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APPENDIX A

Audiogram



Carel du Toit Centre / Sentrum

WHERE DEAF CHILDREN LEARN TO SPEAK / WAAR DOWE KINDERS LEER PRAAT

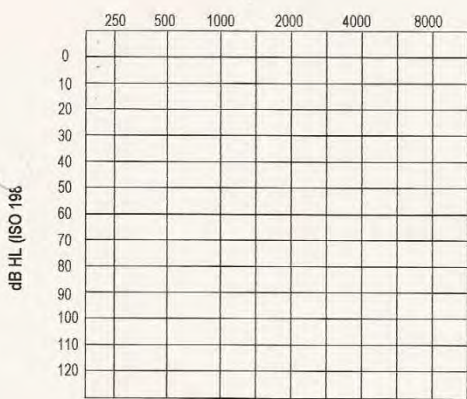


19130 • Tygerberg • 7505 • (021) 938 5303 • (021) 933 5104 • www.careldutoit.co.za • root@careldtsen.wcape.school.za

Name • _____ Date of birth • _____

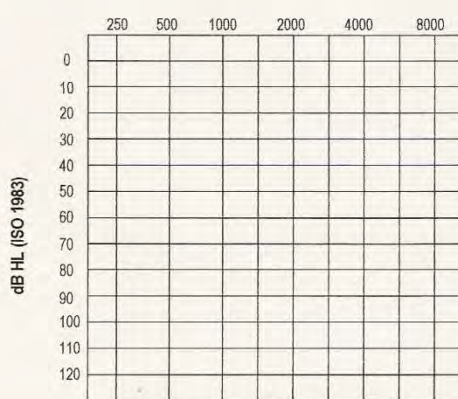
Testdate(s) • _____ Reliability • _____

LEFT EAR



	Masking right			
AC				
BC				

RIGHT EAR



	Masking left			
LG				
BG				

SPEECH PERCEPTION

TEST	STIMULI	SCORE in %
WIPI	35 dB	
	55 dB	
	55 dB +5dB SNR	
CRISP	55 dB	
	55 dB +5 dB SNR	

TYMPANOGRAM

	LEFT	RIGHT
Type		
MEP		
Volume		
Compliance		

Notes • _____

	SYMBOLS	
	L	R
Air conduction	X	O
Bbone conduction	>	<
Bone conduction (mask)]	[
No response	↓	
Free field	V	
Can not test	CNT	
Acoustic reflex (ipsi)	<input type="checkbox"/>	
Acoustic reflex (contra)	<input checked="" type="checkbox"/>	
Hearing aid	A	
Binaural hearing aids	B	

Reg no • 003-401 NPO

Hearing loss	Left	Right
Type		
Degree		
Status		

Additional info	Left	Right
Hearing aids		
Date fitted		
Earmoulds		
FM system		



APPENDIX B

Speech audiometry record sheet



WORD INTELLIGIBILITY BY PICTURE IDENTIFICATION TEST
Assessments with previous generation digital signal processing hearing aids

Child: _____ Date: _____

1.1.1		1.1.2		1.1.3		1.2.1		1.2.2		1.2.3	
school		broom		moon		spoon		hat		flag	
ball		boat		bell		belt		bus		cup	
smoke		coat		coke		goat		smoke		coat	
floor		door		horn		fork		floor		door	
fox		socks		box		blocks		train		cake	
hat		flag		bag		black		chick		stick	
pan		fan		man		hand		pan		fan	
bread		red		bed		head		bread		red	
neck		desk		nest		dress		neck		desk	
stair		bear		chair		pear		school		broom	
eye		pie		fly		tie		eye		pie	
knee		tea		key		bee		knee		tea	
street		meat		feet		teeth		street		meat	
wing		swing		king		ring		wing		swing	
mouse		clown		crown		mouth		mouse		clown	
shirt		church		dirt		skirt		fox		socks	
gun		thumb		sun		duck		gun		thumb	
bus		cup		book		hook		ball		boat	
train		cake		snake		plane		pail		nail	
arm		car		star		heart		arm		car	
chick		stick		dish		fish		stair		bear	
lip		ship		bib		pig		lip		ship	
wheel		seal		queen		green		wheel		seal	
straw		dog		saw		frog		straw		dog	
pail		nail		jail		tale		shirt		church	



WORD INTELLIGIBILITY BY PICTURE IDENTIFICATION TEST
Assessments with integrated signal processing hearing aids

