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## **APPENDICES**



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**APPENDIX A**  
**PERMISSION FROM THE RESEARCH PROPOSAL AND ETHICS**  
**COMMITTEE**



100  
1908 - 2008



21 May 2008

Dear Prof. Louw

**Project:** A perceptual speech assessment protocol for Zulu-speaking pre-schoolers with Cleft Palate  
**Researcher:** D Streicher  
**Supervisor:** Prof. B Louw  
**Department:** Communication Pathology  
**Reference number:** 22032322

Thank you for your response to the Committee's letter of 5 March 2007.

I have pleasure in informing you that the Research Proposal and Ethics Committee formally **approved** the above study at an *ad hoc* meeting held on 20 May 2008. The approval is subject to the candidate abiding by the principles and parameters set out in her application and research proposal in the actual execution of the research.

The Committee requests you to convey this approval to Ms Streicher.

We wish you success with the project.

Sincerely

**Prof. Rina Delport**  
Vice Chair: Research Proposal and Ethics Committee  
Faculty of Humanities  
UNIVERSITY OF PRETORIA  
e-mail: [brenda.louw@up.ac.za](mailto:brenda.louw@up.ac.za)

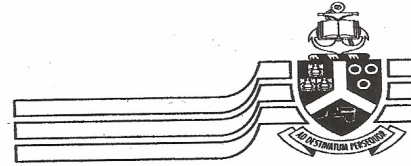


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**APPENDIX B**  
**LETTER OF INFORMED CONSENT TO THE GAUTENG DEPARTMENT OF**  
**HEALTH**



UNIVERSITEIT VAN PRETORIA  
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February 2007

Gauteng Department of Health  
Att: Dr. M. L. Likibi  
Medical Specialist, Research Epidemiology

Dear Dr. Likibi

**Re: Permission to conduct research study for Master's Degree**

As a Master's student in the Department of Communication Pathology at the University of Pretoria, I am conducting a research project namely: **Compilation of a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate.** The aim of this project is to develop an assessment instrument for the assessment of Zulu-speaking pre-school children with cleft palate to be clinically used in Provincial Hospitals in the Gauteng region.

The project involves the development of an assessment instrument for Zulu-speaking pre-school children, testing it on normal Zulu-speaking pre-school children and after the necessary adaptations, testing it on Zulu-speaking pre-school children with cleft palate in the identified hospitals in the Gauteng region. It is hoped that the findings of this study will provide insight in guidelines for the assessment and treatment of pre-school children with cleft palate to improve service delivery to this vulnerable population.

The study will involve selecting pre-school patients with a cleft palate who are in the case loads of speech-language therapists in the hospitals and



assessing their speech characteristics by using the assessment instrument, consisting of pictures, words and sentences to be repeated. The children will be asked to name pictures, repeat sentences and words. It is estimated that the testing will take approximately 45 minutes per child. Testing will take place within therapy hours, within the therapist's convenience. Audio- and video recordings will be made of each child's responses, but in order to protect the identity of the participants will be destroyed after the project is completed. In accordance with international and the University of Pretoria's requirements, raw data derived from these recordings will however be stored for a period of 15 years.

I would like to commence testing in March 2007. The head of each Department, therapists, parents of children and children will be requested to give permission for this project to be conducted (see attached letters). Results from this study will assist speech-language therapists to plan therapy accurately and to make appropriate recommendations.

Your written permission to conduct this research project at identified Provincial hospitals in the Gauteng region is therefore formally requested. Your co-operation in this matter is greatly appreciated.

Should you wish, you will receive a summary of the findings and copy of the assessment protocol once the study has been completed. Ethical Clearance will be obtained from the University of Pretoria before fieldwork commences.

Yours sincerely

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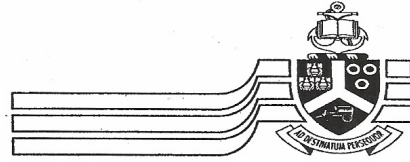
**RESEARCH SUPERVISOR:**

Prof. Brenda Louw



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**APPENDIX C**  
**LETTER OF INFORMED CONSENT TO THE HEAD OF THE NURSERY**  
**SCHOOL**



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Email : [brenda.louw@up.ac.za](mailto:brenda.louw@up.ac.za)

November 2007

Dear Head of the Nursery School

**Re: Permission to conduct research study for Master's Degree**

As a Master's student in the Department of Communication Pathology at the University of Pretoria, I am conducting a research project namely: **Compilation of a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate**. The aim of this project is to develop an assessment instrument for the assessment of Zulu-speaking pre-school children with cleft palate to be clinically used in State Hospitals in the Gauteng region.

The project involves the development of an assessment instrument for Zulu-speaking pre-school children, testing it on normal Zulu-speaking pre-school children and after the necessary adaptations, testing it on Zulu-speaking pre-school children with cleft palate in the identified hospitals in the Gauteng region. It is hoped that the findings of this study will provide insight and guidelines for the assessment and treatment of pre-school children with cleft palate to improve service delivery.

The study will involve selecting normal speaking pre-school children from your Nursery School and assessing their speech characteristics by using the assessment instrument, consisting of pictures, words and sentences to be repeated. The children will be asked to name pictures, repeat sentences and words. It is estimated that the testing will take approximately 45 minutes per child. Testing will take place within school hours, within the school's convenience. Audio- and video recordings will be made of each child's responses, but in order to protect the identity of the participants will be





destroyed after the project is completed. In accordance with international and the University of Pretoria's requirements, raw data derived from these recordings will however be stored for a period of 15 years.

I would like to commence testing in November 2007. The parents of children and children themselves will be requested to give permission for this project to be conducted (see attached letters).

Your written permission to conduct this research project at your school is therefore formally requested. Your co-operation in this matter is greatly appreciated.

Should you wish, you will receive a summary of the findings once the study has been completed. Ethical Clearance will be obtained from the University of Pretoria before fieldwork commences.

