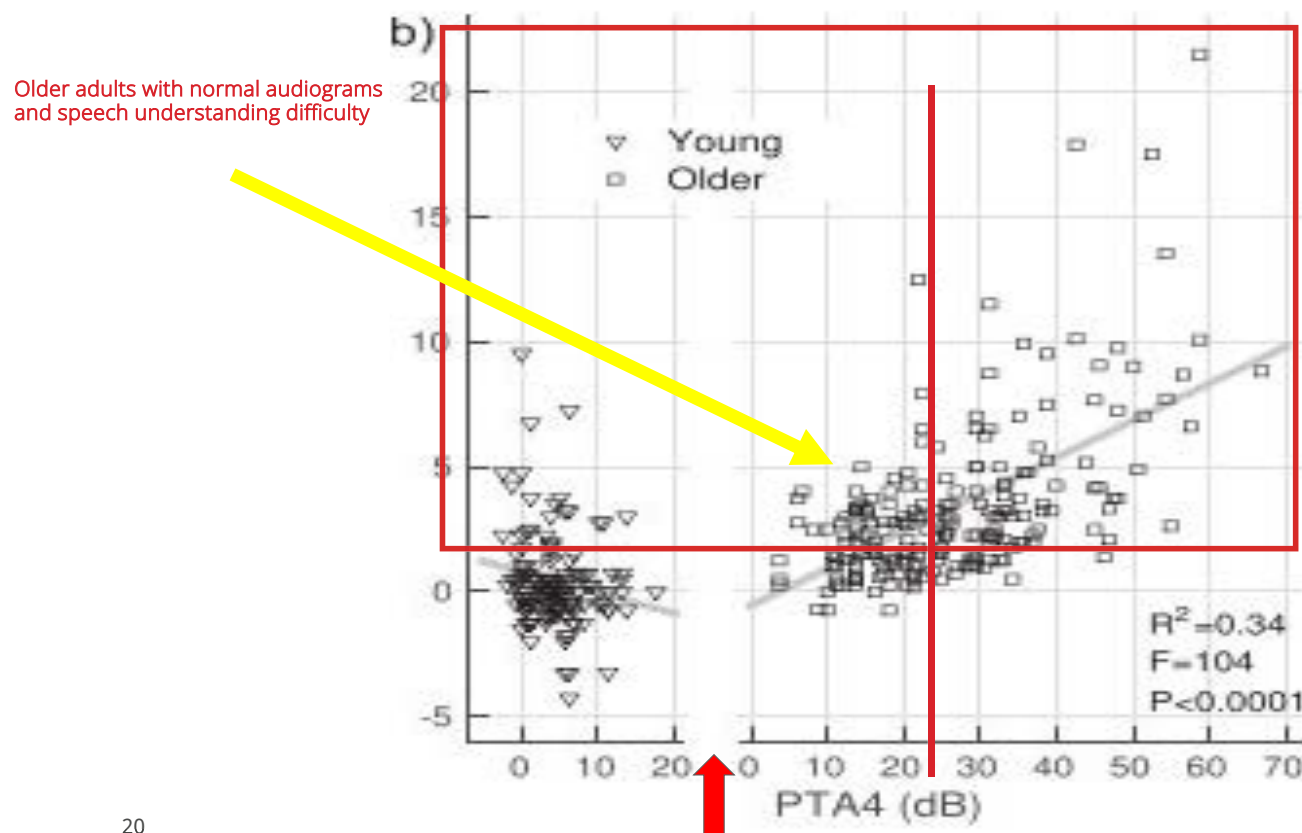
Sources: Liberman, et al (2016),
Valderrama et al (2022)

2. Extended High Frequency Hearing Loss



- Prevalence:
- 64% of adults, aged 18-64
- 56% of adults under the age of 30
- Individuals with EHF loss often self-report more difficulty in everyday, real-life complex listening than those of same age with normal extended-HF hearing

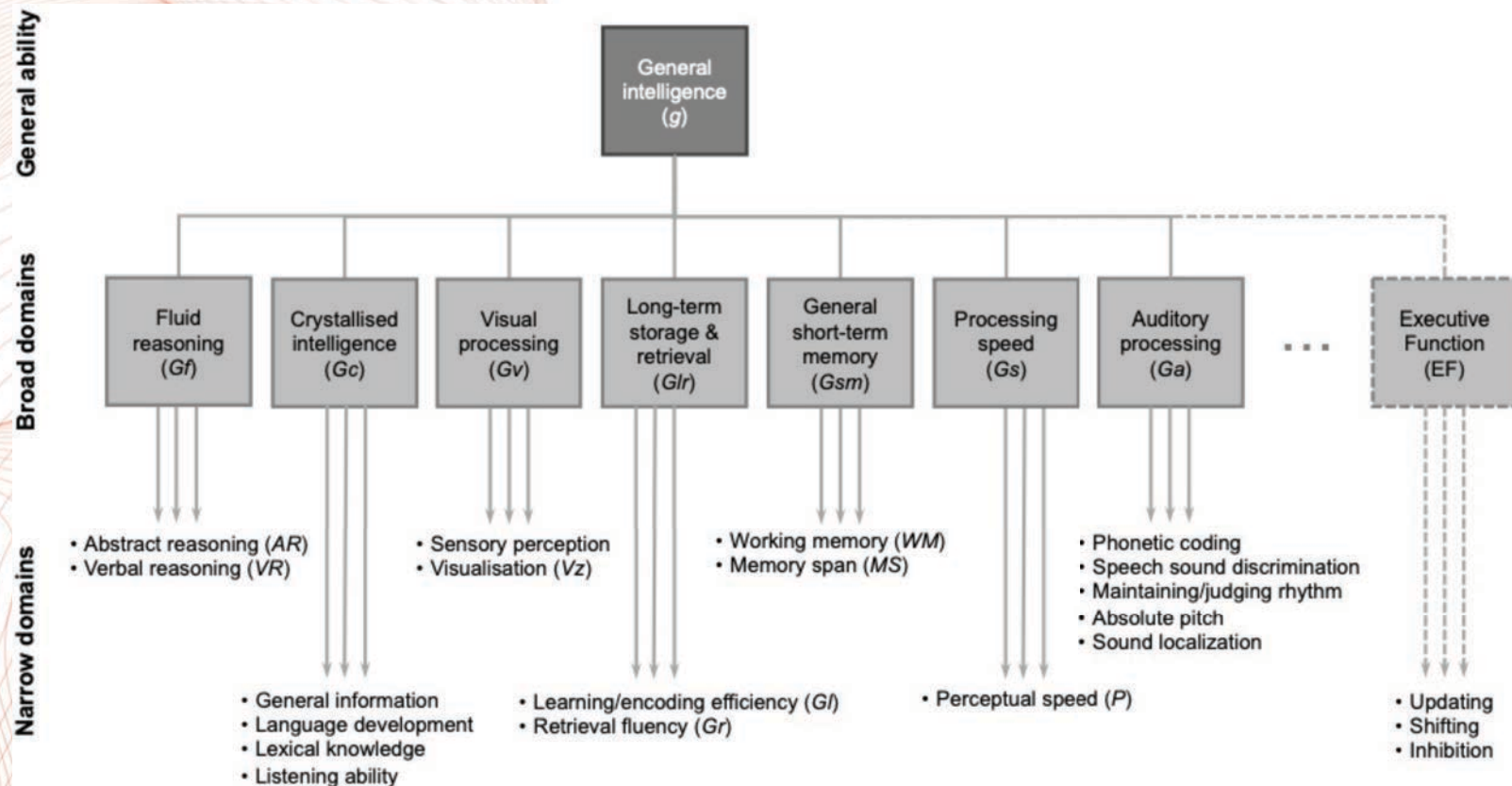
3. Speech understanding in noise



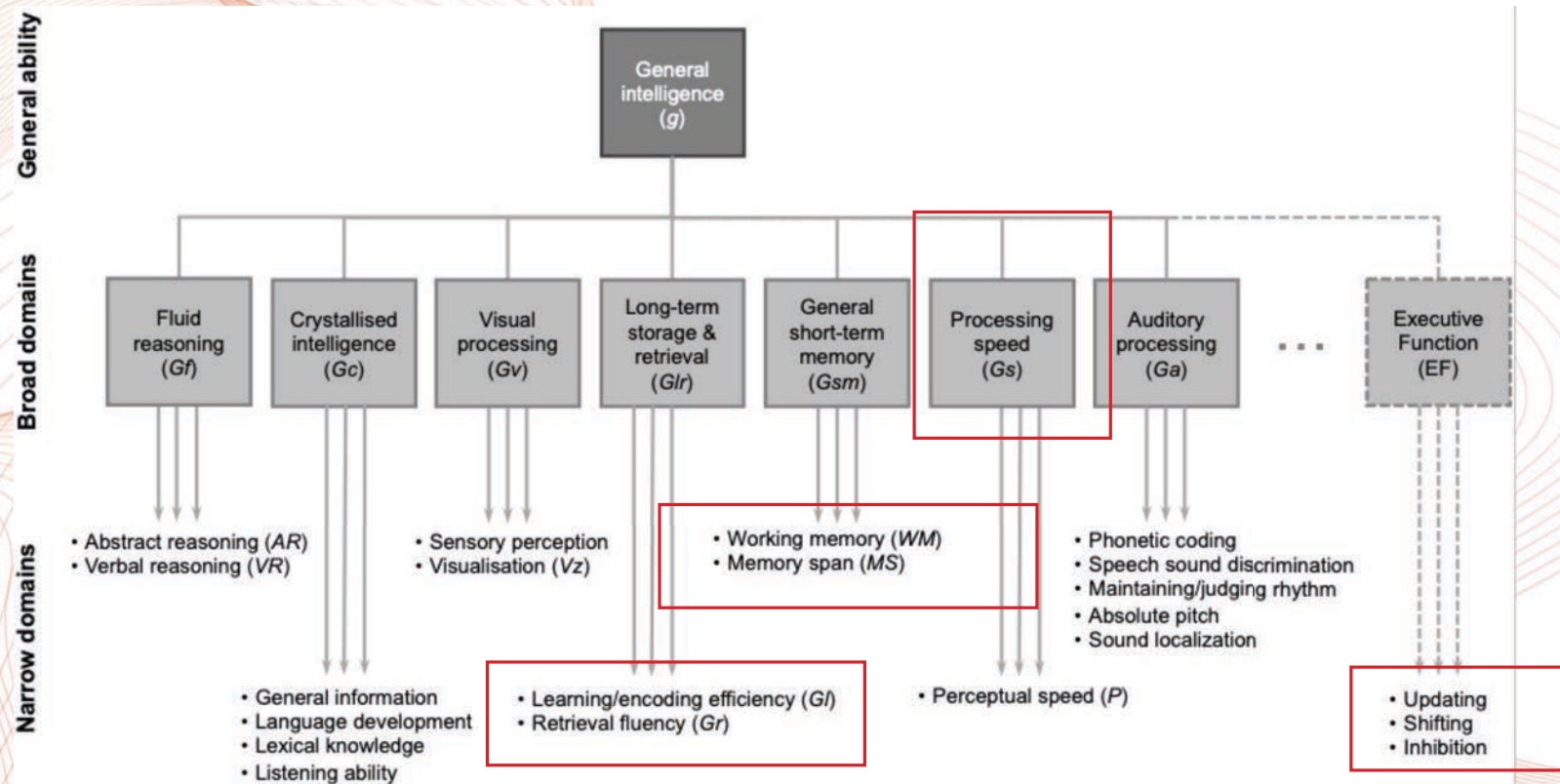
215 younger adults

130 adults over age 60

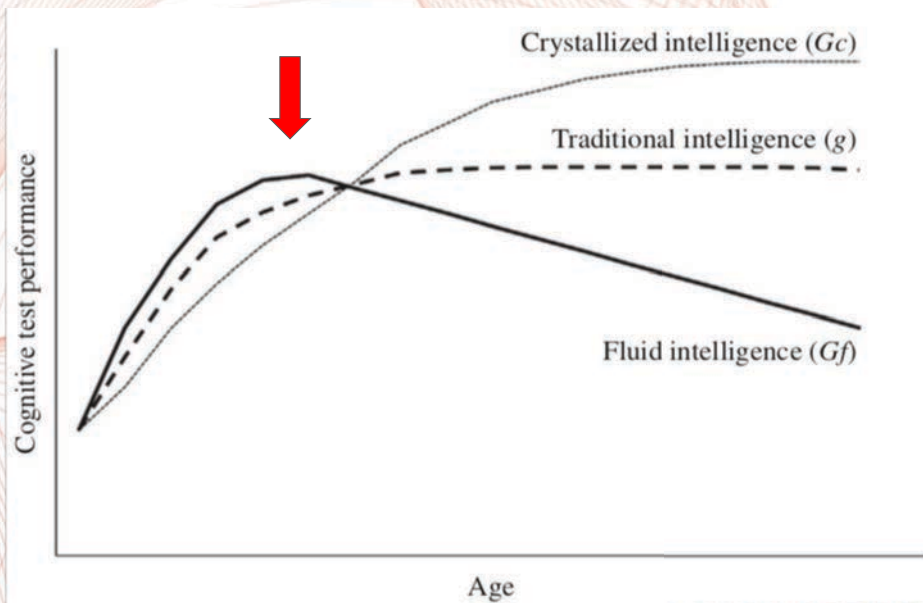
4. Age-related Changes to Cognition



4. Age-related Changes to Cognition



4. Age-related Changes in Cognitive Abilities



- Fluid intelligence: processing speed, inhibition, episodic memory. Peaks at about age 20.
- Crystallized intelligence: knowledge of language, accumulation of knowledge and skills
- Reduced processing speed and capacity make it harder to make use of auditory information, especially in challenging environments

Something to think about....

