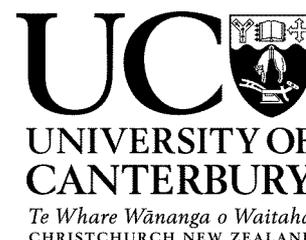


## **Appendix 2**

## College of Science

Ms Ruth Hope, Master of Audiology student  
Department of Communication Disorders  
Email: [rvh12@student.canterbury.ac.nz](mailto:rvh12@student.canterbury.ac.nz)



Associate Professor Margaret Maclagan  
Department of Communication Disorders  
Tel: 364 2987 ext 7083  
Email: [margaret.maclagan@canterbury.ac.nz](mailto:margaret.maclagan@canterbury.ac.nz)

### CONSENT FORM

## The development and evaluation of a speech in noise test for a New Zealand population

Part A: Determining the performance intensity function

Part B: Establishing sentence equivalence

Part C: Establishing equivalent lists

### DECLARATION

I \_\_\_\_\_ (the participant) have read and understood the description and requirements of the above-named study, as outlined in the attached information sheet. Any questions I have asked have been answered to my satisfaction. On this basis, I agree to participate in this study, realising that I may withdraw at any time without prejudice.

I understand that all information provided is strictly confidential and will not be released by the investigator unless required to do so by law.

I agree that research data gathered in this study may be published. I provide consent for this publication with the understanding that anonymity will be preserved, and my name and any other identifying information will not be used.

I note that this proposal has been reviewed and approved by the Department of Communication Disorders, University of Canterbury.

\_\_\_\_\_

Participant

\_\_\_\_\_

Date

## College of Science

Ms Ruth Hope, Master of Audiology student  
Department of Communication Disorders  
Email: [rvh12@student.canterbury.ac.nz](mailto:rvh12@student.canterbury.ac.nz)



Associate Professor Margaret Maclagan  
Department of Communication Disorders  
Tel: 364 2987 ext 7083  
Email: [margaret.maclagan@canterbury.ac.nz](mailto:margaret.maclagan@canterbury.ac.nz)

## PROJECT INFORMATION

You are invited to participate as a subject in the research project '**The development and evaluation of a speech in noise test for a New Zealand population**'. Speech in noise testing gives valuable information about a person's abilities to understand speech in the presence of background noise. It can give an indication of the benefit they may receive from hearing aids and other technology, such as personal FM systems. Speech in noise tests have been developed in the United States and many other parts of the world, but none as yet for a New Zealand population. The purpose of this study is to develop and test speech materials that use vocabulary appropriate for speakers of New Zealand English and are recorded by a native New Zealander.

### **Part A: Determining the performance intensity function**

The purpose of this specific phase of the study is to find out how altering the signal to noise ratio (SNR) affects the intelligibility of sentences when presented to normal hearing listeners. We can estimate this relationship by defining a performance intensity function, which plots how performance changes with intensity.

Your involvement in this project will consist of one testing session, which will last approximately one hour. At the beginning of the session, your hearing will be assessed. The task that you will be required to perform will involve listening to a number of short sentences which are made harder to understand by adding background noise. There will be three sets of sentences, presented at different levels relative to the background noise. You will be asked to repeat out loud as much of each sentence as you can.

These tests are perfectly safe and will in no way cause you any discomfort or harm. However, you may end the tests at any time and are free to discontinue participation in this study, including withdrawal of any information you have provided. There is the possible risk that the preliminary hearing assessment may reveal that you have a hearing loss. If this occurs, you will be entitled to a free diagnostic hearing test at the UC Speech and Hearing clinic.

The project is being carried out as a requirement for the Masters of Audiology degree by Ruth Hope, under the supervision of Margaret Maclagan, who can be contacted on the telephone number at the top of the page. She will be pleased to discuss any concerns you may have about participation in the project.

Thank you for choosing to take part in this study. Your participation is greatly appreciated.