Yours sincerely

A handwritten signature in cursive script that reads "D. Streicher".

Dorette Streicher  
Speech-Language Therapist and Audiologist  
M. Communication Pathology

Tel: 082 837 9234  
E-mail: [dorettestreicher@yahoo.com](mailto:dorettestreicher@yahoo.com)

**RESEARCH SUPERVISOR:**

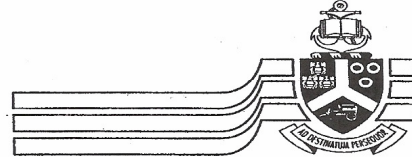
A handwritten signature in cursive script that reads "B. Louw".

Prof. Brenda Louw



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YUNIBESITHI YA PRETORIA

**APPENDIX D**  
**LETTER OF INFORMED CONSENT TO THE HEAD OF THE SPEECH-  
LANGUAGE THERAPY DEPARTMENT**



University of Pretoria

Department of Communication Pathology  
Speech, Voice and Hearing Clinic

Tel : +27 12 420 2355

Fax : +27 12 420 3517

Email : [brenda.louw@up.ac.za](mailto:brenda.louw@up.ac.za)

March 2008

Dear Head of the Speech Therapy Department

**Re: Permission to conduct research study for Master's Degree**

As a Master's student in the Department of Communication Pathology at the University of Pretoria, I am conducting a research project namely: **Compilation of a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate.** The aim of this project is to develop an assessment instrument for the assessment of Zulu-speaking pre-school children with cleft palate to be clinically used in State Hospitals in the Gauteng region.

The project involves the development of an assessment instrument for Zulu-speaking pre-school children, testing it on normal Zulu-speaking pre-school children and after the necessary adaptations, testing it on Zulu-speaking pre-school children with cleft palate in the identified hospitals in the Gauteng region. It is hoped that the findings of this study will provide insight and guidelines for the assessment and treatment of pre-school children with cleft palate to improve service delivery.

The study will involve selecting pre-school patients with a cleft palate from the hospitals and assessing their speech characteristics by using the assessment instrument, consisting of pictures, words and sentences to be repeated. The



children will be asked to name pictures, repeat sentences and words. It is estimated that the testing will take approximately 45 minutes per child. Permission is also requested that patient records are used to complete biographical information on the protocol. Testing will take place within therapy hours, within the therapist's convenience. Audio- and video will be made of each child's responses, but in order to protect the identity of the participants will be destroyed after the project is completed. In accordance with international and the University of Pretoria's requirements, raw data derived from these recordings will however be stored for a period of 15 years.

I would like to commence testing in March 2008. The therapists, parents of children and children themselves will be requested to give permission for this project to be conducted (see attached letters).

The researcher has also applied for permission for the conduction of this research project from Mrs. Sybil Ngcobo, the head of the Department of Health: Gauteng. Please find enclosed consent forms for speech-language therapist to participate in the study.

Your written permission to conduct this research project at your hospital is therefore formally requested. Your co-operation in this matter is greatly appreciated.

Yours sincerely

Dorette Swiegers  
Speech-Language Therapist and Audiologist  
M. Communication Pathology

Tel: 082 837 9234

E-mail: [dorettestreicher@yahoo.com](mailto:dorettestreicher@yahoo.com)

**RESEARCH SUPERVISOR:**

Prof. Brenda Louw

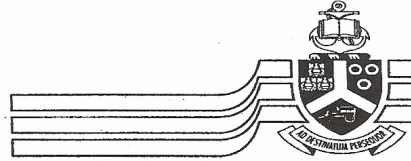


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**APPENDIX E**  
**LETTER OF INFORMED CONSENT FOR SPEECH-LANGUAGE THERAPISTS**



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University of Pretoria

Department of Communication Pathology  
Speech, Voice and Hearing Clinic

Tel : +27 12 420 2355  
Fax : +27 12 420 3517  
Email : [brenda.louw@up.ac.za](mailto:brenda.louw@up.ac.za)

March 2008

Dear Speech-Language Therapist

**Re: Permission to conduct research study for Master's Degree**

As a Master's student in the Department of Communication Pathology at the University of Pretoria, I am conducting a research project namely: **Compilation of a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate.** The aim of this project is to develop an assessment instrument for the assessment of Zulu-speaking pre-school children with cleft palate to be clinically used in State Hospitals in the Gauteng region.

The project involves the development of an assessment instrument for Zulu-speaking pre-school children, testing it on normal Zulu-speaking pre-school children and after the necessary adaptations, testing it on Zulu-speaking pre-school children with cleft palate in the identified hospitals in the Gauteng region. It is hoped that the findings of this study will provide insight and guidelines for the assessment and treatment of pre-school children with cleft palate to improve service delivery.

The study will involve selecting pre-school patients with a cleft palate from your case-loads and assessing their speech characteristics by using the assessment instrument, consisting of pictures, words and sentences to be repeated. The children will be asked to name pictures, repeat sentences and words. It is estimated that the testing will take approximately 45 minutes per child. Testing will take place within therapy hours, within your convenience. Permission is also requested that patient records are used to complete biographical information on the protocol. You will be requested to make audio- and video recordings of each child's responses, but in order to protect the identity of the participants it will be destroyed after the project is completed. In accordance with international and the University of Pretoria's requirements, raw data derived from these recordings will however be stored for a period of 15 years. You are also requested to complete a questionnaire after completion of the protocol.



I would like to commence data collection in March 2008. The head of your Department, parents of children and children themselves will be requested to give permission for this project to be conducted (see attached letters).

The researcher has also applied for permission for the conduction of this research project from Mrs. Sybil Ngcobo, the head of the Department of Health: Gauteng.

Your written permission to conduct this research project at your hospital is therefore formally requested. Your co-operation in this matter is greatly appreciated.

Yours sincerely

A handwritten signature in cursive script that reads "D Swiegers".

