

FOR PROFESSIONALS



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Guide for clinicians

**Adult Cochlear Implant
home-based auditory
training**



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Part 1 Purpose of the home-based auditory training manuals

Auditory training is an important component of adult post-implant rehabilitation. It can be useful to train listening skills and communication strategies, empower the recipient in their listening progress, and encourage good speaking habits in the family and with close associates. Also, areas of ongoing difficulty can be used as an indicator for further improvements of cochlear implant programming.

As clinicians find themselves managing ever-growing cohorts of recipients, it may be difficult to spend sufficient time with recipients with recently activated devices, training on auditory skills and building their confidence in the new auditory stimulus.

Clinician-guided home practice consolidates and supplements the work done in the clinic and is an important component of the post-implant habilitation process in its own right. It enables the recipient to listen within their own environment, which includes such effects as reverberation and environmental distractions, rather than the controlled environmental conditions of the clinic room.

In addition, the recipient has the opportunity to become more proficient at listening to their most frequent communication partners in their daily lives.

The Adult Cochlear Implant home-based auditory training manuals have been designed to provide hands-on materials that are flexible and adaptable enough to cover a range of auditory abilities.

Many exercises have a component for recipients and families to create exercises on topics/ vocabulary of relevance and interest to them.

The aim of the manuals is to supplement the work of the clinician in the clinic, rather than replace it. The intention is for the clinician to select one of the manuals (the manual Getting started or the manual Making progress) and provide a manual for each new recipient in the early days following the switch-on of their implant, and to guide them through the exercises.

The manuals also provide an auditory training exercise plan, which is completed by the clinician and the recipient.

The screening tests (see *appendices 1 and 2*) will help establish an appropriate training level for each recipient.



Part 2 How to use the home-based auditory training manuals

Which manual?

Recipients who progress quickly with the manual Getting started can switch to the manual Making progress

Where to start in the manuals

Both manuals are structured into two sections: Section A Getting started and Section B Making it more challenging. They are both structured according to the auditory development hierarchy.

- Manual Making progress
 - **Section A** Getting started. Sound and speech identification (closed set) and easier speech recognition (open set) exercises.
 - **Section B** Making it more challenging. Open set speech recognition and comprehension exercises in quiet and background noise, and telephone training.
- Manual Getting started
 - **Section A** Getting started. Sound and speech identification exercises (closed set).
 - **Section B** Making it more challenging. Speech recognition (pseudo open set and open set) and speech comprehension.

It is important that training be conducted at an appropriate level for the individual recipients' auditory skills, where the exercises are challenging but not too difficult. Training is more effective if the recipient works at a level where some success is achieved (70–90%), but not 100% proficiency. This maintains the recipient's motivation but leaves room for improvement. The screening tests (see below) provide an indication of the level at which to start.

This is a guide only; the recipients' success with the listening tasks attempted in the clinic is your best indication. We recommend that all recipients complete the sound awareness environmental sounds checklist to start the process of learning to filter out unwanted sounds.

Tips to maximise success

During each clinic session, make a written plan for the exercises to be completed at home by completing the auditory training exercise plan.

- Suggest the appropriate training environment, for example, the quietest place in the house to start, and then as they need more challenging environments, the verandah, lounge room with television on in the background, or in a room the recipient has reported as especially challenging.
- Ask the recipient to complete the recipient notes section when doing the planned exercises at home.
- Encourage the recipient and speaker to work at a distance of about one metre initially, and find a quiet part of the home, to maximise early success.
- Suggest that the training is done at the same time every day, about five days each week for 20–30 minutes at a time. A regular time slot increases the ease with which they can incorporate auditory training into everyday life.

How to demonstrate the manual to your recipient and their speaking partner



Using the prompts at the start of the exercise, explain the purpose and method of each task.

- Demonstrate the exercise using the first one or two items in the exercise. You may need to discuss the volume of speech you are using, and the speed of speech you feel is appropriate for the recipient.
- Demonstrate how to rehearse the target items while pointing to them.
- Show the recipient and speaking partner how to remove visual cues without holding a hand close to the mouth (recipient looks down, speaker sits beside the recipient on the implanted side).
- Demonstrate appropriate feedback; discourage the use of “no”, and demonstrate alternatives such as “listen again”, “nearly right, listen to the end of the sentence again”, or “it sounds a bit like that word but it’s a different word”.