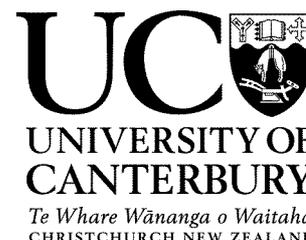
This proposal has been reviewed and approved by the Department of Communication Disorders, University of Canterbury.

## College of Science

Ms Ruth Hope, Master of Audiology student

Department of Communication Disorders

Email: [rvh12@student.canterbury.ac.nz](mailto:rvh12@student.canterbury.ac.nz)



Associate Professor Margaret Maclagan

Department of Communication Disorders

Tel: 364 2987 ext 7083

Email: [margaret.maclagan@canterbury.ac.nz](mailto:margaret.maclagan@canterbury.ac.nz)

## PROJECT INFORMATION

You are invited to participate as a subject in the research project '**The development and evaluation of a speech in noise test for a New Zealand population**'. Speech in noise testing gives valuable information about a person's abilities to understand speech in the presence of background noise. It can give an indication of the benefit they may receive from hearing aids and other technology, such as personal FM systems. Speech in noise tests have been developed in the United States and many other parts of the world, but none as yet for a New Zealand population. The purpose of this study is to develop and test speech materials that use vocabulary appropriate for speakers of New Zealand English and are recorded by a native New Zealander.

### Part B: Equalizing sentence intelligibility

The purpose of this specific phase of the study is to ensure that the sentence materials that we want to use in this test are of equivalent difficulty when presented to normal hearing listeners. To determine that all sentences are equally intelligible, we need to test your performance on these materials.

You will be required to attend one testing session, which will last approximately one hour and twenty minutes. At the beginning of the session, your hearing will be assessed. The task that you will be required to perform will involve listening to a number of short sentences which are made harder to understand by adding background noise. You will be asked to repeat out loud as much of the sentence as you can.

These tests are perfectly safe and will in no way cause you any discomfort or harm. However, you may end the tests at any time and are free to discontinue participation in this study, including withdrawal of any information you have provided. There is the possible risk that the preliminary hearing assessment may reveal that you have a hearing loss. If this occurs, you will be entitled to a free diagnostic hearing test at the UC Speech and Hearing clinic.

The project is being carried out as a requirement for the Masters of Audiology degree by Ruth Hope under the supervision of Margaret Maclagan, who can be contacted on the telephone number at the top of the page. She will be pleased to discuss any concerns you may have about participation in the project.

Thank you for choosing to take part in this study. Your participation is greatly appreciated.

This proposal has been reviewed and approved by the Department of Communication Disorders, University of Canterbury.

## College of Science

Ms Ruth Hope, Master of Audiology student

Department of Communication Disorders

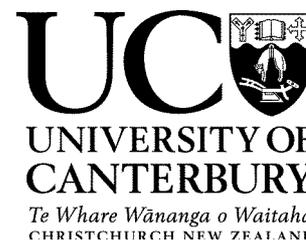
Email: [rvh12@student.canterbury.ac.nz](mailto:rvh12@student.canterbury.ac.nz)

Associate Professor Margaret Maclagan

Department of Communication Disorders

Tel: 364 2987 ext 7083

Email: [margaret.maclagan@canterbury.ac.nz](mailto:margaret.maclagan@canterbury.ac.nz)



## PROJECT INFORMATION

You are invited to participate as a subject in the research project '**The development and evaluation of a speech in noise test for a New Zealand population**'. Speech in noise testing gives valuable information about a person's abilities to understand speech in the presence of background noise. It can give an indication of the benefit they may receive from hearing aids and other technology, such as personal FM systems. Speech in noise tests have been developed in the United States and many other parts of the world, but none as yet for a New Zealand population. The purpose of this study is to develop and test speech materials that use vocabulary appropriate for speakers of New Zealand English and are recorded by a native New Zealander.

### Part C: Forming sentence lists

The purpose of this specific phase of the study is to ensure that the lists of sentences that we want to use in this test are of equivalent difficulty when presented to normal hearing listeners. In order to form lists that will be equally intelligible, we need to test your performance on these materials.