Dorette Swiegers

Speech-Language Therapist and Audiologist  
M. Communication Pathology

Tel: 082 837 9234

E-mail: [dorettestreicher@yahoo.com](mailto:dorettestreicher@yahoo.com)

**RESEARCH SUPERVISOR:**

A handwritten signature in cursive script that reads "B Louw".

Prof. Brenda Louw



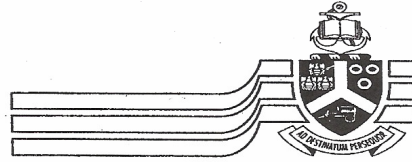
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**APPENDIX F**  
**LETTER OF INFORMED CONSENT FOR PARENTS**





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University of Pretoria

Department of Communication Pathology  
Speech, Voice and Hearing Clinic

Tel : +27 12 420 2355

Fax : +27 12 420 3517

Email : [brenda.louw@up.ac.za](mailto:brenda.louw@up.ac.za)

March 2008

Dear Parents of \_\_\_\_\_

**Re: Consent for child to participate in research study for Master's Degree**

As a Master's student in the Department of Communication Pathology at the University of Pretoria, I am conducting a research project namely: **Compilation of a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate.** The aim of this project is to develop an assessment instrument for the assessment of Zulu-speaking pre-school children with cleft palate to be clinically used in Provincial Hospitals in the Gauteng region.

The project involves the development of an assessment instrument for Zulu-speaking pre-school children, testing it on normal Zulu-speaking pre-school children and after the necessary adaptations, testing it on Zulu-speaking pre-school children with cleft palate in the identified hospitals in the Gauteng region. It is hoped that the findings of this study will provide insight and guidelines for the assessment and treatment of pre-school children with cleft palate to improve service delivery.



The study will involve selecting normal pre-school Zulu speaking/children with a cleft palate from the school/hospitals and assessing their speech characteristics by using the assessment instrument, consisting of pictures, words and sentences to be repeated. The children will be asked to participate after their parents have given permission. It is estimated that the testing will take approximately 45 minutes per child. Testing will take place within school/therapy hours, within the teacher/therapist's convenience. Audio- and video recordings will be made of each child's responses, but in order to protect the identity of participants will be destroyed after the project is completed. In accordance with international and the University of Pretoria's requirements, raw data derived from this study will be stored for a period of 15 years. I would like to commence testing in March 2008.

Your child has been randomly selected to participate in this study. I would be very grateful if you would allow him/her to participate in this project. It will not be a stressful experience for your child. If you are interested in the results, I will gladly share them with you in confidence. For the purpose of this project, strict confidentiality will be observed throughout the completion of the project. A code number will be assigned to your child. The data will only be used for the purpose of this project and thus be reflected as the results of the project.

If you agree that your child may participate in this project, please take a few minutes to complete the attached form. Please return it in the sealed envelope to the therapist.

Thank you for your co-operation by allowing me to assess your child. I can be contacted at the following number should you have any further enquiries:

Cell: 082 837 9234

E-mail: dorettestreicher@yahoo.com

Yours sincerely

Dorette Swiegers

Speech-Language Therapist and Audiologist  
M. Communication Pathology

**RESEARCH SUPERVISOR:**

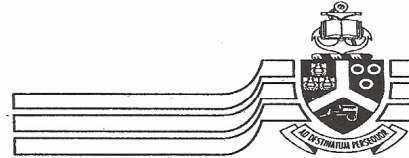
Prof. Brenda Louw



**INFORMED CONSENT FORM**

I, \_\_\_\_\_ parent of \_\_\_\_\_  
agrees that he/she may participate in this project. I am aware of the content of  
the project and agree on the conditions mentioned.

**Signature:** \_\_\_\_\_  
**Date:** \_\_\_\_\_



## University of Pretoria

Department of Communication Pathology  
Speech, Voice and Hearing Clinic

Tel : +27 12 420 2355  
Fax : +27 12 420 3517  
Email : [brenda.louw@up.ac.za](mailto:brenda.louw@up.ac.za)

March 2008

Bazali abathandekayo, baka \_\_\_\_\_

### ***Imvume yokwenza ucwangisiso lweziqo zeMasters.***

Ngiumfundi weziqo zeMasters kumnyango weCommunication Pathology eNyuvesi yasePretoria, ngenza ucwaningo loDidiyelo lwethuluzi lokuhlaziya inkulumo yabantwana bezinkulisa abakhuluma isiZulu abanenkinga yolwanga oluvulekile (cleft palate). Injongo yalocwaningo ukuthuthukisa ithuluzi elizosiza abantwana bezinkulisa abakhuluma ulimi lwesiZulu abanenkinga yolwanga oluvulekile ukuze lisetshenziswe kwezokulapha ezibhedlela zesifundazwe saseGauteng.

Locwaningo luhlanganisa ukuthuthukisa ithuluzi labantwana bezinkulisa abakhuluma isiZulu abanenkinga yolwanga oluvulekile, nokuhlola lelithuluzi kubo kanye labobantwana abakhethwe kwizibhedlela zasesifundazweni saseGauteng futhi kwenziwe nendlela yokulisebenzisa ngokuphumelelayo. Sinethemba lokuthi umphumela ozotholakala kulocwaningo luzosinceda sibe nokuqonda okwengeziwe kwenkinga yolwanga oluvulekile kanye nendlela ephumelelayo yokunceda labantwana.