- Discuss how to provide training and further cues (for example, some visual cues, word emphasis) when the recipient experiences difficulty.
- Ask the speaking partner to do the next item in the exercise. Check that the speaker is using an appropriate voice level/speed of delivery/feedback.



Show the recipients how they can create more material – look for blank tables at the end of the exercise where the recipient and their family can create a similar task with a topic/vocabulary that is relevant to the recipient.

- Suggest other environments or particular family members for speaking partners.
- For some of the later exercises the recipient will work from their own sheets, which are available in the appendices of the manuals.

Progressing the exercises

Explain to the speaking partner how to extend an exercise that is becoming too easy, using the following methods:

- Use longer words.
- Include less familiar vocabulary.
- Increase the distance (for example, by sitting across a table) or sit on the non-implanted side.
- Offer less repeats, encourage more guessing.
- Use less predictable vocabulary.
- Change the environment to incorporate progressively more noise.
- Slowly increase the rate of speech.
- Example on Power point document.





Part 3 Screening tests

It is important to use appropriate screening tests to assess the recipient's ability to identify and recognise speech. Firstly, the results from the screening tests may be used as a guide in setting an appropriate training level for the recipient.

Secondly, repeated assessment using such screening tests before and after the training also provides some indications of whether recipients have benefited from the training or whether the training difficulty should be adjusted.

This manual provides four screening tests (Levels A–D). The screening forms are shown in appendix 1 and can be photocopied. Screening tests Levels A and B are adapted from Mecklenburg, Dowell & Jenison (1982), Cochlear Adult Rehabilitation Manual.

1 Screening tests Levels A–D

Screening test Level A

- The recipient can look at the test sheet while you give the instructions.
- Instructions to recipient: *"I will say one word from each line, please say or point to the word I said."*
- Calculate the correct score as a percentage.
- Make a plan:
If score $\geq 80\%$: give Screening test Level B.
If score $< 80\%$: start at the beginning of the manual Getting started.

Screening test Level B

- The recipient should look at the test sheet while you give the instructions.
- Instructions to recipient: *"I will say one of the four sentences in each set. Please point to or tell me which sentence I said."*
- Calculate the correct score as a percentage.
- Make a plan:
If score $\geq 80\%$: give Screening test Level C.
If score $< 80\%$: use the manual Getting started.

Screening test Level C

- The recipient must not see your copy of the test material. The recipient will have a copy with the first half of the sentence only.
- Instructions to recipient: *"I will say the first half of a sentence with you lip reading. I will then say the whole sentence without you lip reading. Please try to repeat the whole sentence. If you are not sure, please make the best guess that you can."*
- Score one point for each underlined word correctly repeated.
- Calculate the correct score as a percentage.
- Make a plan:
If score $\geq 80\%$: give Screening test Level D.
If score $< 80\%$:
- Use the phoneme confusion matrices (appendix 2) to check vowel and consonant identification and specify training as required.
- Use the manual Getting started.

Screening test Level D

- The recipient does not see the test material as this is completely open set.
- Instructions to recipient: *"I will say some sentences. Please try to repeat as much of the sentence as you can, even if it's only one word. If you are not sure, make a guess. Guessing always counts."* Do not give repeats.
- Use the precise scoring method: each word must be repeated exactly (for example, plurals are scored as incorrect – in sentence one, the response "dogs" instead of "dog" is scored as incorrect).
- Calculate the correct score as a percentage.
- Make a plan:
If score $\geq 80\%$:
- Use the phoneme confusion matrices (appendix 2) to check any residual vowel or consonant confusions, and give training as required.
- Use the manual Getting started: start at section B, part 1, module 9, and work through the manual from there (also include some of the earlier exercises in challenging conditions to enhance hearing in noise or over the phone).
If score $< 80\%$:
- Use the phoneme confusion matrices (appendix 2) to check any residual vowel or consonant confusions, and give training as required.
- Use the manual Getting started: start at section A, modules 4 and 5; or use the manual Getting started: start at section B, module 17.