Child: _____

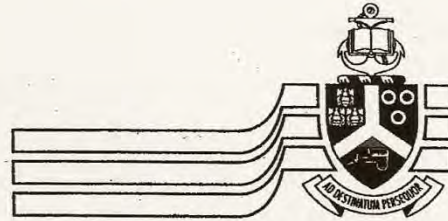
Date: _____

2.1.1		2.1.2		2.1.3		2.2.1		2.2.2		2.2.3	
bag		black		stair		bear		chair		pear	
book		hook		ball		boat		bell		belt	
coke		goat		shirt		church		dirt		skirt	
horn		fork		floor		door		horn		fork	
snake		plane		train		cake		snake		plane	
dish		fish		hat		flag		bag		black	
man		hand		pan		fan		man		hand	
bed		head		fox		socks		box		blocks	
nest		dress		neck		desk		nest		dress	
moon		spoon		straw		dog		saw		frog	
fly		tie		eye		pie		fly		tie	
key		bee		knee		tea		key		bee	
feet		teeth		street		meat		feet		teeth	
king		ring		wing		swing		king		ring	
crown		mouth		mouse		clown		crown		mouth	
box		blocks		school		broom		moon		spoon	
sun		duck		gun		thumb		sun		duck	
bell		belt		bus		cup		book		hook	
jail		tale		smoke		coat		coke		goat	
star		heart		arm		car		star		heart	
chair		pear		chick		stick		dish		fish	
bib		pig		lip		ship		bib		pig	
queen		green		wheel		seal		queen		green	
saw		frog		bread		red		bed		head	
dirt		skirt		pail		nail		jail		tale	



APPENDIX C

Informed consent letter



University of Pretoria

Department of Communication Pathology
Speech, Voice and Hearing Clinic

Tel: +27 12 420 2490
Fax: +27 12 420 3517

August 2007

Dear *(Parent/legal guardian of child with hearing loss)*

RESEARCH PROJECT: PERMISSION TO CONDUCT RESEARCH INVOLVING YOUR CHILD

As qualified audiologists and speech-language therapists we are currently studying towards a Master's degree in Communication Pathology at the University of Pretoria. We would like to conduct a research project that will include two smaller research studies, involving children with hearing loss at the Carel du Toit Centre. The titles of the individual studies will be as follows:

- **Linear Frequency transposition and word recognition abilities of children with moderate-to-severe sensorineural hearing loss** *(conducted by Annerina Verschoor)*
- **Linear frequency transposition and rapid word-learning in young children with a moderate-to-severe sensorineural hearing loss** *(conducted by Surida Booysen)*

The purpose of these studies is to determine if a new type of hearing aid will help children with a hearing loss to hear high frequency sounds better, and if this will have an effect on their ability to recognize spoken words and to learn new words. Frequency transposition hearing aids process high sounds differently from conventional hearing aids and may affect the way children perceive speech and learn new words. The results obtained from this project will provide valuable information about whether this new hearing aid technology is suitable for children and about the word-learning abilities of hearing-impaired children and normal hearing children.

We would like to invite you and your child to participate in this project and request permission to use the information in your child's school file. Should the information in the file indicate that your child is not deemed a suitable participant, you would be informed. Your child will receive two of these frequency transposition hearing aids which he/she will have to use for a 5-week period. During this



period, your child will be assessed five times. The assessments for the project may take up to 1½ hours each, and will include the following procedures which are normally used for biannual assessments at the school:

- Otoscopy to inspect the child's ear canal and ear drum
- Tympanometry to assess the child's middle ear functioning
- Pure-tone audiometry to evaluate hearing thresholds with and without his/her current hearing aids as well as the new hearing aids
- Speech perception tests to assess how the child can understand speech with the current and new hearing aids.

As part of these procedures, your child will also be expected to listen to a story and then demonstrate if he or she can remember the correct picture associated with the new words learned as part of the story. In total your child will be out of the classroom for a period of 7½ hours (divided into 5 assessments) during the 5-week period. Appropriate steps will be taken to make sure that he/she will not fall behind the rest of the class due to participation in this project. At the end of the 5-week period, we will evaluate the results and determine whether frequency transposition or conventional amplification is most beneficial for your child. Should the new type of hearing aid prove to be the best for your child, he or she will be allowed to keep it. Your child will also receive a reading book as prize after all the results had been obtained.

Assessments will take place at the Carel du Toit Centre in the mornings. There are no financial obligations related to participation in this project. There are also no medical risks associated with this project, but your child might experience some adjustment to the new hearing aids. As with all the routine biannual assessments performed at the Carel du Toit Centre, we will inform you immediately as soon as anything out of the ordinary is detected during the assessments that may raise concern, and the necessary steps will be taken in order to manage it according to best practice guidelines.