You will be required to attend one testing session, which will last approximately one hour. At the beginning of the session, your hearing will be assessed. The task that you will be required to perform will involve listening to a number of short sentences which are made harder to understand by adding background noise. After listening to each sentence, you will be asked to repeat out loud as much of the sentence as you can. The level of the sentences will vary in relation to the noise.

These tests are perfectly safe and will in no way cause you any discomfort or harm. However, you may end the tests at any time and are free to discontinue participation in this study, including withdrawal of any information you have provided. There is the possible risk that the preliminary hearing assessment may reveal that you have a hearing loss. If this occurs, you will be entitled to a free diagnostic hearing test at the UC Speech and Hearing clinic.

The project is being carried out as a requirement for the Masters of Audiology degree by Ruth Hope under the supervision of Margaret Maclagan, who can be contacted on the telephone number at the top of the page. She will be pleased to discuss any concerns you may have about participation in the project.

Thank you for choosing to take part in this study. Your participation is greatly appreciated.

This proposal has been reviewed and approved by the Department of Communication Disorders, University of Canterbury.

## Participant questionnaire

Date of test:

Name:

What is your native language(s)?

- New Zealand English  
 Other

What was the language in your household when you were a child?

- Native speakers of New Zealand English only  
 One or more non-native speakers of New Zealand English  
 Multilingual, including New Zealand English

What was the language in which you were educated?

- New Zealand English  
 New Zealand English and Other  
 Other

What is your highest level of education?

- Secondary  
 Tertiary  
 Postgraduate

Do you have difficulty understanding speech in noisy environments?

- Yes  
 No

If you answered yes, please rate the difficulty on a scale of 1 to 7, where 1 = mild difficulty and 7 = severe difficulty.

Rating:

Audiogram

		Frequencies							
Ear		250	500	1000	2000	3000	4000	6000	8000
Left									
Right									

## **Appendix 3**

## NZHINT original sentence list

1	She waited at the back door	61	The old woman nodded
2	The woman dropped her keys	62	His shoes were all muddy
3	They all had to leave	63	She dug up some potatoes
4	We made a fire out of sticks	64	Someone's knocking at the door
5	The waves crashed on the beach	65	The young girl ran down the road
6	Everyone sat on the bed	66	She waved from the doorway
7	They swam in the river	67	They're going to the movies
8	The ducklings walked in a line	68	The cheese is in the fridge
9	He looked at the rainbow	69	The baker gets up early
10	The boy slept in the warm sun	70	She threw the stick to the dog
11	She tripped over her shoelaces	71	The weka stole the bread
12	She tells me bedtime stories	72	My sister broke her arm
13	We had lunch on the lawn	73	She hid the money
14	They drank the hot tea	74	We followed the track
15	The park was full of leaves	75	The biscuits are in the oven
16	The moon shone brightly	76	They pushed off from the pier
17	We'll think of something	77	The front door creaks in the wind
18	He looked but didn't speak	78	She threw the fruit in the bin
19	She screwed up her eyes	79	They ate the apple crumble
20	She wore a long brown dress	80	The kitchen clock was fast
21	Her cheeks were bright red with cold	81	She crossed the car park
22	His mother wore a green scarf	82	We like milk in our tea
23	The big man's shoes hurt him	83	We talked all night
24	Suddenly there was the sea	84	They had lots of homework
25	They caught five little fish	85	The shopping bags were heavy
26	The family stopped to rest	86	Our friend stayed for tea
27	Mum taught me to swim	87	Our cat is very old
28	The boy burst out laughing	88	Mum bought a new summer dress
29	The game finished early	89	The children called out to us
30	Most of the logs were rotten	90	The cat curled up on the bed
31	He called out to his daughter	91	The wind blew the mist away
32	His father hoped they would win	92	The bottle fell on the floor
33	They waded out to the raft	93	They slept in the old hut
34	The farmer yelled at the dogs	94	The tall man frowned slightly
35	The paddock was muddy	95	We're going on holiday
36	The slippers had holes in them	96	The dog caught the possum
37	The spider made a web	97	The cat waved its tail
38	A few cars went down the road	98	The woman rode her bike
39	The man was very strong	99	She cooked some apples
40	The teacher sat in her chair	100	The kitchen was full of smoke
41	The kitten played with the string	101	He soon got tired of watching
42	The builder climbed the ladder	102	The cold air stung his face
43	The player lost his shoe	103	He ate a ham sandwich
44	She forgot about the cake	104	The mattress lay on the floor
45	The children laughed at the show	105	You'll be tired after the trip
46	She's out walking the dog	106	She was wide awake
47	They're not going anywhere	107	Mum called us for breakfast
48	The boy played in the snow	108	It was still very dark
49	She sat down on a rock	109	There were two old men there
50	He's coming back for tea	110	My sister picked some plums
51	Dad forgot to get the milk	111	He handed me the present
52	My brother talks too much	112	They walked towards the ocean
53	She's thinking about Christmas	113	She took a deep breath
54	He found an old skipping rope	114	She dropped the last peach
55	They heard the tui in the bush	115	We stayed and watched them work
56	We picked some daisies	116	They left without warning
57	She planted some seeds	117	No one knows the way
58	The sun came out today	118	The red car passed the bus
59	Class ran later than usual	119	He's missing his friends
60	It was time to get up	120	He carried a silver tray