2 Phoneme recognition tests

It is important to reinforce the ability of recipients to identify phonemes. Vowel and consonant recognition is assessed to determine areas of difficulty then exercises are given based on the results. This guide includes phoneme recognition tests, and both manuals include phoneme identification exercises.

- The vowel recognition test (appendix 2) requires the recipient to identify vowels from a set of 11 vowels (non-diphthongs), presented in an /h/-vowel-/d/ context (for example, “heed”, “hid”, “head” etc.). The consonant recognition test (appendix 2) requires the recipient to identify consonants from a set of 12 consonants in an /a/-consonant-/a/ context (for example, “aba”, “apa”, “ama” etc.).
- The tables at the end of this section provide a list of the vowel and consonant exercises included in the manuals.



Test procedures

- Present the vowel or consonant recognition test by audition alone, randomly selecting stimulus items from the vowel matrix (for example, “heed”, “hid”, “head” etc.) or consonant matrix (for example, “aba”, “apa”, “ama” etc.) in appendix 2. Do not give repeats.
- Ask the recipient to repeat the stimuli.
- Record the results in the matrix.
- Analyse the matrix for the errors/pattern of errors and determine which phonemes/phoneme features require specific auditory training.
- Make a plan: Based on the errors in phoneme recognition, select appropriate exercises from the take-home manuals, with reference to the Phoneme identification exercises.

Example 1 You perform vowel recognition testing with a recipient with a prelingual hearing loss. The vowel recognition matrix results show accurate vowel duration identification but poor vowel frequency identification. In the manual Getting started, start at module 4, exercises 4 and 5.

Example 2 You perform consonant recognition testing with a recipient with a postlingual hearing loss. Analysis of the matrix shows accurate identification of voicing and manner of articulation cues but some confusion, for example, among aba/ada/aga and among asa/asha/afa (that is, errors in identifying the place of articulation). In the manual Getting started, concentrate on module 3, exercises 10–13.

Phoneme identification exercises

Manual Making progress

Vowel identification – Level 1

Exercise 1: Vowel duration

Vowel identification – Level 2

Exercise 2: Vowel frequency cues (same duration)

Exercise 3: Vowel frequency cues (same duration, differ F2 only)

Consonant identification – Level 1

Exercise 4: Voicing

Consonant identification – Level 2

Exercise 5: Manner of articulation – stops vs nasals (voiceless)

Exercise 6: Manner of articulation – stops vs nasals (voiced)

Exercise 7: Manner of articulation – fricatives vs nasals

Consonant identification – Level 3

Exercise 8: Manner of articulation – lateral vs nasal

Exercise 9: Manner of articulation – affricate vs fricative

Consonant identification – Level 4

Exercise 10: Place of articulation – b, d, g

Exercise 11: Place of articulation – p, t, k

Exercise 12: Place of articulation – f, s, sh

Exercise 13: Place of articulation – m, n

Manual getting started

Vowel identification

Exercise 1: Vowel duration and frequency cues

Exercise 2: Vowel duration and frequency cues (more similar)

Exercise 3: Vowel duration and frequency cues (in sentences)

Exercises 4 and 5: Vowel frequency cues (same duration)

Consonant identification

Exercise 6: Position of the high pitched consonant

Consonant identification – Level 1

Exercises 7 and 8: Voicing

Consonant identification – Level 2

Exercise 9: Manner of articulation – stops vs nasals (voiceless)

Exercise 10: Manner of articulation – stops vs nasals (voiced)

Exercise 11: Manner of articulation – fricatives vs nasals

Consonant identification – Level 3

Exercise 12: Place of articulation/high pitched consonants

Appendix 1

Screening test forms A–D

Screening Level A*			
1	park	baseball	impossible
2	hot	entertainment	entertainment
3	boy	shipwreck	understanding
4	cow	rainbow	helicopter
5	duck	mushroom	watermelon
6	meat	cowboy	escalator
7	cold	footstep	demonstration
8	calm	workshop	television
9	cash	sandwich	qualification
10	tea	hotdog	difficulty
SCORE (keywords correct)			/10
			%

* Adapted from Mecklenburg, Dowell & Jenison (1982). Cochlear Adult Rehabilitation Manual.