1. Auditory aging occurs at a much younger age than many clinicians appreciate
2. If you're hearing assessment battery is confined to pure tone thresholds through 8KHz, and single word testing in quiet, you are likely to miss many of these changes in people under the age of about 60. Consider adding Quick SIN and EHF audiometry to better identify these changes.
3. Assume that all individuals aged 55 and over have experienced at least some of the effects of normal aging. This necessitates the need for specific hearing aid fitting guidelines.

How do these normal-aging changes apply to selecting and fitting hearing aids?



New Selection and Fitting Guidelines for Older Adults

 **frontiers** | Frontiers in **Neurology**

TYPE Review
PUBLISHED 20 June 2023
DOI 10.3389/fneur.2023.1122420

 Check for updates

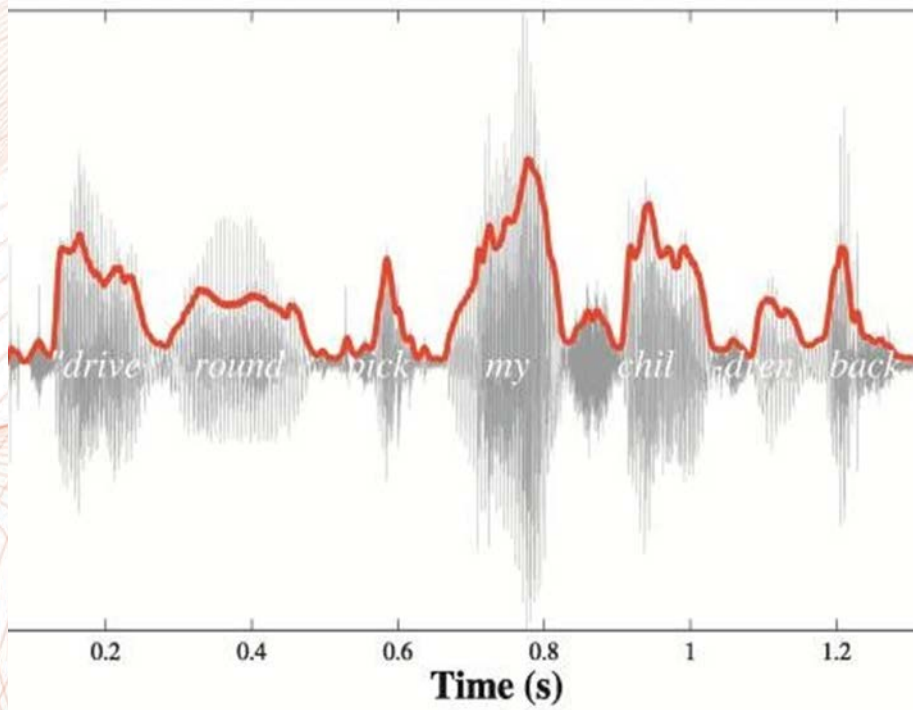
OPEN ACCESS
EDITED BY
Aaron Moberly,
Vanderbilt University Medical Center,
United States
REVIEWED BY
Kathryn Arehart,
University of Colorado Boulder, United States
Helen E. Nuttall,
Lancaster University, United Kingdom
*CORRESPONDENCE
Richard Windle
✉ richard.windle@nhs.net
RECEIVED 12 December 2022
ACCEPTED 02 June 2023
PUBLISHED 20 June 2023

A review of auditory processing and cognitive change during normal ageing, and the implications for setting hearing aids for older adults

Richard Windle^{1*}, Harvey Dillon^{2,3} and Antje Heinrich^{2,4}

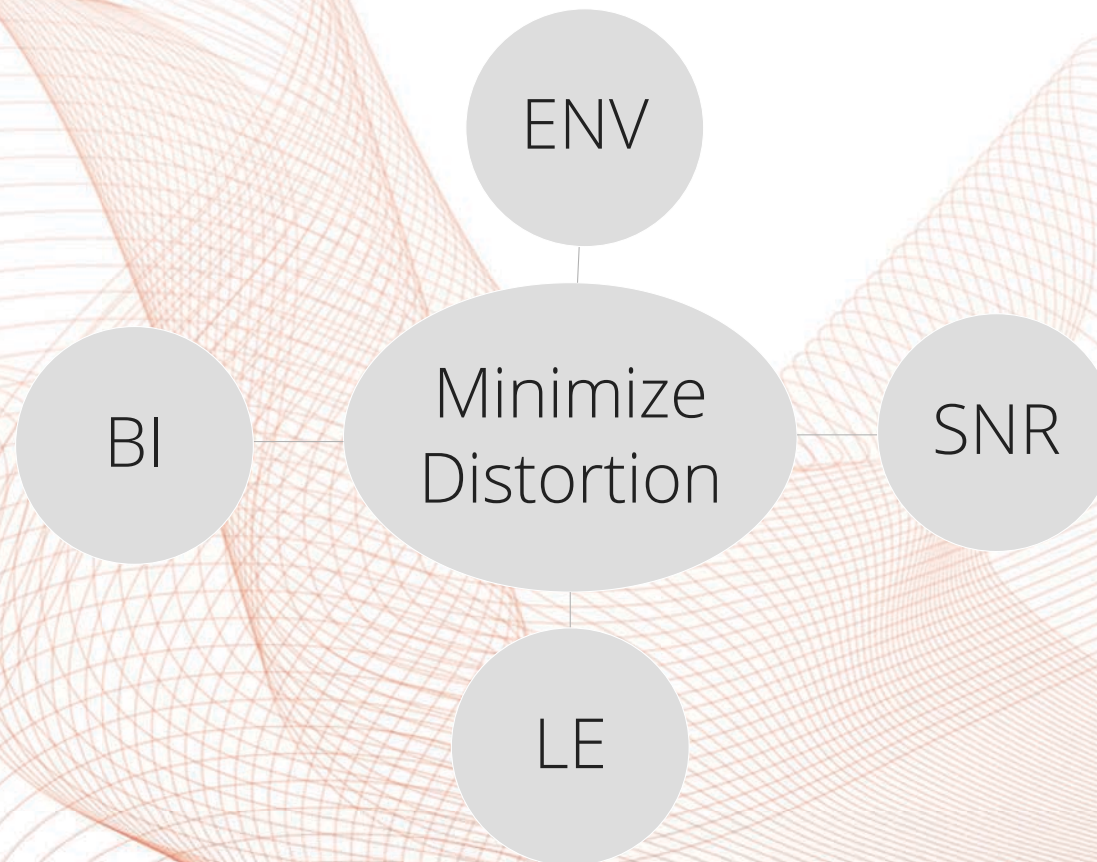
¹Audiology Department, Royal Berkshire NHS Foundation Trust, Reading, United Kingdom, ²NIHR Manchester Biomedical Research Centre, Manchester, United Kingdom, ³Department of Linguistics, Macquarie University, North Ryde, NSW, Australia, ⁴Division of Human Communication, Development and Hearing, School of Health Sciences, University of Manchester, Manchester, United Kingdom

Underlying problem: Aging creates “internal distortion” to the signal

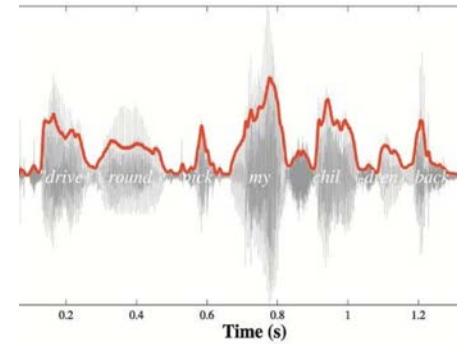


- Hearing aids can add more distortion!
- “Overstimulating” the TFS with amplification causes distortion of the speech envelope
- “Cross modulation” - two signals processed together are perceived as coming from a single source
- “Almost everything we do in programming hearing aids introduces distortion, except improving SNR with directionality.” - Windle et al (2023)

4 Principles (Windle, et al 2023)



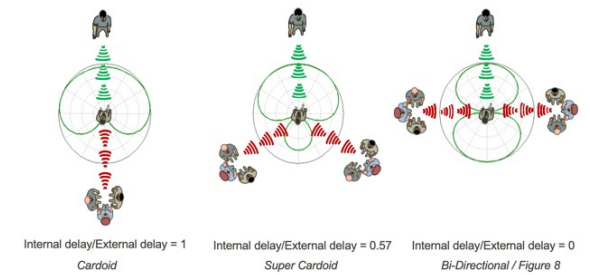
Principle 1 (ENV)



- Older adults will generally be more dependent than younger adults on the speech envelope (ENV) for speech perception, thus they are more susceptible to ENV distortion.

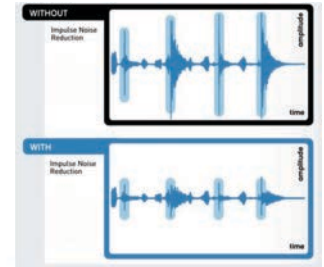
Principle 2 (SNR)

- Subpar speech understanding in noise performance with age indicates a need to improve the signal-to-noise ratio (SNR) with the use of directionality.



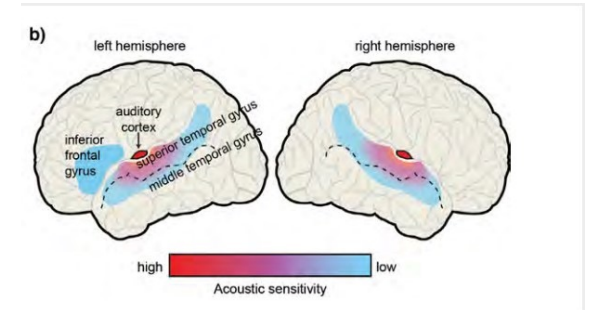
Principle 3 (LE)

- There is a risk that hearing aid processing might increase listening effort. Therefore, hearing aids should minimize cognitive load, loudness discomfort, or other perceptual sound difficulties.
- Other advanced hearing aid features, such as frequency lowering, may distort the signal in ways that further impair speech intelligibility. The evidence is weak, so these should be considered as options for each individual.



Principle 4 (BI)

- Binaural processing is degraded with age and undermines localization cues. Reduced binaural processing also makes some older adults susceptible to binaural interference.

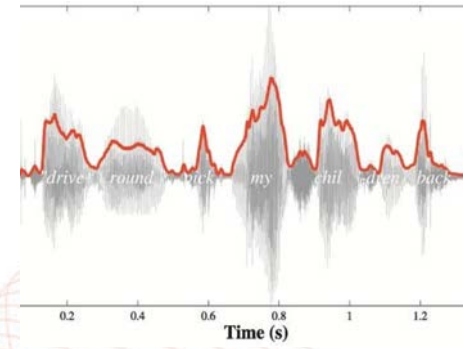


The Devil is in the Defaults



- Evaluate various default, “out-of-the-box” signal processing strategies and how compare to these principles
- How closely do these default settings align with the 2023 Windle et al guidelines?