Sizokhetha abantwana abayiziguli abangakangeni isikolo ezibhedlela, bese sihlaziya iziqu zenkulumo yabo ngokusebenzisa ithuluzi okukhulunywe ngalo kwimisho engaphambili. Ithuluzi leli lenziwe ngezithombe, namagama kanye nemisho okumelwe iphindwaphindwe. Abantwana bazocelwa ukuba bathathe ingxenye ngemva kokuthola imvume kubazali. Kulinganiswele ukuthi locwaningo



ingxenyengemvkokutholaimvumekubazali. Kulinganiswele ukuthi locwaningoluzothatha isikhathi esingabaimizuzu engamashumi amane nesihlanu umntwana ngamunye. Ukuhlolwakomntwana kuzokwenziwakwihora leTherapy, ngemvume kaDokotela (Therapist). Ngesikhathi sokuhlola, ingxoxonomntwana izoshicilelwa kwiziqophi zezithombe (Video) nakwiziqophi zomsindo (Audio), ngemvkokuphela kocwaningoluzolahlwalolushicilelo. Ngingathanda ukuqalalolucwaningo kusukelangoMarch 2008.

Umntwana wakho ukhethelwe ukubangomunye ozohlolelwalolucwaningo. Singajabula uma ungavumelamntwana wakho athathe ingxenyekulolucwaningo. Uma ufuna ukwazi ngomphumela, singakujabulela ukuxoxanawe ngasesengemvkokuhlolwakomntwana wakho. Ucwaningolwethuluzobe luyimfihlo lapho siqhubekanokuhlolabantwana. Umntwana ngamunye uzonikezwa inombolo. Konke okuzotholakala ekuhlolweni kuzobe kwenzelwacwaningo futhi kuzothathwanjengomphumelawocwaningo.

Uma uvuma ukubamntwana wakho athathe ingxenyekulolucwaningo, sicela ugcalise ifomu elingemuvalifake emvilophini, bese ulinikeza uDokotela (Therapist) wakho.

Siyabonga ngokusivumela ukubasihlole umntwana wakho. Uma unemibuzo ungangithinta kulenombolo engezantsi:

**Cell:** 082 837 9234

**E-mail:** [dorettestriecher@yahoo.com](mailto:dorettestriecher@yahoo.com)

Othandekayo

Dorette Swiegers

Speech-Language Therapist and Audiologist  
M. Communication Pathology

**Research Supervisor:**

Prof. Brenda Louw



---

**INCWADI YOKWAMUKELA ISICELO**

Mina \_\_\_\_\_ umzali ka \_\_\_\_\_  
nginikeza imvume yokuthi abambe iqhaza ohlelweni locwaningo engaziswe  
ngalo. Ngiyahambisana nemigomo ebhalwe encwadini futhi ngiyakwazi  
okuzolindeleka kumntwana wami.

Isinginesha yomzali: \_\_\_\_\_

Usuku: \_\_\_\_\_



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## **APPENDIX G**

### **VERBAL ASSENT AND CHILD PARTICIPATION**

### **Verbal assent for Child participation**

I am going to show you some pictures. I want you to tell me what you see. Then I will ask you to repeat some sentences and say some word, just as you see in this picture. You may tell me at any time when you don't want to look at the pictures anymore. You can show me these 2 pictures when you want to stop or carry on. Nothing will happen when you don't want to carry on.



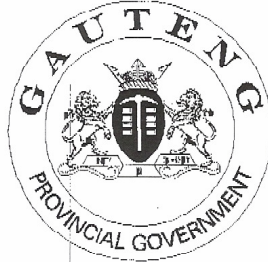






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**APPENDIX H**  
**PERMISSION FROM THE GAUTENG DEPARTMENT OF HEALTH TO**  
**CONDUCT THE STUDY AT PROVINCIAL HOSPITALS IN GAUTENG**



**PROVINCIAL RESEARCH COMMITTEE.**

**RESEARCH PROPOSAL EVALUATION FORM FOR APPROVAL BY THE HEAD OF THE DEPARTMENT.**

Principal Investigator: Streicher Dorette

Researcher's contact details: Tel 082 837 9234 F: dorettestreicher@yahoo.com FAX: 011 820 7311

**Research Topic: Compilation of a perceptual speech assessment protocol for Zulu speaking preschool children with cleft palate**

Supervisor's Name: Professor Brenda Louw

Co Supervisor: none

Date submitted: 22 October

Date Reviewed: 29 October 2007

Reviewer's name: Dr ML Likibi

**SECTION A**

|  | YES | NO | N/A |
|--|-----|----|-----|
| 1. Is this research project within the scope of the Department of Health key policy priorities/directives? | X   |    |     |
| 2. Content of Research:<br>Original work   | X   |    |     |
| • New facts, ideas   |     |    |     |
| • Confirmation of uncertain data   |     | X  |     |
| • Repetition of known data and consequently of limited importance  |     | X  |     |
| • Unreliable and/or inadequate   |     | X  |     |
| • Confusion of topics/questions  |     | X  |     |
| • Intervention study   |     | X  |     |
| 3. Is the title of the research project suitable?  | X   |    |     |
| 4. Are the objectives of the research project adequate?  | X   |    |     |
| 5. Could the objectives be limited to better focus on the project's main objective?                        |     | X  |     |
| 6. Writing style   |     |    |     |

**Research Topic: Compilation of a perceptual speech assessment protocol for Zulu speaking preschool children with cleft palate**



|   |   |   |   |
|---|---|---|---|
| • The text of the proposal is clear   | X |   |   |
| • The nomenclature used is correct  | X |   |   |
| • The references used are relevant, comprehensive and accurate (corrected)                                  | X |   |   |
| • The spelling and grammar are correct  | X |   |   |
| • The language needs improvement  |   | X |   |
| • The research proposal needs restyling and rewriting   |   | X |   |
| 7. Are the research methods appropriate to the study  | X |   |   |
| 8. Does the study have ethical approval?<br>If yes, name the ethics committee <b>University of Pretoria</b> | X |   |   |
| 9. Is the definition and measurement of variables consistent with the scope of the proposal                 | X |   |   |
| 10. Is data collection method in line with study design?  | X |   |   |
| 11. Is time frame of the proposal adequate to meet the objectives?  |   |   | X |
| 12. Is it stated in the proposal the method of dissemination of the results of the research project?        |   | X |   |
| 13. Is the possible conflict of interests clarified?  | X |   |   |
| Are financial implications and financial support transparent?   | X |   |   |

**Summary of the proposed study**

The purpose of this study is to develop a perceptual assessment instrument for Zulu speaking children with cleft palate.