Your child's participation in this project will be much appreciated. Participation is strictly voluntary and you may decide to withdraw your child at any time without any negative consequences. Information regarding the project or you and your child's right as participant will be provided upon request at any time during the study. All information and test results will be treated with confidentiality and the information will be destroyed should you wish to withdraw from the project. According to international and U.P regulations, a copy of the raw data will be stored in electronic format for 15 years before it will be destroyed. The stored data may be used in future research projects, but should this happen, your permission in this regard, will be requested. The information and results gathered will be available in the format of a thesis at the Academic Information Centre (AIC) of the University of Pretoria as well as in a possible journal publication. All participants will have access to the data obtained in this project.

You are kindly requested to complete the attached document should you decide to take part in the study, and return it to your child's class teacher as soon as possible.



You are most welcome to contact us at any stage if you require more information, or want to discuss your child's participation in this project.

Kind regards,

Surida Booysen
Student researcher
Carel du Toit Centre
☎ 021-938 4884 / 021-930 3136
☎ 021-930 3144


Annerina Verschoor
Student researcher
Carel du Toit Centre
☎ 021-938 4884 / 021-930 3136
☎ 021-930 3144

Mrs. Emily Groenewald
Supervisor

Dr. Catherine van Dijk
Supervisor

Prof. Brenda Louw
HEAD: DEPT COMMUNICATION PATHOLOGY

Dear Surida and Annerina,

RESEARCH PROJECT: PERMISSION TO CONDUCT RESEARCH INVOLVING YOUR CHILD

I hereby give permission for my child to participate in this project. I also grant permission for you to access his/her school file in order to obtain audiological information. The identity of my child will not be revealed and all information will be treated in the strictest of confidence. I can withdraw my consent at any particular time without penalty or fear of implication for my child.

.....
Child's name








.....
Parent/Guardian

.....
Date



APPENDIX D

Informed assent letter

1. My name is _____.	✓	✗
2. My ears  will listen with the new  hearing aids.	✓	✗
3. I will listen to Surida's stories  and Annerina's words.	✓	✗
4. Surida and Annerina will  not tell anybody if I struggle.	✓	✗
5. I will try  my best.	✓	✗
6. If I don't want to listen to the words and stories I can tell teacher  and then I can stop.	✓	✗
7. I can help choose which hearing aids are the best  !	✓	✗



APPENDIX E

Ethical clearance: Research Proposal and Ethics Committee



Ons verw: Me P Woest / 99095697
Tel: 012 420 2736
Faks: 012 420 2698
E-pos: petru.woest@up.ac.za



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Pretoria 0002 Republiek van Suid-Afrika
Tel: 012 420-3111 Faks: 012 420-2698
<http://www.up.ac.za>

Fakulteit Geesteswetenskappe

11 Oktober 2007

Me A Verschoor
Posbus 15727
PANORAMA
7506

Geagte me Verschoor

TITELREGISTRASIE: STUDIERIGTING – MKOMMUNIKASIEPATOLOGIE

Met genoeë deel ek u mee dat die volgende goedgekeur is:

ONDERWERP: Linaer frequency transposition and word recognition abilities of children with moderate-to-severe sensorineural hearing loss

LEIER: Dr C van Dijk

MEDE-LEIER: Me E Groenewald

U aandag word in besonder op die volgende gevestig:

1. **TERMYN VAN REGISTRASIE**
 - (a) U moet vir minstens een akademiese jaar as student vir die magistergraad geregistreer wees voordat die graad toegeken kan word.
 - (b) U registrasie moet jaarliks voor April van elke akademiese jaar hernu word totdat u aan al die vereistes vir die magistergraad voldoen het. Geen herregistrasie sal na 31 Maart aanvaar word nie. U sal slegs geregtig wees op die leiding van u leier indien u jaarliks bewys van registrasie aan hom voorlê.
2. **GOEDKEURING VIR INDIENING**

Vir eksamendoeleindes moet u voldoende eksemplare vir elke eksaminator indien, tesame met 'n skriftelike verklaring van u leier dat hy/sy die indiening van die verhandeling goedkeur sowel as 'n verklaring deur u, wat voor 'n Kommissaris van Ede geteken word, wat by Studente-administrasie ingehandig word.
3. **KENNISGEWING VOOR INDIENING**