Principle 1 (ENV)

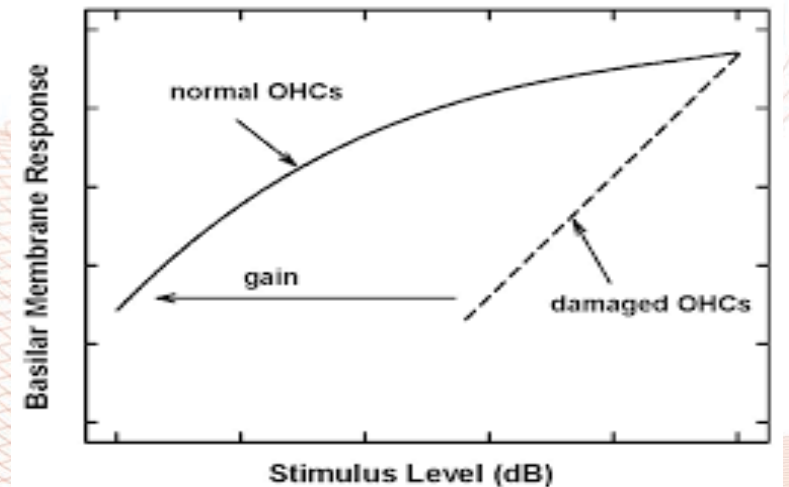
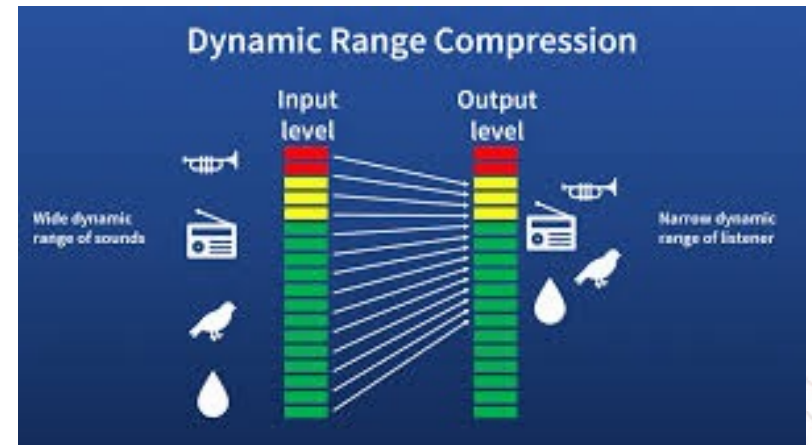


- Older adults will generally be more dependent than younger adults on ENV for speech perception, thus they are more susceptible to ENV distortion.
- What the audiologist needs to do:
- Ensure speech is audible but with minimal distortion to ENV. This requires the correct amount of compression, **which includes careful consideration of compression ratio and compression speed**

Compression Basics

Kneepoints and Ratios

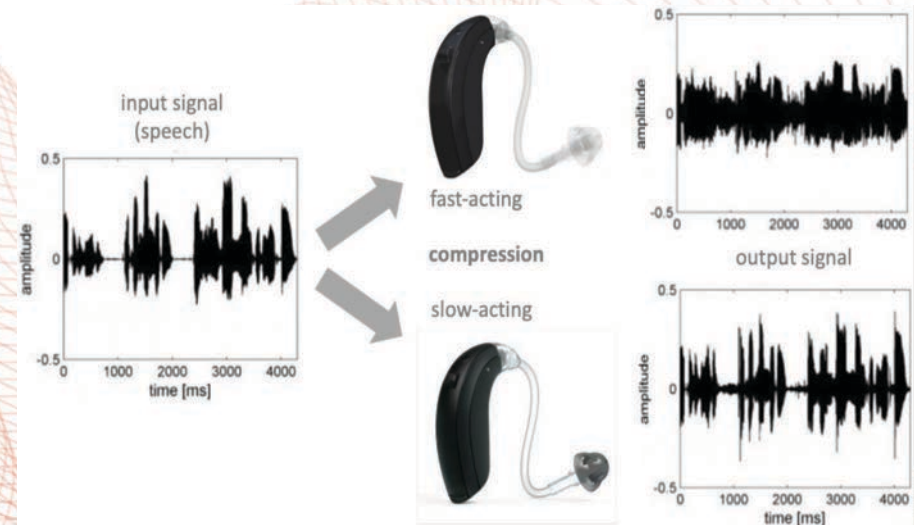
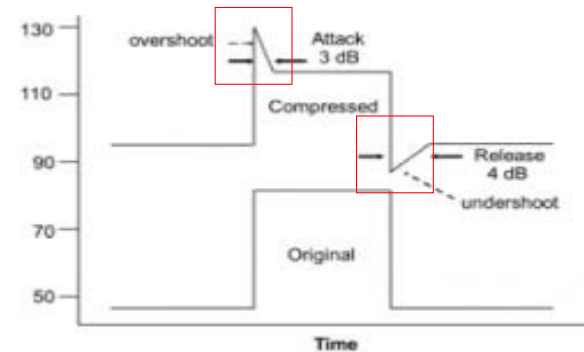
- How the hearing aid squashes the volume of sound into the residual dynamic range of the individual (between threshold and LDL)
- WDRC: repackage sounds into the remaining dynamic range of the wearer; more gain for quiet, less gain for louder sounds



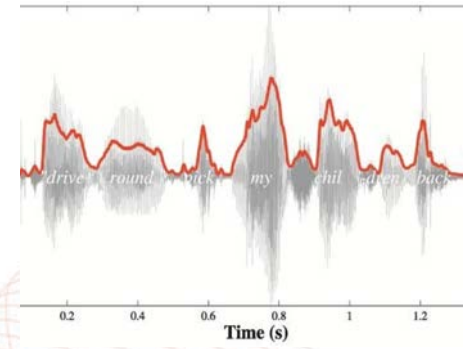
Compression Basics

Compression Speed

- How quickly the gain is changed between soft and loud sounds
- Attack time: how quickly the gain is reduced. Hearing aids have similar attack times (1 to 10 msec)
- Release time: how quickly the gain increases again when sound falls to a lower level.
- Fast-acting or syllabic compression: Aims to restore normal loudness perception
- Slow-acting: to preserve the temporal structure and short-term changes in sound, particularly the envelope of speech



Principle 1 (ENV)



- Older adults will generally be more dependent than younger adults on ENV for speech perception, thus they are more susceptible to ENV distortion.
- What the audiologist needs to do:
- Ensure speech is audible but with minimal distortion to ENV. This requires the correct amount of compression, **which includes careful consideration of compression ratio and compression speed**

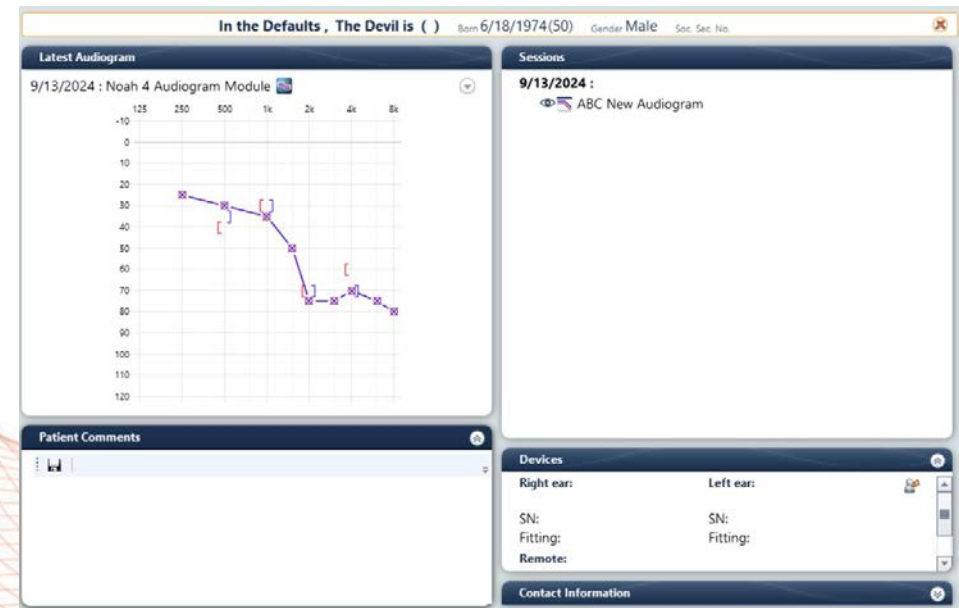
Guidelines call for:

Principle 1

- Consider slow-acting compression as the default setting for older adults and in noisy environments for all hearing aid wearers
- Recognize there is a variation in preference between individuals, so both slow and fast compression can be provided in separate programs.
- If fast-acting compression is used, the compression ratio should be reduced to levels that avoid ENV distortion. The compression ratio should be ~ 1.7 or less for older adults

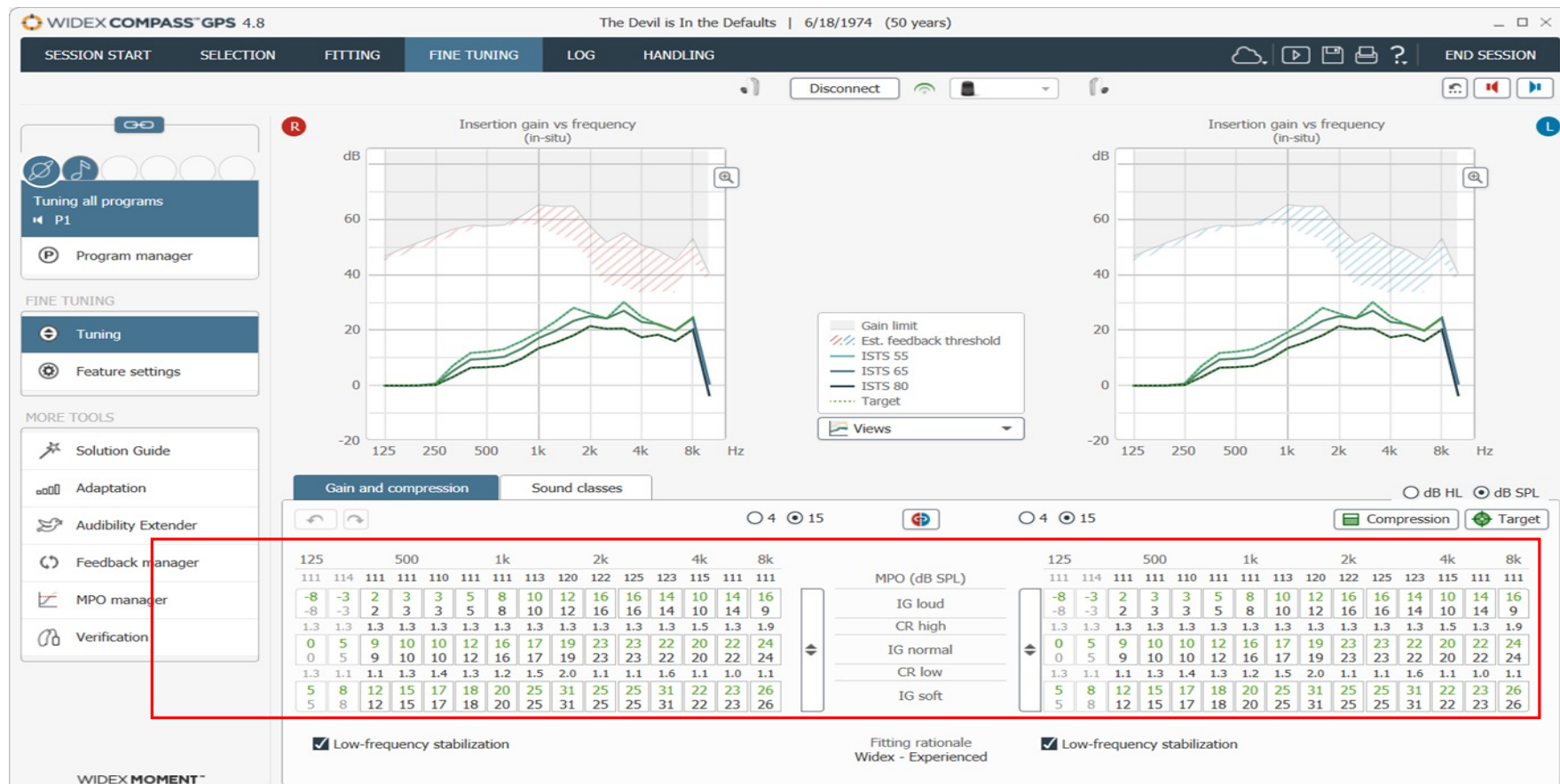
What we did

- First-fit Widex 440 RIC and Signia 7IX RIC
- Downward sloping loss
- Closed dome eartip
- What are the defaults settings?
- How do the default settings compare to the UK Guidelines for older adults?