121	A book case crashed down	184	Sunshine came through the window
122	We took the long way home	185	The waves lifted the boat
123	Our old wooden house was small	186	She pointed to the house
124	The sun was getting hotter	187	She could see the whales
125	The cleaner swept the floor	188	People hurried down to the sea
126	The girls stood to one side	189	The ferns were bright green
127	We had to empty our plates	190	The rocks cut her feet
128	She's finishing her drink	191	She had a handful of stones
129	He doesn't smile much	192	They knew the place very well
130	The children walked to school	193	After lunch they went walking
131	She started her homework	194	They washed their hands in the stream
132	They searched for the bag	195	She was allowed into the room
133	The farmer cleaned his shoes	196	He wanted to stay longer
134	He's walking down to the shop	197	She brushed her hair quickly
135	They ran back and forth	198	The boat came close to the shore
136	The smoke made him cough	199	She read five chapters
137	Something landed in his lap	200	The chicken soup was hot
138	She'll get wet if she slips	201	The water boiled on the stove
139	She's going to catch him	202	Her uncle waved from the car
140	You'll miss the show	203	The tins were stacked high
141	The news came yesterday	204	The chickens were noisy
142	The children stamped their feet	205	On Sunday morning it rained
143	She climbed out of the hay	206	They gathered around the fire
144	They had a lovely day	207	He's good at athletics
145	The knife cut the string	208	She asks hard questions
146	The bush rang with birdsong	209	The woman read the paper
147	She brushed the insects away	210	They learned two easy songs
148	A seagull flew overhead	211	She's upstairs in bed
149	She stared across the garden	212	The notice was worn away
150	Grandad made him work hard	213	Mum's ready for work now
151	The grass is still damp	214	They slept through the earthquake
152	It's eating all the food	215	The man saw lights on the lake
153	We can't pay our bill this month	216	We'll set a good example
154	The woman fell heavily	217	The window faced east
155	The doctor has a big bag	218	A lantern hangs on the porch
156	We don't know what to do	219	They filled three buckets
157	The clothes hang in the wardrobe	220	We're sorting out the dresses
158	The breeze moved the curtains	221	The dog was whining
159	The soldiers got off the train	222	They all got out safely
160	The old man counted his coins	223	The mist cleared for a moment
161	He found work on a boat	224	The others ate the soup
162	The boy drew a picture	225	The branch brushed her shoulder
163	She walked to the bus stop	226	We'll take care of each other
164	She slipped on the path	227	They're a close family
165	The runner turned the corner	228	The raft held together
166	The guitar is out of tune	229	There are no wrong answers
167	The fence was newly painted	230	His foot was trapped in the hole
168	He was too clever for them	231	She ignored the alarm
169	He took off his hat	232	They got a warm welcome
170	They chased the other children	233	The little girl likes baking
171	She hurt her shoulder	234	He got punched in the face
172	She has to do the milking	235	He began to think clearly
173	The apples had black spots	236	Many people were missing
174	The water is in the teapot	237	She moved on quickly
175	He wore his new pyjamas	238	Someone came to the door
176	The truck made a loud noise	239	The volcano roared
177	There was no room for him	240	The woman raised her voice
178	We hid behind the couch	241	The washing dried in the sun
179	She missed two days of school	242	The glass smashed on the floor
180	The drive didn't take long	243	We could get a drink
181	The dogs were in the paddock	244	They shared out the food
182	They climbed the steep mountain	245	The hens scratched in the dirt
183	He kept the old lady talking	246	They found the girl inside