Dit is 'n vereiste dat u my ten minste drie maande voor die tyd in kennis stel van u voorneme om 'n verhandeling/skripsie in te dien.
4. **VOORSKRIFTE IN VERBAND MET DIE VOORBEREIDING VAN DIE VERHANDELING/SKRIPSIE ASOOK DIE SAMEVATTING IS OP DIE KEERSY VAN HIERDIE BRIEF UITEENGESIT.**

Die uwe

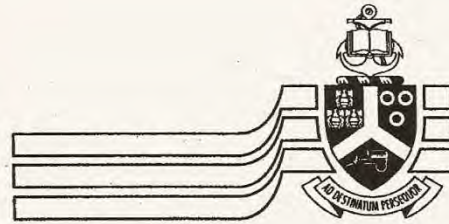
nms DEKAAN: FAKULTEIT GEESTESWETENSKAPPE

GW-505A



APPENDIX F

***Letter requesting permission to the centre for hearing-impaired
children***



University of Pretoria

Department of Communication Pathology
Speech, Voice and Hearing Clinic

Tel: +27 12 420 2490
Fax: +27 12 420 3517

August 2007

Dear Mrs. du Preez

RESEARCH PROJECT: PERMISSION TO CONDUCT RESEARCH INVOLVING CHILDREN WITH HEARING LOSS

As qualified audiologists and speech-language therapists we are currently studying towards a post-graduate Master's degree in Communication Pathology at the University of Pretoria. We would like to conduct a research project by dividing it into two research studies involving children with moderate-to-severe sensorineural hearing loss at the Carel du Toit Centre. The titles of the individual studies will be as follows:

- **Linear frequency transposition and word recognition abilities of children with moderate-to-severe sensorineural hearing loss** (*conducted by Annerina Verschoor*)
- **Linear frequency transposition and rapid word-learning in young children with a moderate-to-severe sensorineural hearing loss** (*conducted by Surida Booysen*)

The purpose of these studies is to determine if a new type of hearing aid will help children with a hearing loss to hear high frequency sounds better, and if this will have an effect on their ability to recognize spoken words and to learn new words. Frequency transposition hearing aids process high sounds differently from conventional hearing aids and may affect the way children perceive speech and learn new words. The results obtained from this project will provide valuable information about whether this new hearing aid technology is suitable for children and about the word-learning abilities of hearing-impaired children and normal hearing children.

We would like to invite you and the children at your school to participate in this project and request permission to access the personal information in the children's school file as well as the audiological facilities at the school. Parents of the children between the ages of 5.0 and 7.11 years will receive letters of informed consent. After the parents have given permission for the children to take part in the study, information in the school files will need to be analysed to determine suitable candidacy. Each child will also undergo a receptive vocabulary assessment that will take approximately 20 minutes.

Should the information in the file or the results of the vocabulary assessment indicate that the child is not deemed a suitable participant, you and the parents will be informed. During a 5-week period, the children will be assessed five times. Initial assessment will occur with the children's own hearing aids. Thereafter each child (at most 10 children) will receive two of these frequency transposition hearing aids, which they will have to use for a 4-week period. The assessments for the project may take up to 1½ hours each, and will include the following procedures which are normally used for biannual assessments at the school:

- Otoscopy to inspect the child's ear canal and ear drum
- Tympanometry to assess the child's middle ear functioning
- Pure-tone audiometry to evaluate hearing thresholds with and without his/her current hearing aids as well as the new hearing aids
- Speech perception tests to assess how the child can understand speech with the current and new hearing aids.

As part of these procedures, the children will also be expected to listen to a story and then demonstrate if they can remember the correct picture associated with the new words learned as part of the story. In total, each child will be out of the classroom for a period of 7½ hours (divided into 5 assessments) during the 5-week period.

Appropriate steps will be taken to make sure that the children will not fall behind the rest of the class due to participation in this project by liaising with each class teacher, Mrs. Kritzinger and Mrs. Swartz, regarding suitable times to extract individual children from the educational environment. At the end of the 5-week period, we will evaluate the results and determine whether frequency transposition or conventional amplification is most beneficial for children with a hearing loss. Since the hearing aids under investigation had been donated to the centre, the children will be able to keep the hearing aids should they prove to be most beneficial. Each child will also receive a reading book as prize after all the results has been obtained.

Assessments will take place at the Carel du Toit Centre in the mornings. There are no financial obligations related to participation in this project to either you or the parents of the children selected. There are also no medical risks associated with this project, but the children might experience some adjustment to the new hearing aids. As with all the routine biannual assessments performed at the Carel du Toit Centre, we will inform you immediately as soon as anything out of the ordinary is detected during the assessments that may raise concern, and the necessary steps will be taken in order to manage it according to best practice guidelines.