**Research Question:** NA

**Study design:** Quantitative descriptive study

**Study Site:** Audiology units in Gauteng public hospitals

**Population and sample:** Purposive sampling of children already in the case loads of speech language therapists

**Data collection:** video and audio recording of patient interview during therapy sessions

**Publication and dissemination of project findings:** Masters Degree Research Report

**Budget:** Graduate student funded research project, no cost to the Gauteng Department of Health other than time of the therapists at data collection site

**Evaluator's Comments**

Ethical clearance is given for this Masters degree research project by the University of Pretoria and there are no financial implications for the GDoH. Therefore, we do not have any objection to recommend that the study be conducted in Gauteng Province. It is the responsibility of the principal investigator to ensure that:

- Permission to access research participants is granted by the management of the institutions before data collection commence

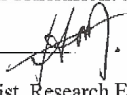
**Research Topic:** Compilation of a perceptual speech assessment protocol for Zulu speaking preschool children with cleft palate



- A research report is submitted to the Gauteng DoH Research Unit and the findings are communicated to appropriate Units within Gauteng DoH on completion.
- Details of future publications of the findings are disclosed to the Gauteng Department of Health
- The researcher is further invited to present the findings at the next PRAKASH VALLABH PHC research conference (2008)

Provisional approval for data collection for this student protocol is hereby granted whilst the protocol is submitted to the HOD's office.

**Reviewer's final conclusion: Accept without change**

  
Dr ML Likibi  
Medical Specialist, Research Epidemiology

**Research Topic: Compilation of a perceptual speech assessment protocol for Zulu speaking preschool children with cleft palate**



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**APPENDIX I**  
**PERMISSION FROM THE NURSERY SCHOOL TO CONDUCT THE STUDY**  
**AT THE INSTITUTION**



**KLEUTERSKOO  
KWAGGASRAND**

**RODSTRAAT 181  
KWAGGASRAND  
0183  
TEL: (012) 386-6597  
FAKS: (012) 386-8781**

6 November 2007

Liewe Dorette

**INSAKE: Navorsing by ons skool vir verdere studies**

Hiermee gee ek toestemming dat Dorette haar navorsing by ons skool mag kom doen vir haar verdere studies waarmee sy tans besig is.

Sy is 'n ou bekende by ons en het reeds van tevore ook by ons skool aangeklop om hulp. Ons verwelkom enige verder studies onder kleuters aangesien hulle die toekoms van ons land is en dit 'n bydrae lewer tot elkeen.

Ek sou graag 'n opsomming van die resultate van die waarneming na afloop van die navorsing onder oë wil kry.

Ons sien uit daarna om jou by ons skool te ontvang. Kontak ons gerus as daar nog enige verdere vrae is.

Vriendelike groete

-----  
Ingrid Strydom  
HOOF



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UNIVERSITY OF PRETORIA  
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**APPENDIX J**  
**QUESTIONNAIRE TO THE SPEECH-LANGUAGE THERAPISTS**



## **A Perceptual Speech Assessment Protocol for Zulu Speaking Pre-Schoolers with Cleft Palate.**

**Dorette Swiegers**

### **Participant Information sheet.**

Dear Speech-language therapist.

Thank you for participating in this study.

The aim of this protocol is to provide information regarding the perceptual speech assessment for Zulu-speaking children with cleft palate. This will be used to develop a clinical assessment tool for speech-language therapists for assessing children with cleft palate.

#### **Role of participant:**

You are requested to complete the following questionnaire as part as the masters research project on the development of a perceptual speech assessment protocol for Zulu speaking children with cleft palate.

- Please complete the biographical information sheet first
- Prior to completing the questions in the questionnaire, please study the provided protocol and pictures. Then complete the questions in **Section A** by marking the appropriate box on the questionnaire.
- You are requested to conduct the protocol on Zulu speaking children with cleft palate between 3 and 6 years of age by using the protocol, test form and pictures to assess these children.
- Please plot the children's responses on the protocol provided.
- After assessing the children and plotting the responses on the provided forms, please complete **Section B** of the questionnaire by marking the appropriate box.
- Please fax the completed protocol and questionnaire to Dorette on/before 30 March 2008. Fax number: 086 622 6133. You are welcome to keep the

pictures. Please do not hesitate to contact me on 082 837 9234 should you require any additional information. Thank you for your effort.

**Questionnaire: Perceptual speech assessment protocol for Zulu speaking children with cleft palate.**

**Biographical Information of Speech-Language therapist:**

| Hospital employed by:   |   |
|---|---|
| Question  | Response  |
| Level of service delivery provided by the Hospital:                 | <input type="checkbox"/> Primary <input type="checkbox"/> Secondary <input type="checkbox"/> Tertiary   |
| Language/s of therapist in which therapy is provided:               | <input type="checkbox"/> English <input type="checkbox"/> Afrikaans <input type="checkbox"/> Zulu<br><input type="checkbox"/> Sepedi <input type="checkbox"/> Other, please specify |
| Qualification in Speech-Language therapy:                           | <input type="checkbox"/> Bachelor's degree <input type="checkbox"/> Master's degree<br><input type="checkbox"/> Doctorate<br><input type="checkbox"/> Other, please specify         |
| Years of experience with cleft palate:                              |   |
| Are there children with cleft lip/palate in your current case load: | <input type="checkbox"/> Yes <input type="checkbox"/> No  |
| Prevalence of children with cleft palate in case load:              | ____ Approximate number of children with cleft lip/palate in case load<br>____ Approximate number of children in full case load   |

**Section A: Evaluation of the applicability of the protocol.**

- Please read through the protocol and page through the pictures prior to answering the questions. Provide your perceptions and impressions of each aspect by marking the appropriate box:

|   |
|---|
| 1. Do you find the instructions of the perceptual speech assessment protocol:<br><input type="checkbox"/> Unclear <input type="checkbox"/> Clear <input type="checkbox"/> Comprehensive |
|---|

|   |
|---|
| 2. Do you feel that the description of the cleft palate speech characteristics are:<br>Necessary: <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Clear: <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Accurate: <input type="checkbox"/> Yes <input type="checkbox"/> No |
|---|



3. Do you feel that the content of the protocol is sufficient to provide an accurate perceptual assessment of the speech characteristics of children with cleft palate in Zulu?