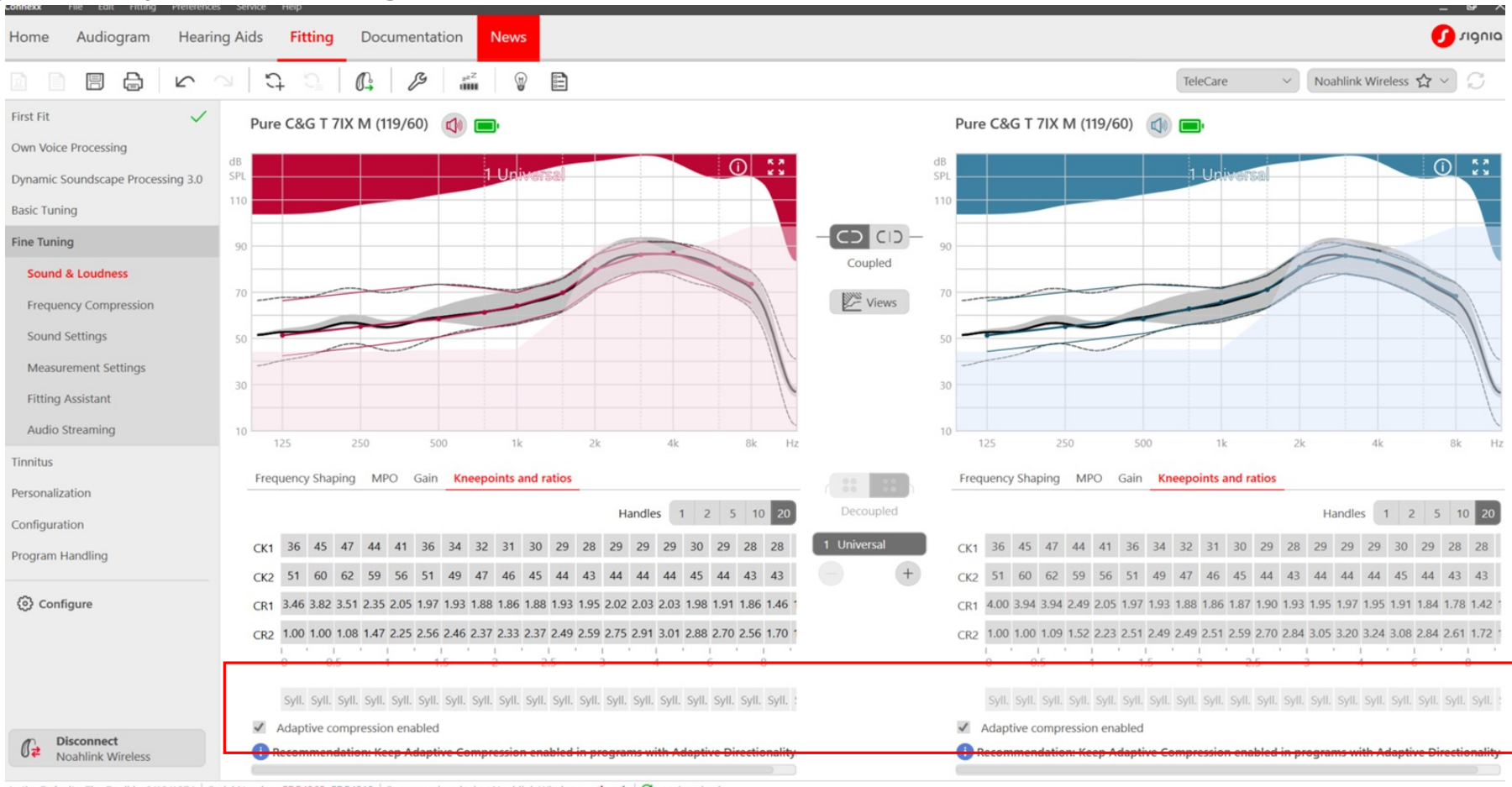
Compression Speed Defaults

Widex: Slower acting

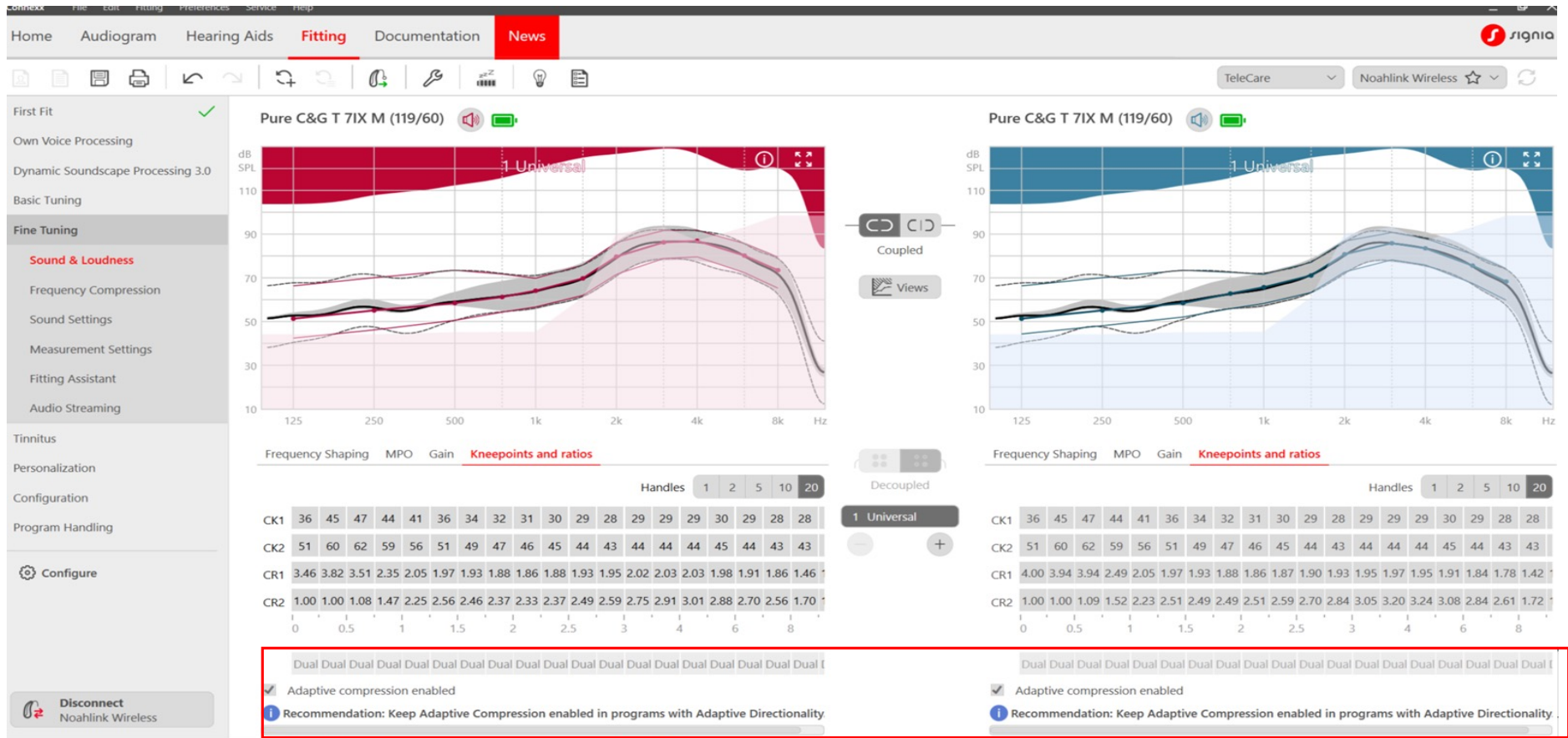


Compression Speed Defaults

Signia: Dual/Syllabic (faster acting)