Your school's participation in this project will be much appreciated. Participation is strictly voluntary and you may decide to withdraw your consent at any time without any negative consequences. Information regarding the project or the school and children's right as participants will be provided upon request at any time during the study. All information and test results will be treated with confidentiality and the information will be destroyed should you wish to withdraw from the project. According to international and U.P regulations, a copy of the raw data will be stored in electronic format for 15 years before it will be destroyed. The stored data may be used in future research



projects, but should this happen, your permission in this regard, will be requested. The information and results gathered will be available in the format of a thesis at the Academic Information Centre (AIC) of the University of Pretoria as well as in a possible journal publication. All participants will have access to all data obtained in this project.

You are kindly requested to complete the attached form should you decide to take part in the study, and return it to us as soon as possible.

You are most welcome to contact us at any stage if you require more information, or want to discuss your school's participation in this project.

Kind regards,

Surida Booysen
Student researcher
Carel du Toit Centre
☎ 021-938 4884 / 021-930 3136
☎ 021-930 3144


Annerina Verschoor
Student researcher
Carel du Toit Centre
☎ 021-938 4884 / 021-930 3136
☎ 021-930 3144

Mrs. Emily Groenewald
Supervisor

Dr. Catherine van Dijk
Supervisor

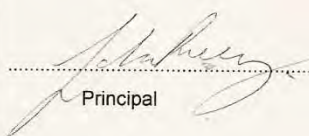
Prof. Brenda Louw
HEAD: DEPT COMMUNICATION PATHOLOGY



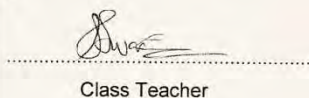
Dear Surida and Annerina,

RESEARCH PROJECT: PERMISSION TO CONDUCT RESEARCH INVOLVING CHILDREN WITH HEARING LOSS

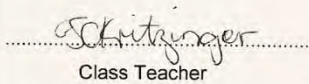
I hereby give permission for you to conduct this project at our school. I also grant permission for you to access the necessary school files in order to obtain audiological information and to use our audiological facilities. The identity of our school and children will not be revealed and all information will be treated in the strictest of confidence. I can withdraw my consent at any particular time without penalty or fear of implication for the children.


.....
Principal

30.08.07
.....
Date


.....
Class Teacher

30.08.07
.....
Date


.....
Class Teacher

30.08.07
.....
Date



APPENDIX G

Ethical clearance: Committee for Human Research



UNIVERSITEIT • STELLENBOSCH • UNIVERSITY
jou kennisvenoot • your knowledge partner

5 October 2007

Ms A Verschoor
Carel du Toit Centre
PO Box 19130
TYGERBERG
7505

Dear Ms Verschoor

**RESEARCH PROJECT : "THE EFFECT OF FREQUENCY TRANSPORTATION ON THE
SPEECH PERCEPTION ABILITIES OF CHILDREN WITH
MODERATE-TO-SEVERE HEARING LOSS"**

The primary evaluator and the chairperson appraised your response dated 14 September 2007 to the problems that the Committee for Human Research identified in the original submission of the project. The corrections/additional information has been provided satisfactorily, but it was requested that the statistician should be consulted before the study starts to determine if the sample size is adequate.

On receipt of the additional information/corrected document(s) the application will be reconsidered. **Please mark all the corrections/amendments clearly in order to allow rapid scrutiny and appraisal.**

Yours faithfully

CJ VAN TONDER
RESEARCH DEVELOPMENT AND SUPPORT (TYGERBERG)
Tel: +27 21 938 9207 / E-mail: cjvt@sun.ac.za

CJVT/pm



C:\DOCUMENTS AND SETTINGS\PORTIA.000\MY DOCUMENTS\MMN\PROJEKTE\VOORWAARDELIX\2007\VERSCHOOR A 001-02.DOC

Fakulteit Gesondheidswetenskappe • Faculty of Health Sciences



Verbind tot Optimale Gesondheid • Committed to Optimal Health
Afdeling Navorsingsontwikkeling en -steun • Research Development and Support Division
Posbus/PO Box 19063 • Tygerberg 7505 • Suid-Afrika/South Africa
Tel: +27 21 938 9677 • Faks/Fax: +27 21 931 3352
E-pos/E-mail: rdsinfo@sun.ac.za