- Yes  Unsure  No

4. Would you use the perceptual speech assessment protocol to assess the speech of Zulu speaking children with cleft palate?

- Yes  
 No, if not, please provide reasons

5. Do you feel that the protocol will be easy to administer on Zulu speaking children with cleft palate?

- Yes  No  Unsure

6. Do you think that you will require the assistance of an interpreter when:

- Administering the protocol:  
 Yes  No  Unsure
- Interpreting the elicited responses:  
 Yes  No  Unsure

7. Do you think the rating system of the protocol is appropriate?

- Yes  No  Unsure

Please justify your answer:

8. Do you feel that the length of the protocol is appropriate for use in your hospital setting?

- Yes  No  Unsure

If No, Please provide reasons: \_\_\_\_\_

9. Would it be practical to make audio/video recordings of the assessment in your hospital context?

- Yes  No

If not, please explain: \_\_\_\_\_



10. Do you think the protocol will be suitable for:

- |                           |                              |                             |
|---------------------------|------------------------------|-----------------------------|
| ▪ Three year old children | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| ▪ Four year old children  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| ▪ Five year old children  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| ▪ Six year old children   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

11. Do you feel that any of the following could contribute to non-compliance from children being assessed:

- |  |   |
|--|---|
| <input type="checkbox"/> Language delay      | <input type="checkbox"/> English As Additional Language (EAL) |
| <input type="checkbox"/> Clarity of Pictures | <input type="checkbox"/> Level of concepts included           |

12. Would it be useful to have such a perceptual protocol as an assessment instrument?

- |                              |  |
|------------------------------|--|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No, if not, please specify: _____ |
|------------------------------|--|

13. In which other languages would such a protocol be a useful tool to you?

- |                                 |                                  |                                |                                |  |
|---------------------------------|----------------------------------|--------------------------------|--------------------------------|--|
| <input type="checkbox"/> Tswana | <input type="checkbox"/> Ndebele | <input type="checkbox"/> Xhosa | <input type="checkbox"/> Venda | <input type="checkbox"/> Other, please specify _____ |
|---------------------------------|----------------------------------|--------------------------------|--------------------------------|--|

Please provide any additional comments regarding the protocol:

### **Section B: Administration of the Protocol**

- After administering the protocol please take time to complete **Section B** of the questionnaire.

If you did not perform the protocol on a case, please indicate the reason:

- |   |  |
|---|--|
| <input type="checkbox"/> No case available                          | <input type="checkbox"/> No time available |
| <input type="checkbox"/> Did not feel the need to perform on a case | <input type="checkbox"/> Not interested    |

If you did perform the protocol, please answer the following:

1. On how many children did you perform the protocol on: \_\_\_\_\_  
The ages of these children: \_\_\_\_\_



2. Did you find the protocol easy to administer in terms of:

|            |                              |                             |
|------------|------------------------------|-----------------------------|
| ▪ Pictures | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| ▪ Rating   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

3. Did you feel the length of the protocol was:

|                                  |                              |                             |
|----------------------------------|------------------------------|-----------------------------|
| ▪ Age-appropriate                | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| ▪ Suitable for hospital contexts | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

4. Did you feel the protocol allowed for a detailed perceptual speech analysis of the children's speech?

Yes  No

5. Did you find the descriptions of the cleft palate speech characteristics useful for the analysis and interpretation of results?

Yes  No

6. Did you feel that audio/video recordings of the child's performance would have been beneficial for transcribing their responses?

Yes  No

7. If any of the children tested were experienced were non-compliant, to which factor/s would you describe their behavior to:

8. Did you give the instructions to the children in Zulu?

Yes  No

If No, other languages used for instructions: \_\_\_\_\_

9. Did you need the assistance of an interpreter to administer the protocol?

Yes  No

10. Do you feel that you will be able to use the Zulu protocol in future?

Yes  No

Please explain: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

11. Please share any comments and recommendations regarding the administration of the protocol:

**Thank you for your co-operation and participation in this research project.**



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**APPENDIX K**  
**PERCEPTUAL SPEECH ASSESSMENT PROTOCOL FOR ZULU SPEAKING**  
**CHILDREN WITH CLEFT PALATE**

**Perceptual speech assessment protocol for Zulu speaking children with cleft palate**

**Dorette Swiegers**  
**University of Pretoria**

**Contents of speech assessment protocol:**

1. Aim of the protocol
2. Biographical data sheet
3. Cleft plate speech characteristics
4. Speech Assessment:
  - 4.1 Sound inventory and pictures: See Appendix 1
  - 4.2 Counting and rote speech
  - 4.3 Sentence Repetition
  - 4.4 Word lists with non-nasal and nasal consonants
  - 4.5 Conversational Speech
5. Analysis of elicited speech sample form

**Perceptual Speech Assessment Protocol for Zulu speaking children with cleft palate.**

**Dorette Swiegers**

**University of Pretoria**

**1. INTRODUCTION TO THE PROTOCOL:**

This protocol aims to provide the speech-language therapist with a clinical tool for the perceptual speech assessment of children with cleft palate in Zulu, in the current absence of such an instrument.