247	He crawled into a corner	310	The girl was out of breath
248	We're staying with a friend	311	She wore a green necklace
249	She was asleep on the couch	312	The belt was too tight
250	He was asked to speak	313	The washing machine was empty
251	They wanted to help out	314	They looked for the car keys
252	The blanket covered them	315	She bought three coffees
253	They took it down the hill	316	The student picked up her pens
254	The list of names was read out	317	The garden was ruined
255	There are none to spare	318	The man got very annoyed
256	His parents argued often	319	Her nose was sunburnt and peeling
257	They ran back and forth	320	The police want to talk to him
258	The policeman shouted	321	The mirror faced the window
259	He couldn't find a seat	322	They went down to the pub
260	The fire warmed their hands	323	He looked back at the house
261	They made a hole in the wall	324	She jumped onto the horse
262	The shovel was brand new	325	There's a hole in the pocket
263	The butter was expensive	326	The shop sells fruit and veges
264	They collected the eggs	327	The bus is on time for once
265	Knives are dangerous	328	Mum dropped us off in town
266	Most people like chocolate	329	Her grand-daughter is tiny
267	We need some hot water	330	She saw a famous actor
268	They bought some new clothes	331	The ring shone on her finger
269	Books were piled on the shelves	332	No one saw him creep past
270	They looked like sisters	333	The bike was lying in a bush
271	They put up the tent	334	She dragged the carpet outside
272	We brushed sand off our jeans	335	The pot sat on the stove
273	She felt a lot better	336	The sun shone through the leaves
274	The baby has woken up	337	The questions were easy
275	The play was a great success	338	The restaurant was busy
276	We don't need any carrots	339	The song had lots of verses
277	The girl put the toys away	340	The afternoon was wet
278	The carpenter arrived	341	They picked lemons from the tree
279	She has two older brothers	342	Names are hard to remember
280	The computer is broken	343	The tomato sauce was red
281	Dogs like company	344	He stopped on the doorstep
282	He seems really nice	345	She painted the landscape
283	The newspaper blew away	346	The driver wore a white shirt
284	The puppy sleeps on the bed	347	The little kids were in one corner
285	A plane just flew over	348	Dinner was ready at six
286	It's busy at the airport	349	They had a great time last night
287	The hot soup burned her tongue	350	We passed round cups of tea
288	You're not supposed to be here	351	She heard the truck passing
289	She's too little for swimming	352	She talked about her journey
290	We don't have much time	353	Guests sleep in the front room
291	She cut up the broccoli	354	There's only one bathroom
292	The new teacher looks nervous	355	They didn't argue any more
293	They listened to the news	356	His wife sent him a letter
294	Her handbag was heavy	357	The washing dried fast in the wind
295	The cupboard was dusty	358	The photo was faded
296	They cooked pikelets for tea	359	We played cards on the deck
297	She tripped on the carpet	360	He stood in the corridor
298	The shop was empty	361	Those two go to high school
299	The train woke her up	362	They shifted the chairs next door
300	She looked down the hill	363	We cleared away the dishes
301	They recorded her height	364	The girls were doing handstands
302	They packed up the tent	365	They cleared a patch of ground
303	Something hit me in the eye	366	They waited in the kitchen
304	Sheets hang on the washing line	367	The team wore a uniform
305	They drove inside the gate	368	We left the beach behind
306	It didn't surprise me at all	369	The woman stopped talking
307	We've both got the same shoes	370	We could stay at the hut
308	We had been awake for hours	371	We took Mum shopping
309	Mum was yawning and nodding	372	We ate marmite on toast