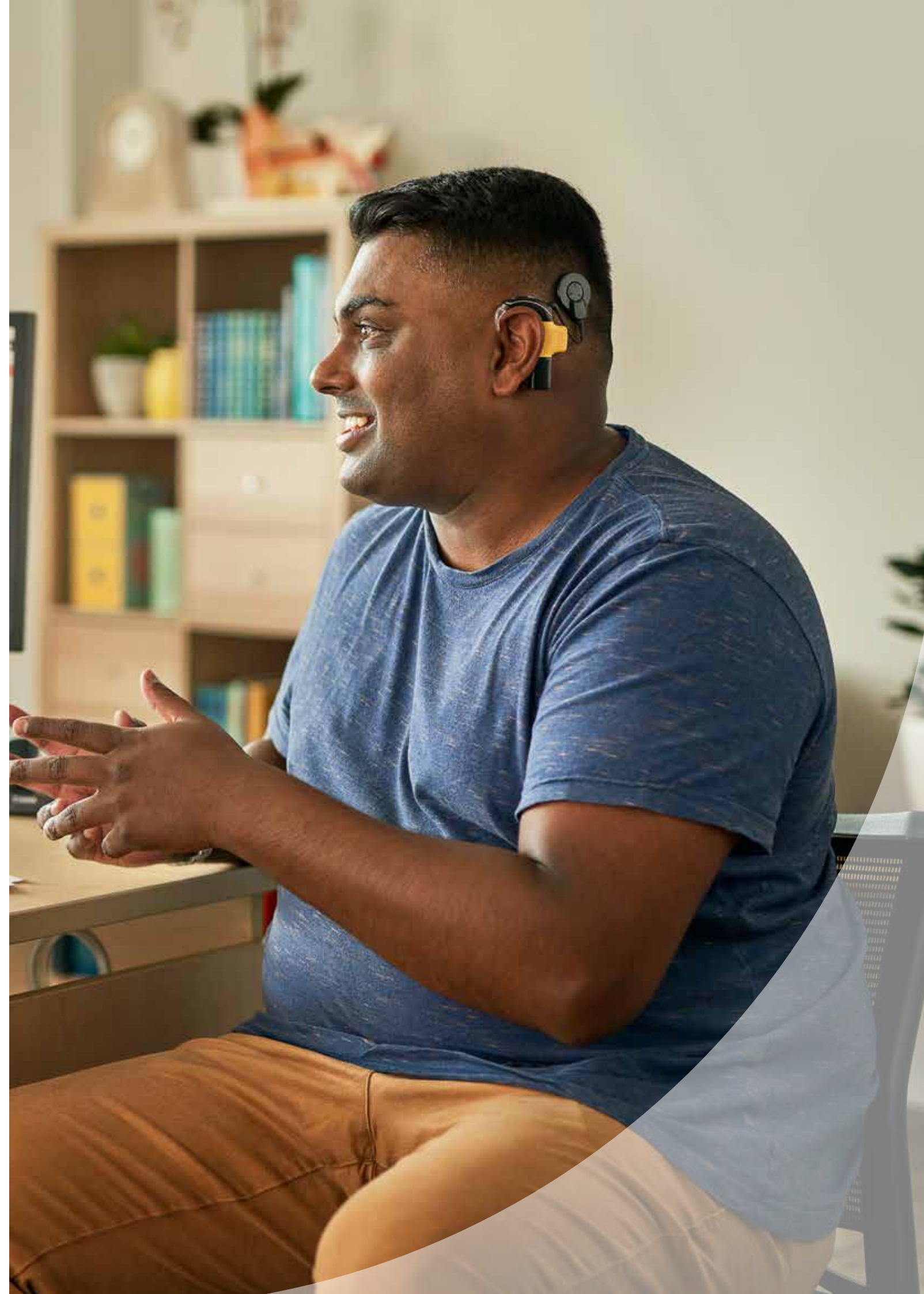
Screening Level B*			
1	The goldfish is in the bowl. There is no time. Sunrise will be early. The girl has long hair.	6	Come in the front door. There could be a mistake. Dogs bark too much. We eat lunch at one o'clock.
2	She has gone now. Coffee has caffeine. There is no sunshine today. The last flood was in March.	7	I can see you. There's a full moon tonight. Watch the football game. The farm is in the country.
3	The teacher spoke too quietly. Please wait at home. He bought a new car. Drink orange juice for a cold.	8	You can travel by train. The red pen is on the desk. She is ten years old. Please serve the tea.
4	The children went to bed. We swim in the lake. Drive the car home. Bring it here.	9	It's a long distance call. We need wood for the fireplace. The suitcase is brown. She has a fever.
5	I'll be there in a minute. Practise makes perfect. A whale is a mammal. The dog is brown.	10	The winter months are cold. Take your vitamins. Knock on the door. Eat fresh fruit.
SCORE (keywords correct)			/10
			%