In an attempt to provide adequate assessment to improve care to children with cleft palate, several goals and guidelines were set by the Eurocleft Speech group ([www.eurocran.org](http://www.eurocran.org)) for the perceptual assessment of these children. The Eurocran cleft project has proposed several universal parameters for the assessment of children with cleft palate and to improve inter centre comparisons ([www.eurocran.org](http://www.eurocran.org)). These parameters include the use of speech material consisting of a word list, short sentences, spontaneous speech, sentence repetition and counting ([www.eurocran.org](http://www.eurocran.org)).

The parameters were developed to facilitate in service delivery to children with cleft palate, as it was noted that different teams use different assessment tools, making the comparison of data and speech findings impossible. In an attempt to provide the best care for all, a group of expert speech-language therapists proposed to overcome this lack of standardized clinical material by providing guidelines for the perceptual assessment of children with cleft palate, contributing towards evidence-based practice for these children (Henningsson et al. 2007:2). These guidelines are applied for reporting the speech outcomes of children with cleft palate regardless of the individual's country of origin, language or languages spoken and other variables that could affect speech. These guidelines is aimed at achieving greater consistency in reporting speech outcomes to apply data



universally in assessing children with cleft palate and to report perceptual speech data for research purposes (Henningsson et al. 2007:2).

## **2. BIOGRAPHICAL DATA SHEET:**

### **Patient Information**

**Cleft Palate/Craniofacial Team / Center / Unit / Hospital** \_\_\_\_\_

**Date:** \_\_\_\_\_ **Referring Person:** \_\_\_\_\_

**Patient Initials:** \_\_\_\_\_ **Gender:** \_\_\_ M \_\_\_ F

**Date of birth:** \_\_\_\_\_ **Age:** \_\_\_\_\_

**Home Language:** \_\_\_\_\_ **Additional languages:** \_\_\_\_\_

|   |   |
|---|---|
| <b>Cleft type (circle):</b>                                       | UCLP, BCLP, Hard & Soft Palate only,<br>Left/Right, Other _____ |
| <b>Associated Conditions (e.g. language delay, otitis media):</b> | ___ No ___ Yes  |
| <b>Syndrome:</b>  | ___ No ___ Yes (specify): _____                                 |
| <b>Oronasal Fistulae:</b>   | ___ No ___ Yes ___ Unknown                                      |
| <b>Velopharyngeal Incompetency:</b>                               | ___ No ___ Yes ___ Unsure                                       |

**Age at primary closure of hard palate (if applicable):** \_\_\_ years \_\_\_ months

**Age at primary closure of soft palate (if applicable):** \_\_\_ years \_\_\_ months

**Age at lip closure (if applicable):** \_\_\_\_\_ years \_\_\_\_\_ months

**Age at secondary velopharyngeal surgery (document age at each surgery, columella lengthening, as applicable):** \_\_\_\_\_

**Speech Therapy:**

|                           |                               |                             |
|---------------------------|-------------------------------|-----------------------------|
| <b>No / Yes / Unknown</b> | <b>If yes, from what age:</b> | <b>Duration of therapy:</b> |
| <b>Where:</b>             |                               |                             |
| <b>Progress:</b>          | ___ Good                      | ___ Satisfactory ___ Poor   |

## Assessment Details:

Date of Assessment: \_\_\_\_\_ Age at assessment: \_\_\_\_\_

### Speech assessment conducted by:

\_\_\_\_\_ Speech-language therapist \_\_\_\_\_ Other (specify) \_\_\_\_\_

\_\_\_\_\_ Number of people conducting assessment

Language in which assessment was conducted: \_\_\_\_\_

Language in which instructions were given: \_\_\_\_\_

### Conditions of speech evaluation:

\_\_\_ Live judgment only (no recording)

\_\_\_ Audio recording (\_\_\_ digital/ \_\_\_ analogue)

\_\_\_ Video recording (\_\_\_ digital/ \_\_\_ analogue)

Do you use any method to ensure agreement between speech-language therapists rating the speech of clients? \_\_\_ Yes \_\_\_ No

### If applicable, how do you obtain agreement:

\_\_\_ Live ratings, therefore not applicable \_\_\_\_\_ Inter-rater reliability obtained

\_\_\_ Consensus listening \_\_\_\_\_ Intra-rater reliability obtained

\_\_\_ None

### Speech transcriptions done by:

\_\_\_ Patient's speech-language therapist \_\_\_\_\_ Other (specify): \_\_\_\_\_

\_\_\_ Independent speech-language therapist

Comments regarding elicited speech sample of client (e.g. length, duration, co-operation):

\_\_\_\_\_  
\_\_\_\_\_

### **3. CLEFT PALATE SPEECH CHARACTERISTICS:**

The following definitions of the cleft palate speech characteristics were included to guide the assessment and analysis of data.

(Source: Henningson, G., Kuehn, D., Sell, D., Sweeney, T., Trost-Cardamone, J., & Whitehill, T. L. 2007. Universal Parameters for Reporting Speech Outcomes in Individuals with Cleft Palate. *The Cleft Palate Craniofacial Journal*, 44, (1), 1-17.)

1. **Hypernasality:** Excessively undesirable amount of perceived nasal cavity resonance during phonation.
2. **Hyponasality:** Lack of nasal resonance for the three phonemes [m], [n] and [ŋ] resulting from a partial or complete obstruction in the nasal tract.
3. **Mixed resonance:** Voice quality, which exhibits characteristics of hypernasality and hyponasality.
4. **Cul-de-sac:** Voice quality resulting from anterior nasal obstruction and posterior aperture, or from carrying the tongue too far backward, usually described as hollow sounding.
5. **Nasal airflow:** Airflow through the nose, usually measurable or audible, heard most frequently during the production of voiceless plosives and fricatives.
6. **Nasal grimace:** When nasal flare, nostrils and upper lip, mid and upper face moves abnormally during speech.
7. **Dentalisation:** Sounds produced between the teeth.
8. **Lateralisation:** Sounds produced on the one side of the mouth.
9. **Palatalisation:** Occurs when a sound is produced as a palatal rather than a non-palatal sound.
10. **Assimilation/co-articulation:** Modification of a speech sound due to the influence of adjacent sounds.
11. **Backing:** The substitution of a velar/uvular for any consonant other than a velar/uvular.
12. **Pharyngeal articulation:** Speech produced by use of pharyngeal and glossopharyngeal muscles at the site of the pharyngeal wall and velum.
13. **Glottal Articulation:** Plosive sound produced by the sudden release of subglottic air pressure.
14. **Active nasal fricatives, nasal realisation of fricatives and plosives:** Nasal pharyngeal sound that accompanies the production of voiceless pressure sounds in the speech.
15. **Gliding of fricatives / affricates:** The substitution of a glide for a fricative or affricate.