373	You've been away too long	436	People had seen the horses
374	The school's closed today	437	They haven't got coats
375	You can't use this road	438	No one had come after them
376	We took three bottles with us	439	They had scones with cream
377	Mum might change her mind	440	She climbed up the tree
378	It's better to wait a while	441	The hot concrete burned his feet
379	We talked on the phone all night	442	His parents were in town
380	We're learning to swim	443	There's a bridge further up
381	She searched for her glasses	444	The chairs were painted pink
382	They knew we were there	445	The rope stayed out of reach
383	The plumber fixed the tap	446	He turned up his collar
384	She walked straight outside	447	The duck stole a piece of bread
385	His idea didn't work	448	We'll do it while she's out
386	We wouldn't change a thing	449	She knocked over the basket
387	There was rubbish everywhere	450	Put your hands over your eyes
388	He didn't mind at all	451	The girl was very strong
389	Icecream can hurt your teeth	452	We'll make a chocolate cake
390	They went to see the movie	453	The meal was delicious
391	The little boy sat quietly	454	She used a dozen eggs
392	The toy box was empty	455	He breathed on his cold hands
393	An artist lives upstairs	456	The soap bubbles burst
394	The dentist called them in	457	They wheeled in their bikes
395	She drank a glass of milk	458	The shop's open on Sundays
396	They saw a rainbow	459	She likes the blue pencil case
397	He sat next to the heater	460	All the windows are closed
398	We're going on a trip	461	The oven caught fire
399	She nearly missed the plane	462	She made lots of jam
400	The man goes to work early	463	He took off his black gumboots
401	They stopped halfway up	464	They sat by the fountain
402	The new girl had soft brown eyes	465	She looked at the picture
403	This horse can do tricks	466	They heard the sound of water
404	The earth was stony	467	He told a funny joke
405	Cats don't eat lettuce	468	She jumped in the puddle
406	The salad was on the table	469	The visitor got off the boat
407	He was lying on his side	470	They went out in a raft
408	They put him in the paddock	471	The boy carried a big pack
409	There's no shelter anywhere	472	There was a huge thunderstorm
410	It's cold on the hills	473	He walked along the wharf
411	We'll build him a stable	474	She bought a ticket
412	They caught up with their friend	475	They fed the ducks at the park
413	The fish went into the fridge	476	The beetle hid in the ground
414	We talked about the storm	477	The bruise was purple
415	It was a sack of mussels	478	They ran through the night
416	She made a sling for his arm	479	He needed a holiday
417	He made two phone calls	480	They were pleased with the catch
418	He'll be away by lunchtime	481	The bird made a nest
419	The driver gave us a ride	482	The hen sat on the eggs
420	They worked out the answer	483	They waited a day or two
421	Lambs are born in the spring	484	The cat was under the house
422	They took sandwiches for lunch	485	They drank milo at bedtime
423	He's out milking the cows	486	We can't get the books today
424	The fruit trees are in flower	487	The lid fit very tightly
425	Let's get some fish and chips	488	She put on the white socks
426	The woman smiled at him	489	The nurse was a kind woman
427	They threw stones in the pond	490	She stepped onto the porch
428	No one answered the door	491	He lived in a white cottage
429	The man turned off the tap	492	The seagulls flew over the waves
430	He's not supposed to be here	493	The dog came out of the kennel
431	They won't be hard to find	494	She got out of her school clothes
432	We should have cleaned it up	495	She never went outside
433	My sister did the dishes	496	The sheep ate the grass
434	We have to find a boat	497	They brought in the firewood
435	These people are very nice	498	Her brother was the shortest

499 He headed further downstream  
500 They held onto the rope

501 They watched the news on tv  
502 There was just one problem

## **Appendix 4**