Screening Level C: Clinician copy		
		Score
1	The children played with... a <u>bat</u> and <u>ball</u> .	/2
2	Go to the bank to... <u>open</u> an <u>account</u> .	/2
3	He went shopping to buy... <u>milk</u> and <u>bread</u> .	/2
4	I'm looking for a house... with <u>three</u> <u>bedrooms</u> .	/2
5	She spent her holiday... <u>swimming</u> at the <u>beach</u> .	/2
6	He travelled to work... by <u>bus</u> and <u>train</u> .	/2
7	At the farm they saw... some <u>cows</u> and <u>horses</u> .	/2
8	Please wake me up... at <u>five</u> o'clock.	/2
9	She cleaned the house with... a <u>mop</u> and a <u>broom</u> .	/2
10	The weather will be... <u>warm</u> and <u>sunny</u> .	/2
SCORE (keywords correct)		/20
		%

Screening Level C: Clinician copy	
1	The children played with...
2	Go to the bank to...
3	He went shopping to buy...
4	I'm looking for a house...
5	She spent her holiday...
6	He travelled to work...
7	At the farm they saw...
8	Please wake me up...
9	She cleaned the house with...
10	The weather will be...

Screening Level D*		
		Score
1	The <u>dog</u> <u>barked</u> at the <u>cat</u> .	/2
2	<u>Kick</u> the <u>ball</u> .	/2
3	<u>Wash</u> the <u>shirt</u> .	/2
4	She <u>added</u> the <u>sugar</u> .	/2
5	He <u>ordered</u> <u>apple</u> <u>pie</u> .	/2
6	She <u>sewed</u> the <u>coat</u> .	/2
7	The <u>play</u> is <u>starting</u> <u>soon</u> .	/2
8	There is a <u>horse</u> in the <u>paddock</u> .	/2
9	The <u>sun</u> <u>rose</u> in the <u>sky</u> .	/2
10	The <u>clothes</u> <u>dried</u> <u>outside</u> .	/2
TOTAL (keywords correct)	/25
	 %

*Adapted from IEEE sentences. Institute of Electrical and Electronic Engineers (1969) "IEEE recommended practice for speech quality measurements". IEEE Transactions on Audio and Electroacoustics, 17: 225-246. New York: IEEE.



Appendix 2

Vowel and consonant confusion matrix forms

Vowel matrix

		Response											
		heed	heed	head	had	hard	hud	hod	hawed	hood	who'd	heard	
Stimulus	heed	■											
	hid		■										
	head			■									
	had				■								
	hard					■							
	hud						■						
	hod							■					
	hawed								■				
	hood									■			
	who'd										■		
	heard											■	

Consonant matrix

		Response											
		aba	apa	ama	ava	afa	ada	ata	ana	aza	asa	aga	aka
Stimulus	aba	■											
	apa		■										
	ama			■									
	ava				■								
	afa					■							
	ada						■						
	ata							■					
	ana								■				
	aza									■			
	asa										■		
	aga											■	
	aka												■

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We aim to give people the best lifelong hearing experience and access to next generation technologies. We collaborate with leading clinical, research and support networks to advance hearing science and improve care.

That's why more people choose Cochlear than any other hearing implant company.

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