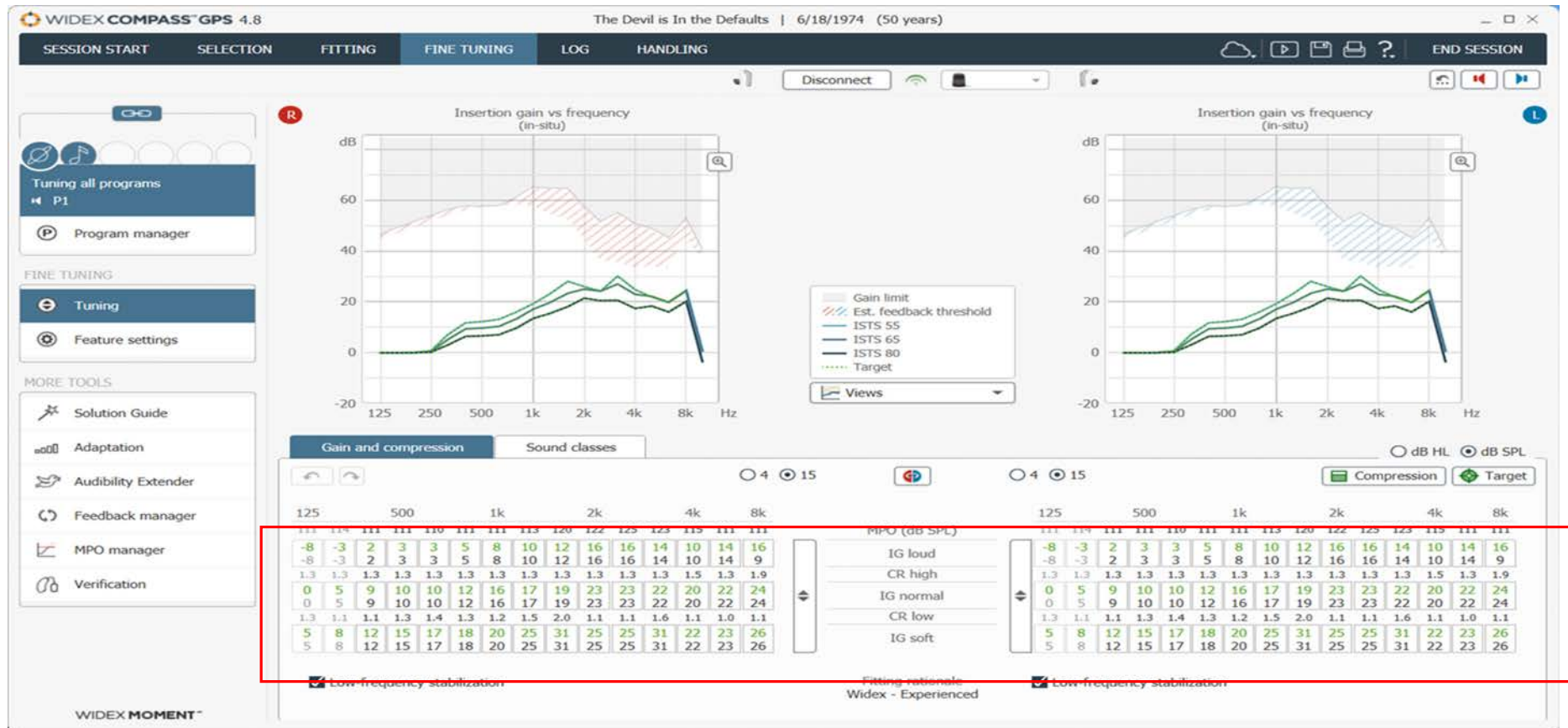


Add 2nd program

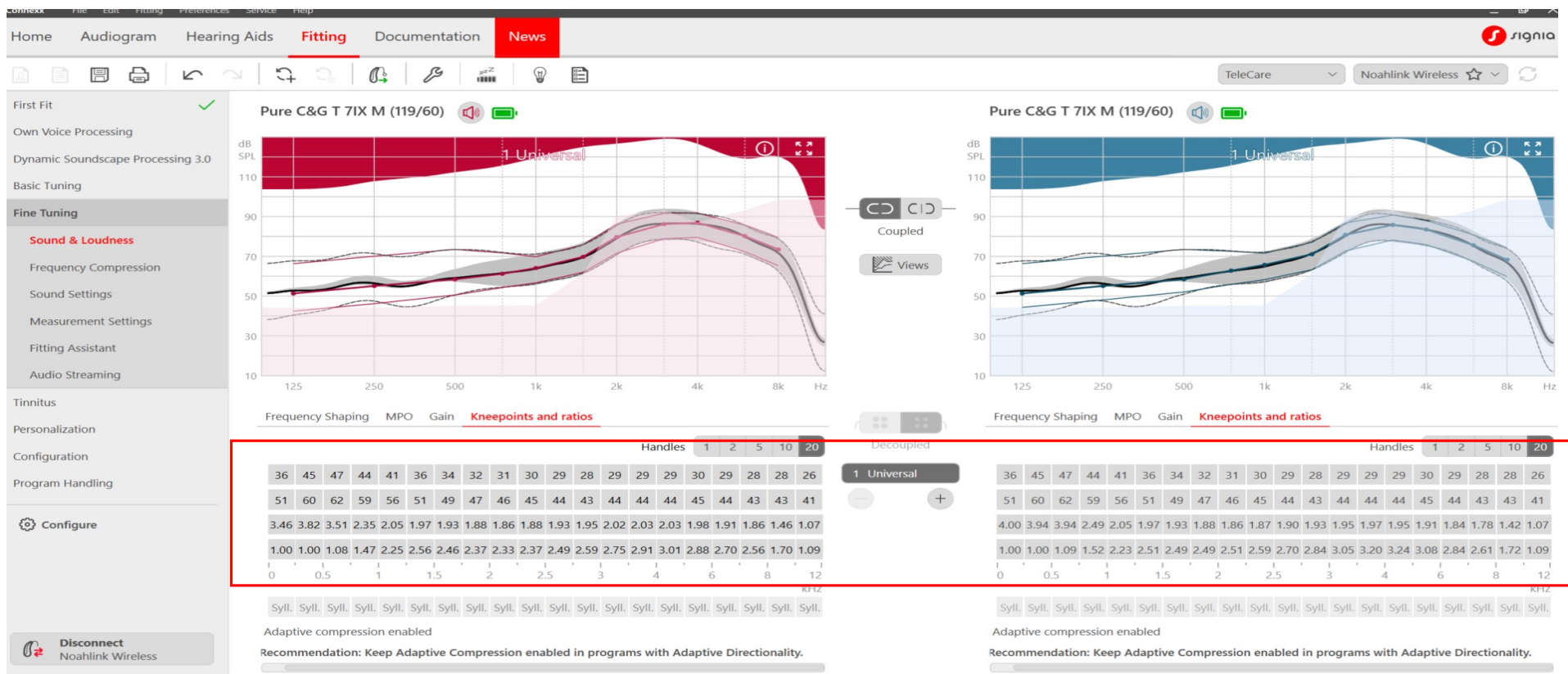


Compression Knee-point & Ratio Defaults

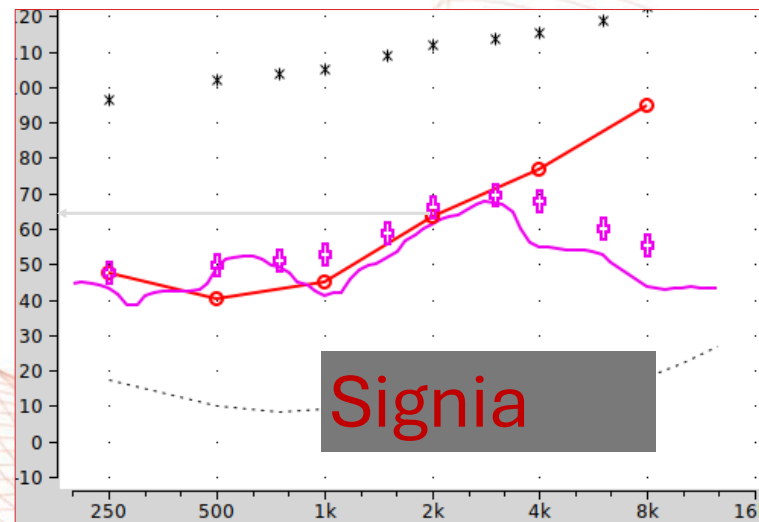
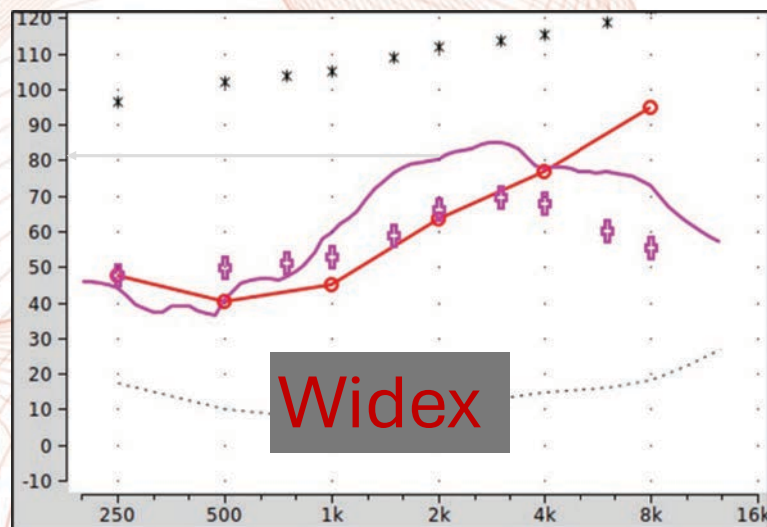
Widex: low kneepoints and ratios



Signia: higher kneepoints and slightly larger ratios



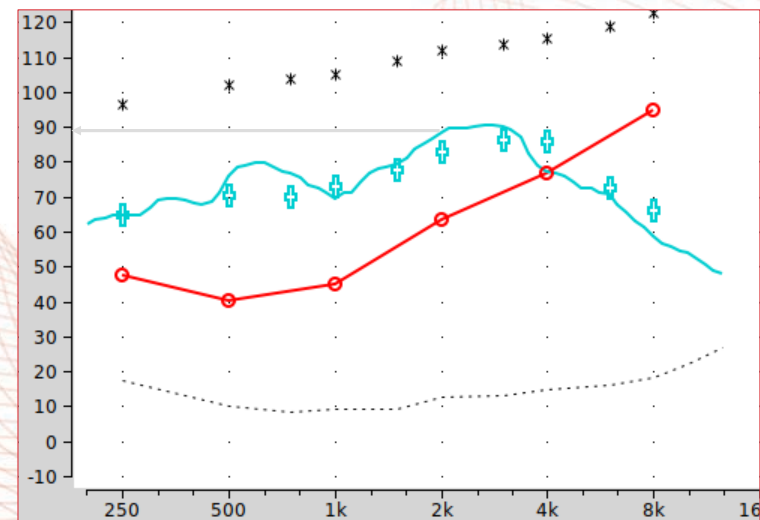
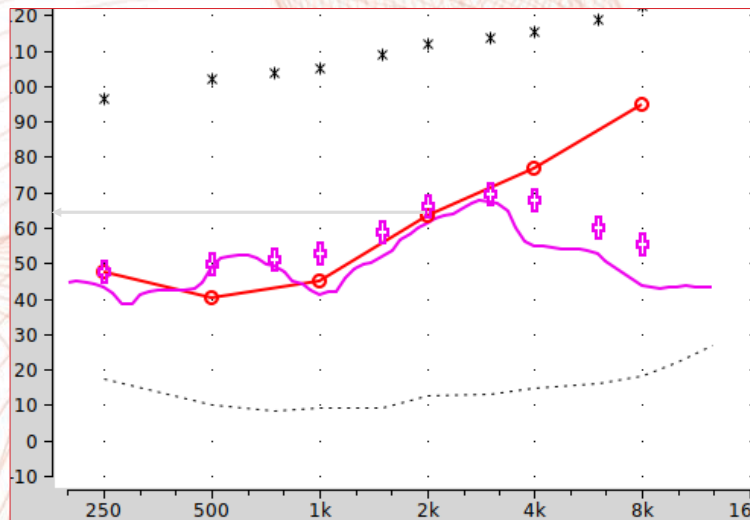
Effective Compression



NAL-NL2 default output for 50 dB SPL (ISTS), closed ear on KEMAR

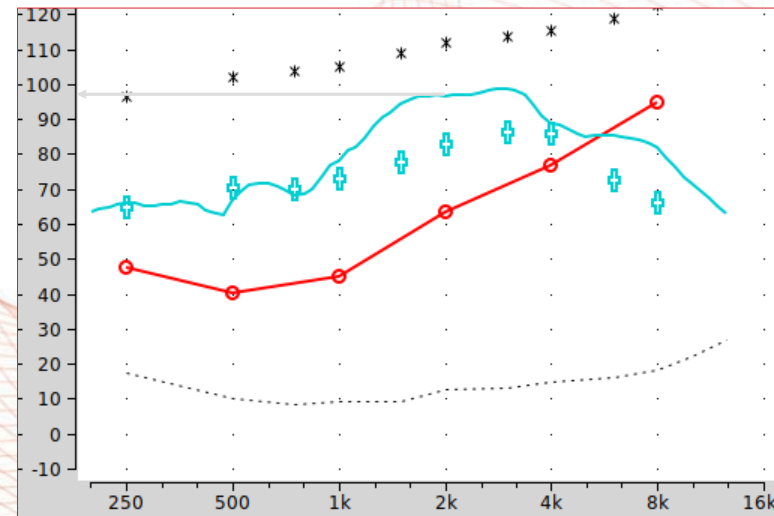
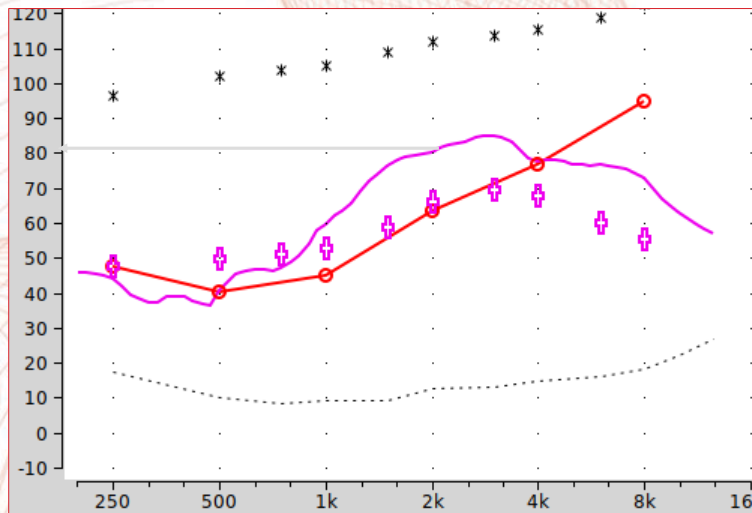
Effective Compression

Signia



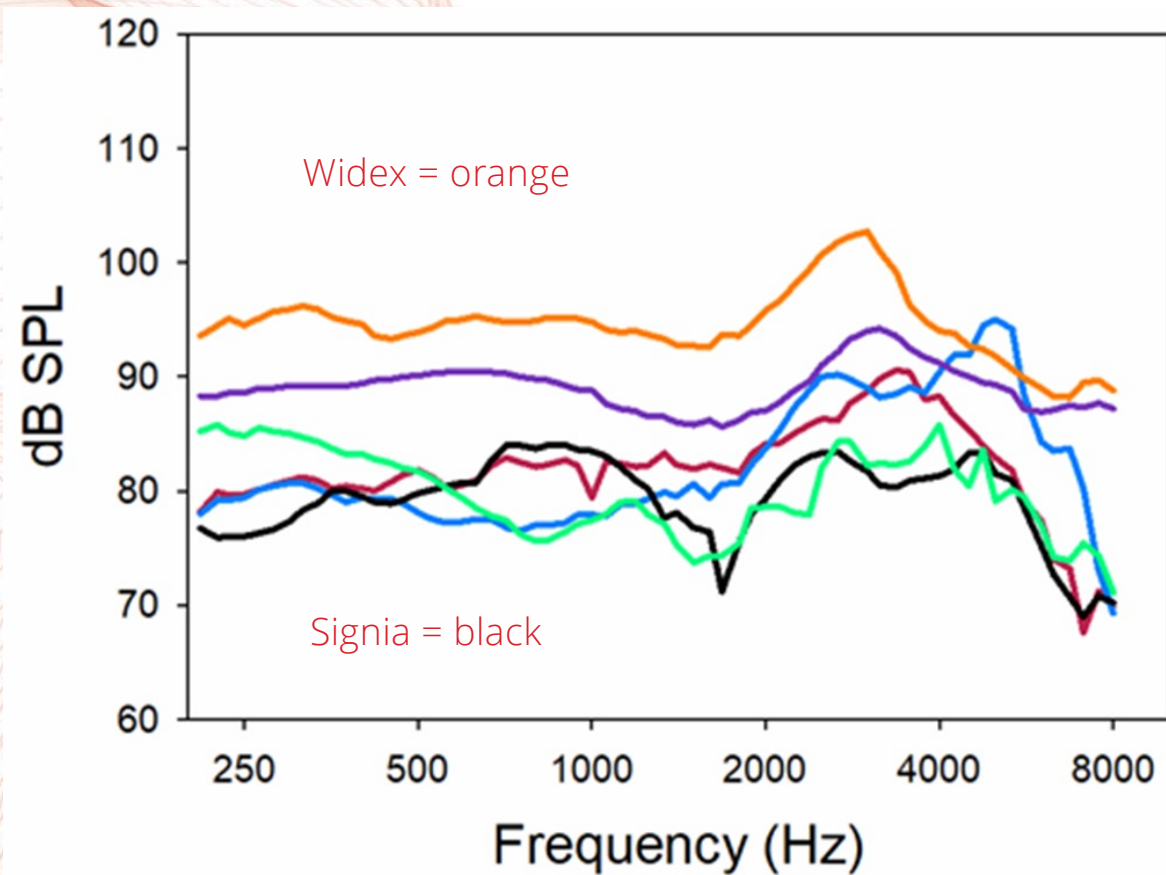
For 2000 Hz, as input changes by 30 dB, output changes by ~24 dB.
Effective WDRC ratio of ~0.8

Effective Compression Widex



As input changes by 30 dB, output changes by ~18 dB.
Effective WDRC ratio of ~1.7

OSPL90 coupler measure with hearing aid set to default NAL-NL2



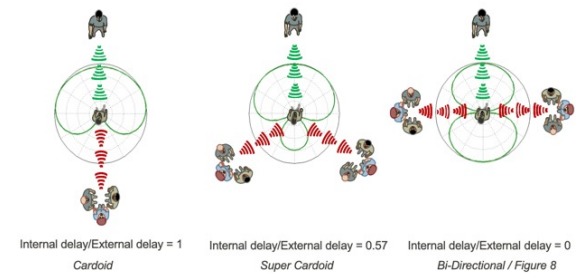
Mueller et al (2021)

Guidelines call for:

Principle 1

- Consider slow-acting compression as the default setting for older adults and in noisy environments for all hearing aid wearers **Both brands meet this guideline.**
- Recognize there is a variation in preference between individuals, so both slow and fast compression can be provided in separate programs. **Widex has slow release times. Signia also defaults to slow-ish. Easy to add a second program with slower release times in Signia software**
- If fast-acting compression is used, the compression ratio should be reduced to levels that avoid ENV distortion. The compression ratio should be ~ 1.7 or less for older adults. **Both brands meet this guideline, but it needs to be verified with REM**

Principle 2 (SNR)



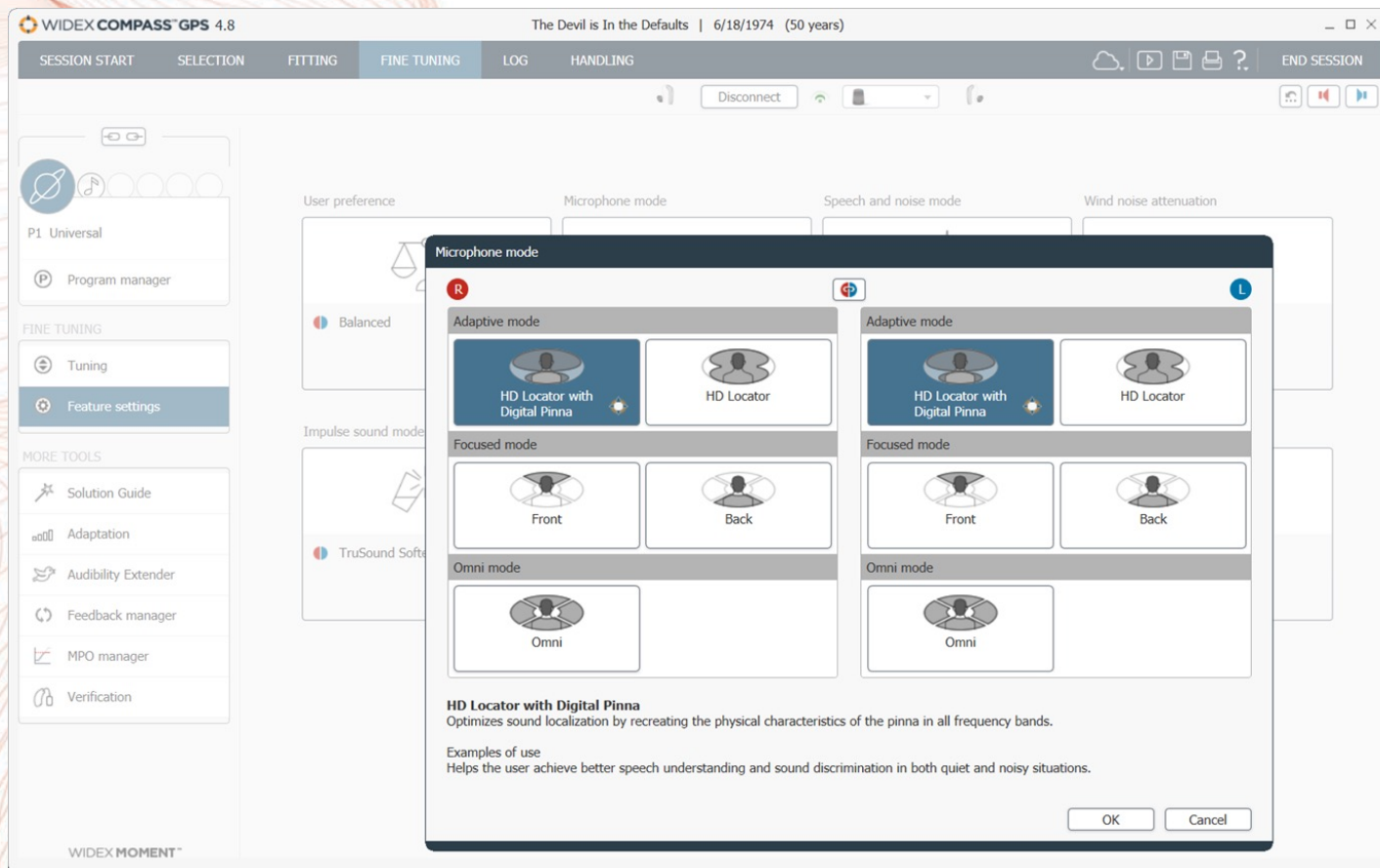
- Subpar speech understanding in noise performance with age indicates a need to improve the signal-to-noise ratio (SNR) with the use of directionality.
- What the audiologist needs to do:
- Directionality is always beneficial to improve the SNR. Ensure the hearing aid's directional system is optimized. Consider use of a remote mic.

Guidelines call for:

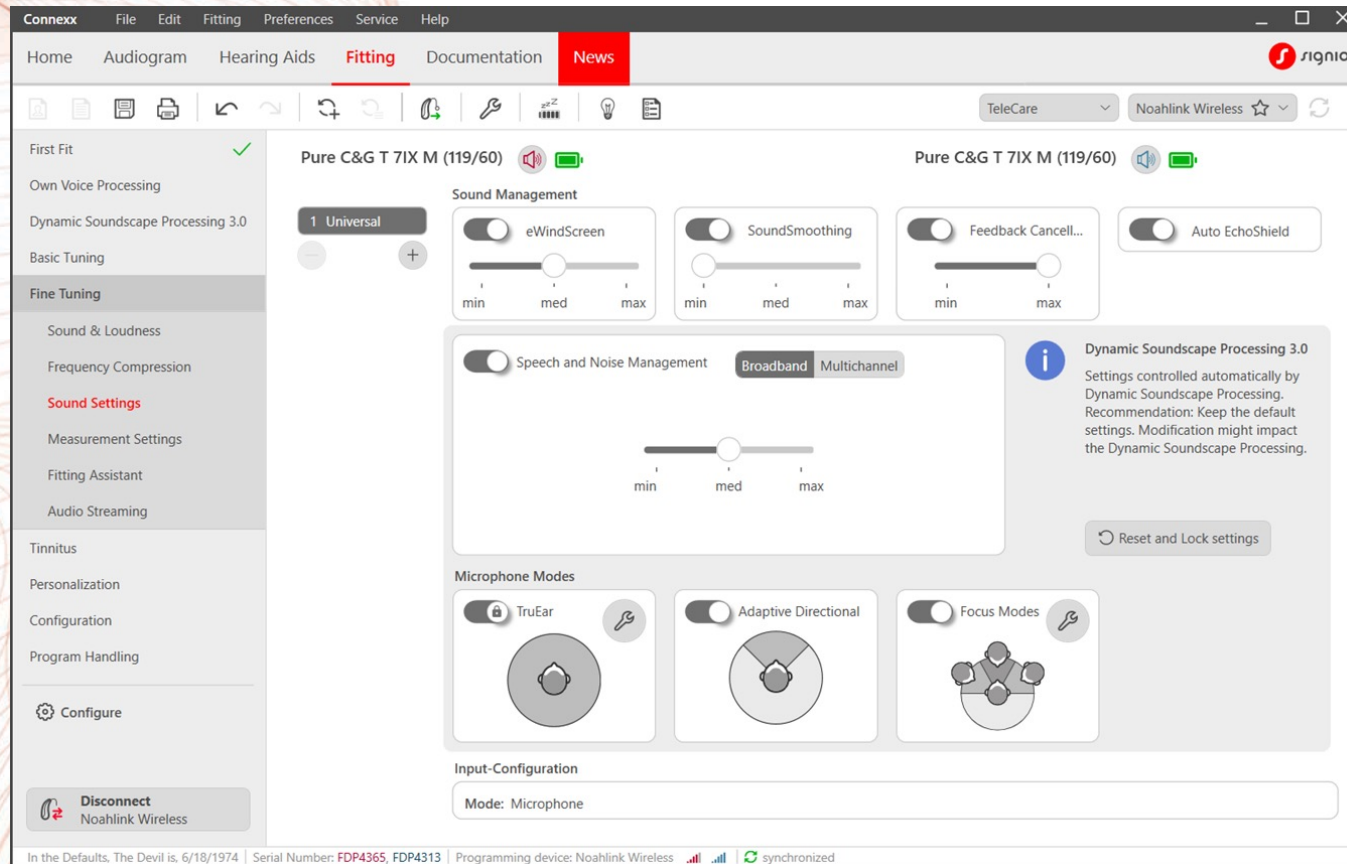
Principle 2

- For acoustically challenging listening situations, improving the wearer's SNR is always beneficial
- Consider using custom earmolds instead of open eartips, as the latter is prone to reduction in directional benefit.

Directionality Defaults



Directionality Defaults



Directionality

Rear speaker



Aided ear with
probe tube positioned

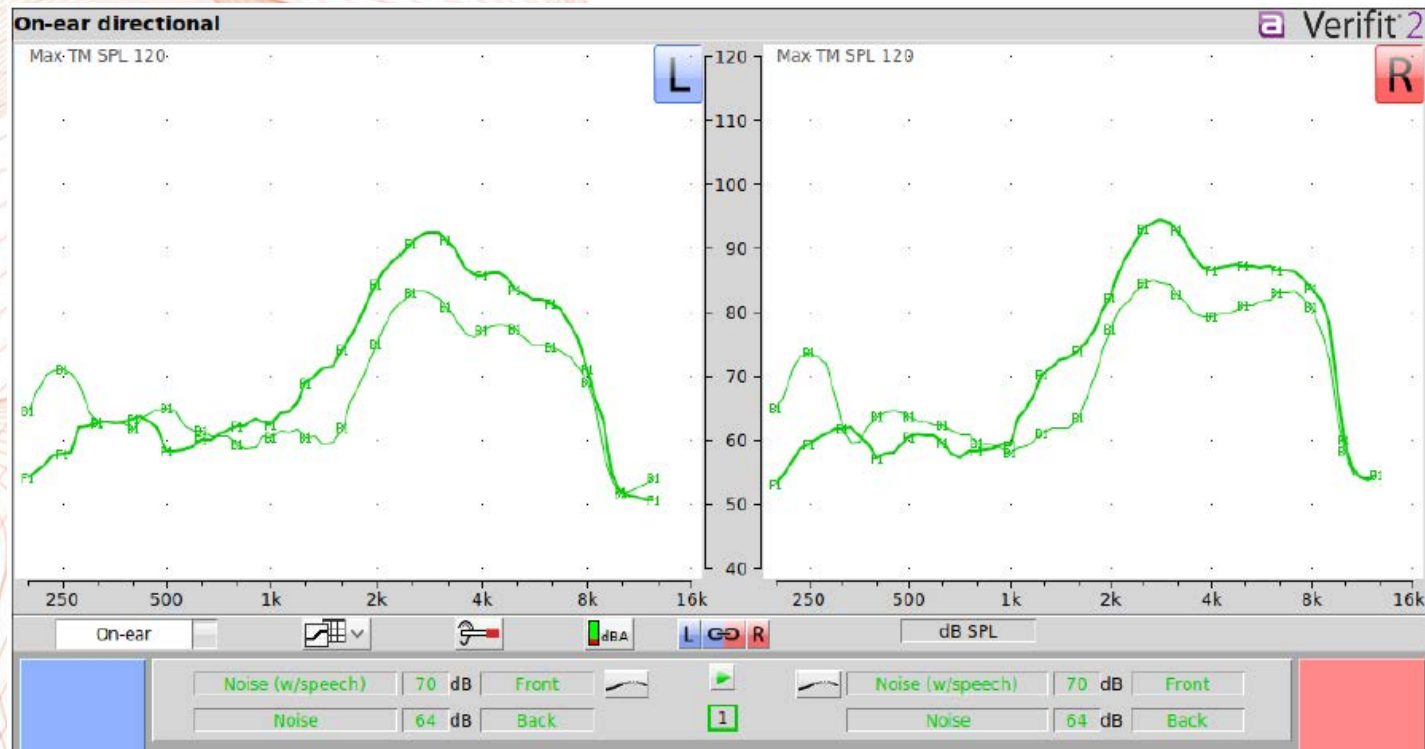


Verifit in On-ear
directional mode



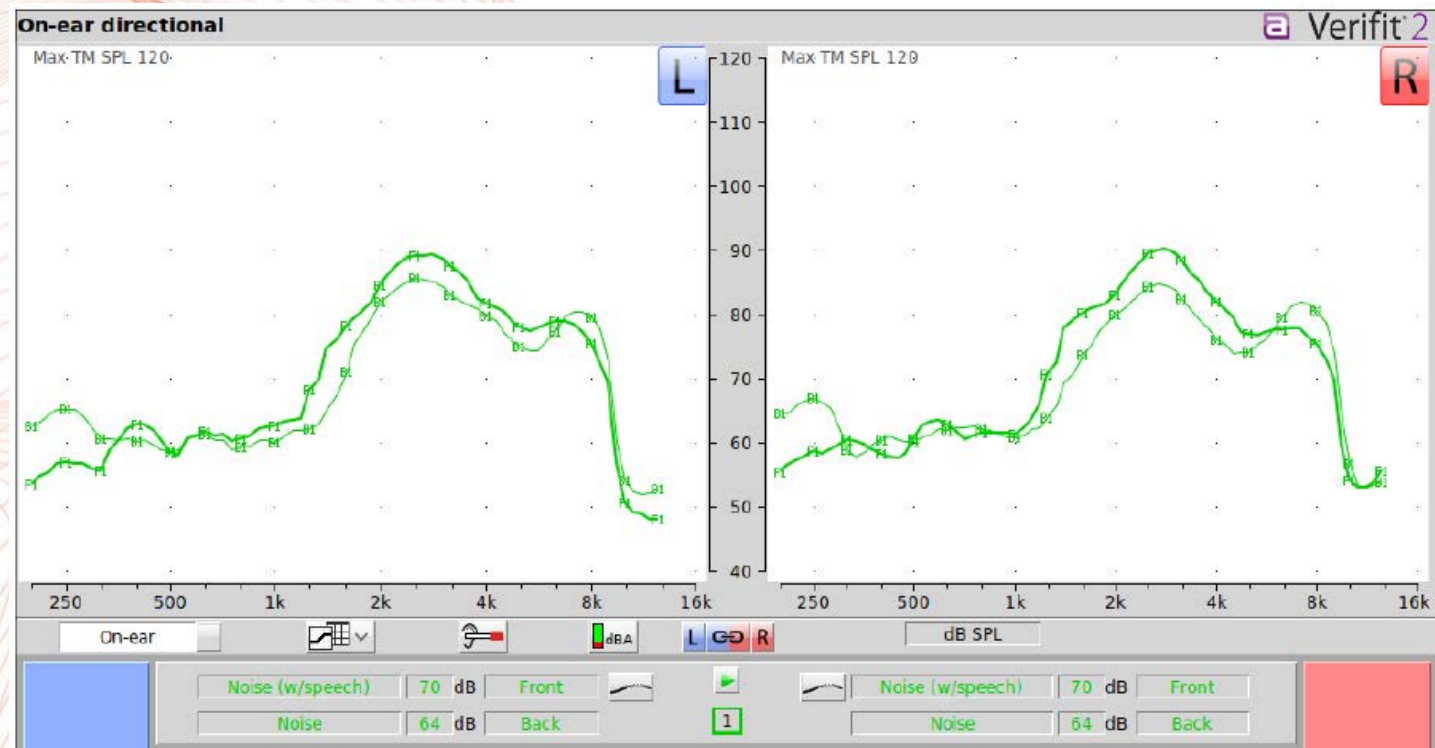
Equal distance

Directionality - Signia



Left	200	250	315	400	500	630	800	1k	1k25	1k6	2k	2k5	3k15	4k	5k	6k3	8k	10k0	12k5	Right	200	250	315	400	500	630	800	1k	1k25	1k6	2k	2k5	3k15	4k	5k	6k3	8k	10k0	12k5
Test 1 F	54	58	63	63	58	60	62	62	69	74	84	91	91	86	84	81	71	52	51	Test 1 F	53	59	62	57	60	60	58	59	70	74	82	93	93	86	87	87	84	60	55
Test 1 B	65	71	63	62	65	61	59	60	60	62	75	83	81	77	77	74	69	52	54	Test 1 B	65	74	62	64	64	62	60	58	61	63	77	84	83	79	81	83	81	58	55

Directionality - Widex



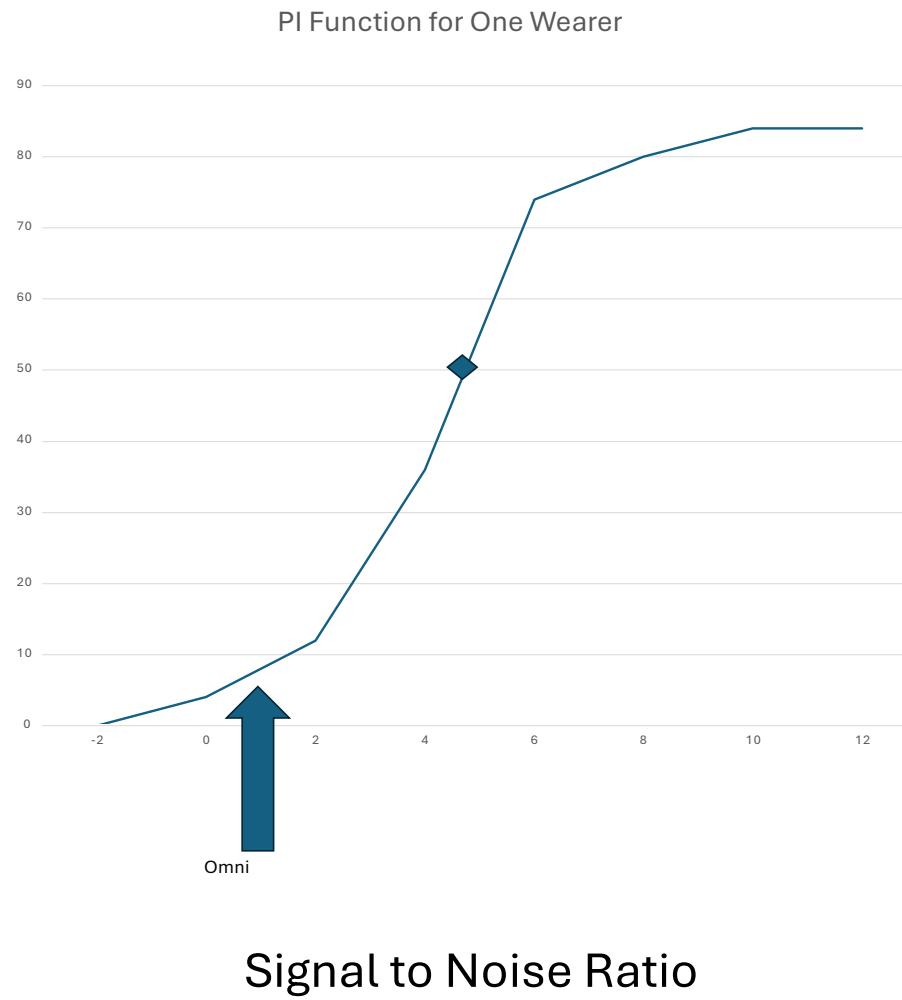
Left	200	250	315	400	500	630	800	1k	1k25	1k6	2k	2k5	3k15	4k	5k	6k3	8k	10k0	12k5
Test 1 F	53	57	56	63	58	62	61	63	68	78	85	89	88	82	78	79	76	51	48
Test 1 B	63	65	61	60	59	61	59	60	62	71	82	86	83	80	75	77	79	54	53

Right	200	250	315	400	500	630	800	1k	1k25	1k6	2k	2k5	3k15	4k	5k	6k3	8k	10k0	12k5
Test 1 F	55	59	60	58	61	63	62	61	71	80	83	90	88	82	77	78	75	54	56
Test 1 B	65	67	59	60	60	62	62	61	64	74	80	84	82	76	74	80	81	57	54

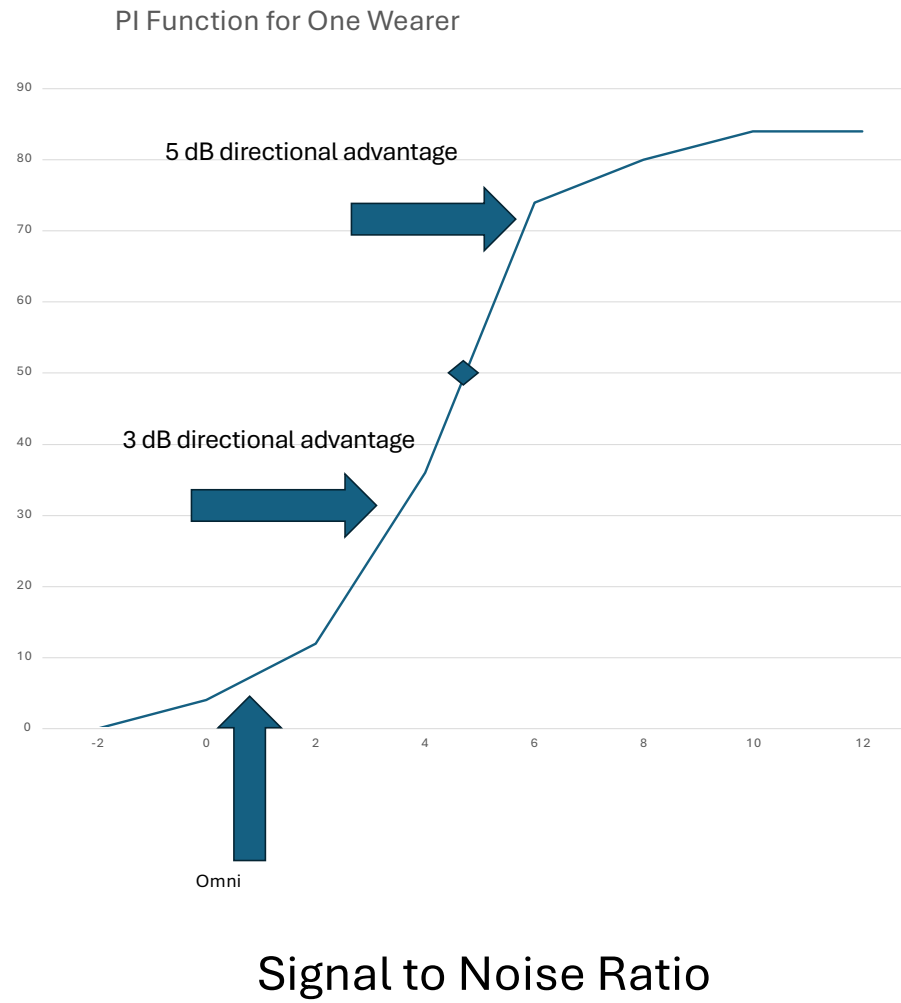
Effective Directionality

- In listening situations with an adverse SNR (e.g., ~ 70 dB SPL, with a +1 or +2dB SNR), bilateral beamformers can provide an added 2 dB advantage over unilateral beamformers.
- When might a 2 dB advantage make a big difference?

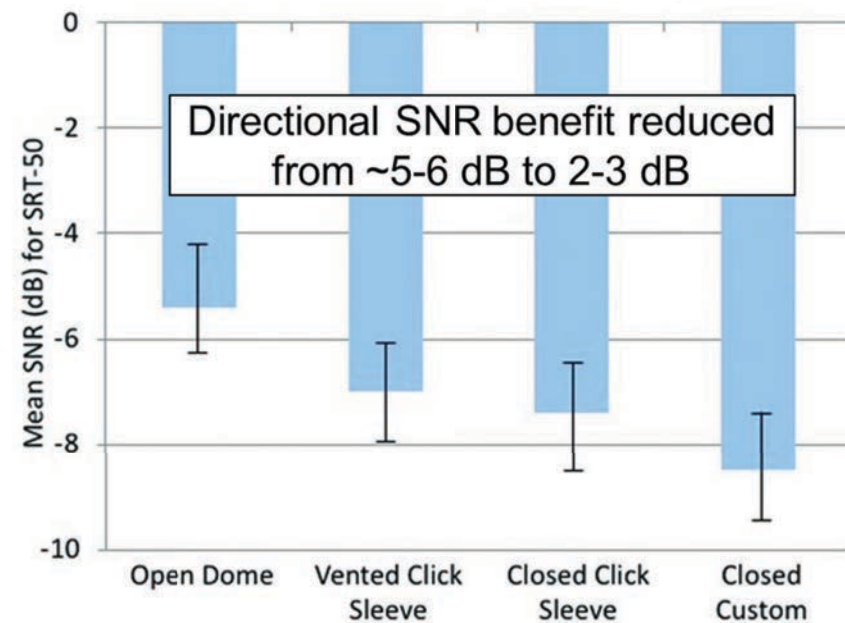
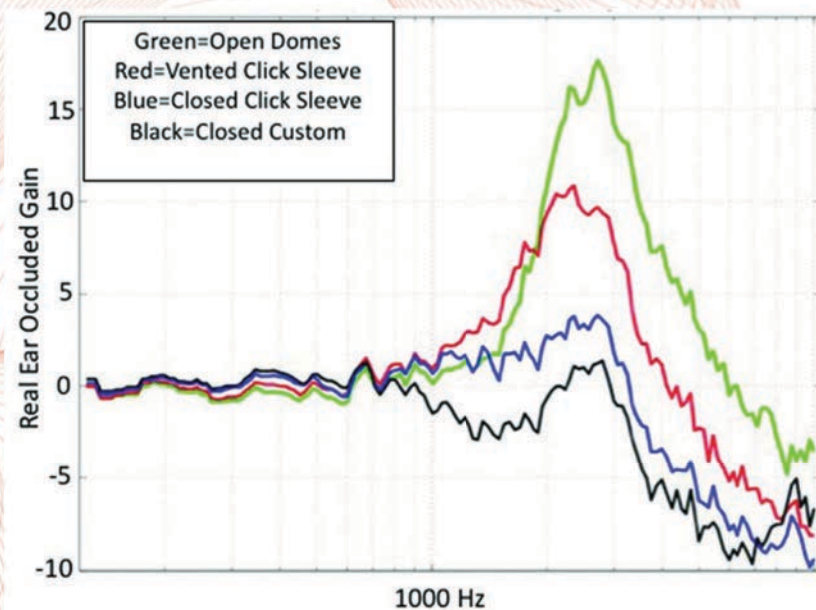
SRT-50
(%)



SRT-50
(%)



Of course, venting can have a big effect on SNR improvements



Top to bottom, these REOGs correspond to the speech recognition results (left to right)

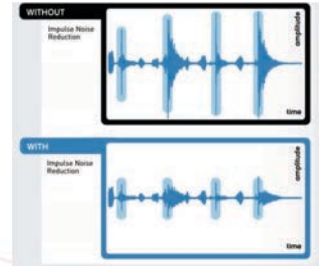
Guidelines call for:

Principle 2

- For acoustically challenging listening situations, improving the wearer's SNR is always beneficial. Both brands improve the SNR. Signia's bilateral beamformer has a slight 1-2 dB advantage. This advantage is expected to disappear with any open eartip coupling.
- Consider using custom earmolds instead of open eartips, as the latter is prone to reduction in directional benefit.

Principle 3 (LE)

- There is a risk that hearing aid processing might increase listening effort. Therefore, hearing aids should minimize cognitive load, loudness discomfort, or other perceptual sound difficulties.
- What the audiologist needs to do:
- Set the hearing aid's MPO just under the patient's LDLs. Ensure digital noise reduction algorithms are activated but not too aggressive.

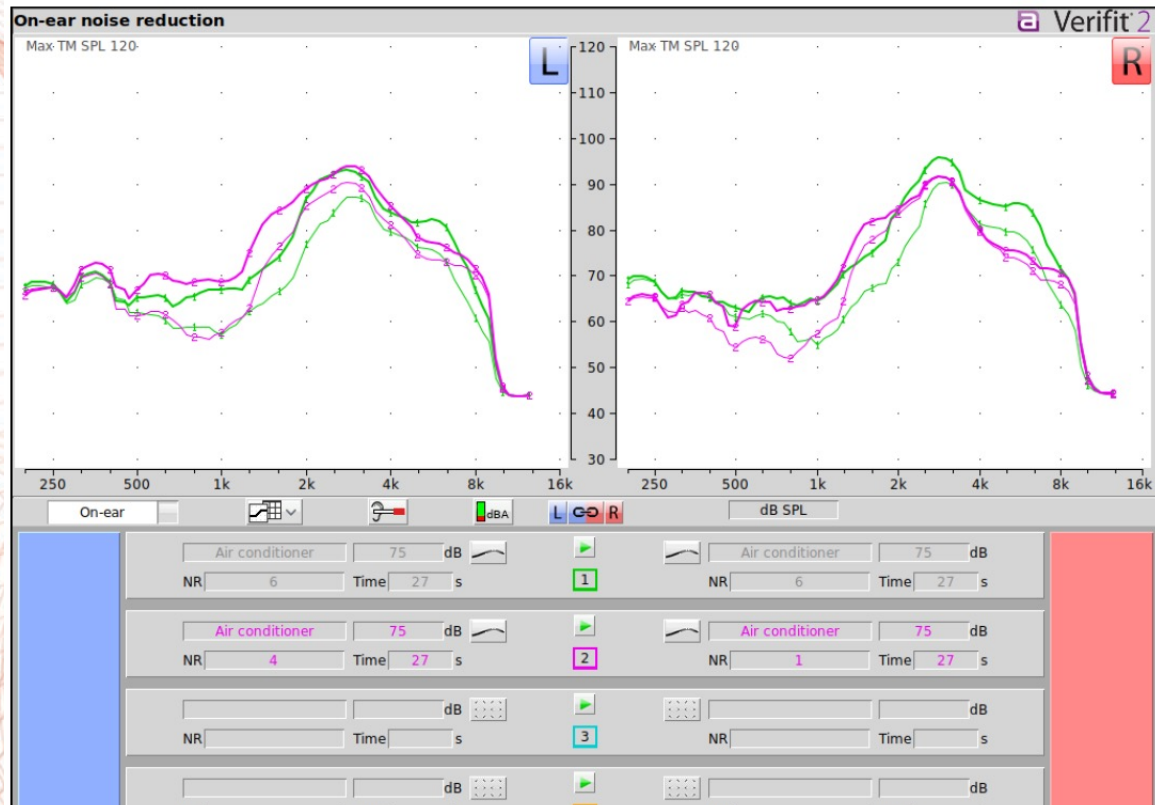


Guidelines call for:

Principle 3

- Noise reduction is best set to moderate
- Consider adding a second program because some wearers might prefer stronger noise reduction in some listening situations
- Noise reduction settings should be validated with the patient

Digital Noise Reduction

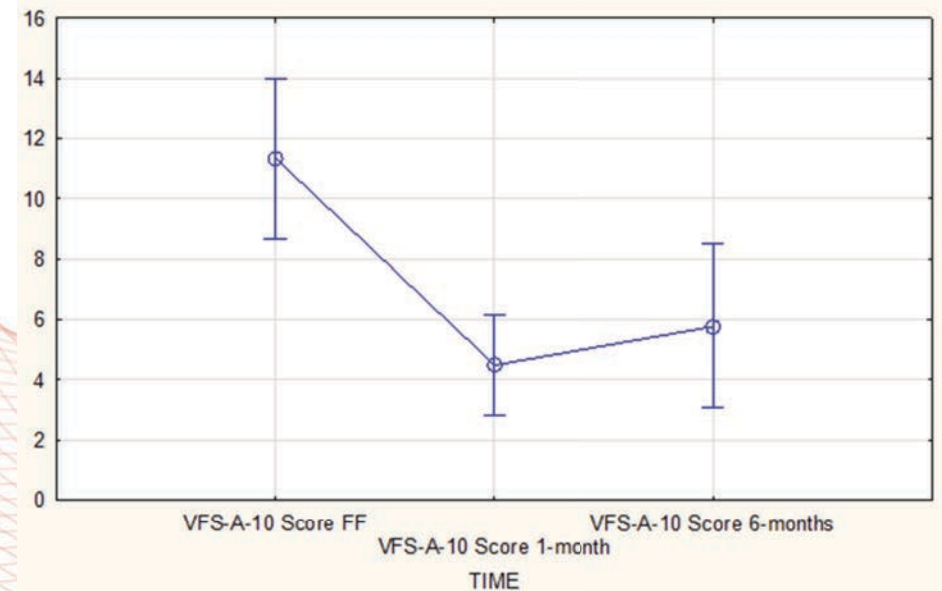


Left	200	250	315	400	500	630	800	1k	1k25	1k6	2k	2k5	3k15	4k	5k	6k3	8k	10k0	12k5
Pre test 1	68	68	70	69	65	65	65	67	69	74	87	92	92	84	82	81	67	45	44
Post test 1	67	67	68	68	62	60	59	57	62	67	77	84	87	80	76	73	61	45	44
Pre test 2	66	67	71	71	67	70	69	69	75	84	89	92	93	85	78	76	72	46	44
Post test 2	67	68	70	68	61	61	57	58	63	76	85	89	89	81	75	73	70	45	44

Right	200	250	315	400	500	630	800	1k	1k25	1k6	2k	2k5	3k15	4k	5k	6k3	8k	10k0	12k5
Pre test 1	69	69	67	65	63	65	64	65	70	75	84	93	95	86	85	84	72	48	44
Post test 1	68	69	66	65	61	62	58	55	61	67	73	86	90	81	80	76	64	46	44
Pre test 2	64	65	64	66	59	64	63	65	72	82	85	90	91	80	75	73	71	48	44
Post test 2	64	65	63	61	54	56	52	57	65	78	84	90	91	80	74	71	68	47	44

Validation of DNR Settings

		Never/ Almost Never	Rarely	Sometimes	Often	Almost Always/ Always
1.	I feel worn out from everyday listening.	0	1	2	3	4
2.	Struggling to listen and understand makes me feel tired.	0	1	2	3	4
3.	I get so exhausted from listening that I cannot do the things I enjoy.	0	1	2	3	4
4.	I schedule my day to avoid getting tired from listening.	0	1	2	3	4
5.	I get so tired from listening that I start to miss details in a conversation.	0	1	2	3	4
6.	I get so exhausted from listening that I go to bed early.	0	1	2	3	4
7.	I withdraw when I am unable to follow conversations in noisy places.	0	1	2	3	4
8.	Feeling tired from listening causes strain on my relationships.	0	1	2	3	4
9.	I feel emotionally drained when it is hard for me to listen and understand.	0	1	2	3	4
10.	It takes a lot of energy to listen and understand.	0	1	2	3	4



Guidelines call for:

Principle 3

- Digital noise reduction is best set to moderate **Both brands use modest amounts of DNR**
- Consider adding a second program because some wearers might prefer stronger noise reduction in some listening situations
- Digital noise reduction settings should be validated with the patient

5 Clinical Nuggets



Clinical Nugget #1: Go Beyond Matching Prescribed Gain Targets

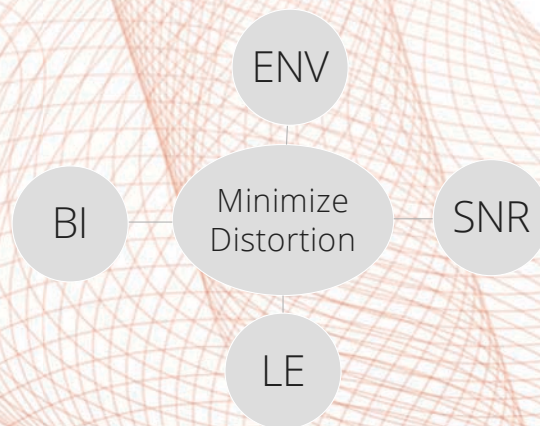
- Conducting verification and matching gain to a prescription target alone does not make a good hearing aid fitting
- Maintain a smooth, broadband frequency responses with an effective compression ratio (gain difference between 50 and 80dB SPL) of ~1.7 or less
- Bilateral beamformers benefit all listeners, regardless of the underlying compression speed of the hearing aid (Rallipalli, et al 2024). Thus, ensure directional system is working properly. (Note: not all manufacturers use adaptive 4-mic arrays)
- Use REM co-listening to confirm sound quality is acceptable (Scollie, 2024)

Clinic Nugget #2: Know the Defaults of Your Manufacturer

- Be aware of the default parameters of the manufacturer. You can learn a lot with REM and your test box. Know the gain, compression, MPO defaults of your favorite manufacturer and when they need to be adjusted for older adults
- Important: With software adjustments, many compression, directionality, and noise reduction parameters across manufacturer's can be programmed to meet Windle et al 2023 guidelines

Clinical Nugget #3: Validate Preferences with Self-Reports

- Given individual variability, it is essential to validate each wearer's preference and amount of benefit, centered on the 4 Principles
- Consider your self-report validation options and choose wisely:
 - Profile of Aided Loudness (PAL)
 - Vanderbilt Fatigue Scale for Adults (VFS-A-10)
 - Client-oriented Scale of Improvement (COSI)



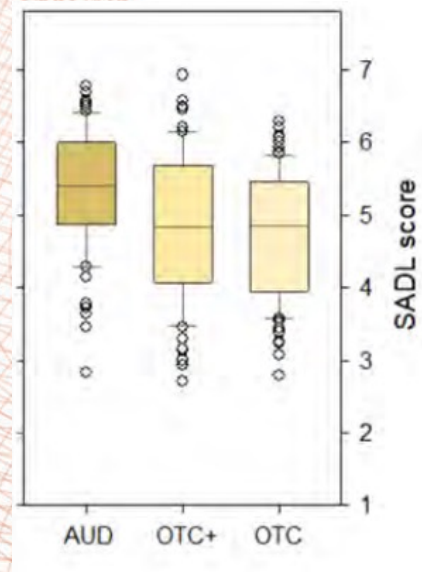
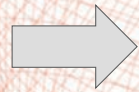
Clinical Nugget #4: Use unaided Quick SIN scores as a counseling guide

- Hearing aids cannot overcome all the peripheral and central auditory deficits experienced by older adults.
- Use the unaided Quick SIN scores as a guide. If score is greater than ~7dB SNR loss or patient is in a lot of adverse SNR situations, set reasonable expectations
- Instruct these patients on how to modify their listening environments and behaviors in noisy places. Talk about supplemental technology (remote mics, live speech captioning on smartphone, auditory training exercises)

Clinical Nugget #5: Lean into your counseling skills and use of best-practice guidelines

- Remind your patients that it is more important to see a premium provider who follows current clinical guidelines (e.g., Windle et al, 2023), than it is to purchase premium devices from someone not following those (or any other published) guidelines

In-person care yielded best outcomes



Key References

- Jenstad, L. (2011). Considerations in Hearing Aid Fitting for Older Adults & Overcoming the Hearing Aid Barrier. Audiology Online, 6 Dec 2011. Retrieved from <https://www.audiologyonline.com/articles/considerations-in-hearing-aid-fitting-793>.
- Mishra, S. K., Saxena, U., & Rodrigo, H. (2022). Extended High-frequency Hearing Impairment Despite a Normal Audiogram: Relation to Early Aging, Speech-in-noise Perception, Cochlear Function, and Routine Earphone Use. *Ear and hearing*, 43(3), 822–835.
- Rallapalli, V., Freyman, R., & Souza, P. (2025). Relationship Between Working Memory, Compression, and Beamformers in Ideal Conditions. *Ear and hearing*, 46(2), 523–536.
- Ross, B., Dobri, S., & Schumann, A. (2021). Psychometric function for speech-in-noise tests accounts for word-recognition deficits in older listeners. *The Journal of the Acoustical Society of America*, 149(4), 2337.
- Scollie, S. (2023). 20Q: next-level hearing aid verification AudiologyOnline, Article 28775. Available at www.audiologyonline.com
- Windle, R., Dillon, H., & Heinrich, A. (2023). A review of auditory processing and cognitive change during normal ageing, and the implications for setting hearing aids for older adults. *Frontiers in neurology*, 14.
- Windle, R. (2024). 20Q: Changes to auditory processing and cognition during normal aging – should it affect hearing aid programming? part 1 – changes associated with normal aging. AudiologyOnline, Article 28791. Available at www.audiologyonline.com
- Windle, R. (2024). 20Q: Changes to auditory processing and cognition during normal aging – should it affect hearing aid programming? part 2 – programming hearing aids for older adults. AudiologyOnline, Article 28792. Available at www.audiologyonline.com
- Wu, Y.H.; Stangl, E.; Branscome, K.; Oleson, J. & Ricketts, T.A. (2025). Impact of hearing aid service-delivery model and technology on patient outcomes: A Randomized Clinical Trial. *JAMA Otolaryngology-Head & Neck Surgery*. doi:10.1001/jamaoto.2025.1008

Questions

- brian.taylor@wsa.com