#### **4. MATERIALS FOR ELICITING SUGGESTED SPEECH SAMPLE:**

##### ***4.1 Sound inventory and pictures: See Appendix 1***

- *Request the child to repeat the following words. Do not elicit these words by using pictures: (Phindaphinda lamagama alandelayo). Please indicate the responses on the provided form: Zulu Words for perceptual speech assessment.*

1. mfimfa (to ooze out)
3. qhinqa (to wait)
5. ncenga (to deplore)
7. chonkco (perched)
9. ngxil (tight)

2. iqoqo (a collection)
4. fengqa (to use nickname)
6. qonkela (to amass)
8. gxiba (to slander)
10. nxese (regret)

11. nhinhiza (to speak through nose)      12. enza (to do)  
13. onga (to gather)                              14. ongula (to skim off)

- *Show the child the pictures. Request the child to name the words when you show the picture and indicate responses on the provided form: Zulu Words for perceptual speech assessment. (Shono igama lalokho okubona esithombeni).*

#### **4.2 Counting and rote speech:**

- *Request the child to count from one to ten. Children can produce these responses spontaneously, or they can imitate the speech-language therapist's productions. Number cards may be used to elicit these responses. Indicate responses in the table below. (Bala kusuka kusuka kokukodwa kuya eshumini (1 kuya ku-10))*

| <b>Word</b>             | <b>Child's elicited response</b> |
|-------------------------|----------------------------------|
| 1. kunye                |                                  |
| 2. kubili               |                                  |
| 3. kuthathu             |                                  |
| 4. kune                 |                                  |
| 5. kuhlanu              |                                  |
| 6. kuyisithupha         |                                  |
| 7. kuyiskhombisa        |                                  |
| 8. kuyisishiyagalombili |                                  |
| 9. kuyisishiyagalolunye |                                  |
| 10. kuyishumi           |                                  |

- *Request the child to say the days of the week. Children can produce these responses spontaneously, or they can repeat the speech-language therapist's productions. Indicate responses in the table below. (Yisho izinsuku zesonto noma zeviki)*

| <b>Word</b>                       | <b>Child's elicited response</b> |
|-----------------------------------|----------------------------------|
| uMsombuluko ( <i>Monday</i> )     |                                  |
| uLwesibili ( <i>Tuesday</i> )     |                                  |
| uLwesithathu ( <i>Wednesday</i> ) |                                  |
| uLwesisine ( <i>Thursday</i> )    |                                  |
| uLwesihlanu ( <i>Friday</i> )     |                                  |
| uMgqibelo ( <i>Saturday</i> )     |                                  |
| iSonto ( <i>Sunday</i> )          |                                  |

#### **4.3 Sentence Repetition:**

- *Request the child to repeat the sentences. Indicate responses in the table below. (Yisho lemisho elandelayo emva kwami).*



| Sentence   | Child's elicited response |
|--|---------------------------|
| 1. Umfana udlala ngebhola. (The boy plays with a ball)               |                           |
| 2. Inja ilambile futhi iyadla. (The dog is hungry and eats his food) |                           |
| 3. Ngiyayibona indlu. (I see the house)                              |                           |
| 4. Umama ubuye izolo ekhaya. (Mother came home yesterday)            |                           |
| 5. Izinkukhu ziphuzi. (The chickens are yellow)                      |                           |
| 6. Insimbi iyakhala. (The bell is ringing)                           |                           |
| 7. Ubhaka amakhekhe. (She bakes a cake)                              |                           |
| 8. Ucingo (ifoni) iwele phansi. (The phone is falling down)          |                           |
| 9. UMary uzilimaze isandla. (Mary hurt her hand)                     |                           |
| 10. UJohn ugibele ibhayasikili lakhe. (John is riding his bicycle)   |                           |
| 11. UTim uqgoka isiqgoko. (Tim is wearing a hat)                     |                           |
| 12. Ubaba ulungisa umnyango. (Father is mending the door)            |                           |

#### 4.4 Word lists with nasal and non-nasal consonants:

- Request the child to repeat the following words. Indicate responses in the table below. (*Phindaphinda lamagama alandelayo*)

| Words with non-nasal consonants |               |                   | Words with nasal consonants |               |                   |
|---------------------------------|---------------|-------------------|-----------------------------|---------------|-------------------|
| Zulu words                      | English words | Elicited response | Zulu words                  | English words | Elicited response |
| ubudoda                         | manliness     |                   | umfula                      | river         |                   |
| idada                           | duck          |                   | indoda                      | man           |                   |
| ilokwe                          | dress         |                   | izintombi                   | young girl    |                   |
| ugogo                           | grandmother   |                   | ingxoxo                     | conversation  |                   |
| ufudu                           | tortoise      |                   | umsindo                     | noise         |                   |
| qhotho                          | honest        |                   | ngcono                      | better        |                   |
| icici                           | earring       |                   | izinja                      | dogs          |                   |
| igula                           | calabash      |                   | ingubo                      | blanket       |                   |
| Isivakashi                      | visitor       |                   | isingumo                    | decision      |                   |
| ubisi                           | milk          |                   | imimese                     | knives        |                   |

#### 4.5 Conversational speech:

Elicit a 2 minute or longer spontaneous, connected speech sample from the child. Use open-ended questions, narratives or descriptions of events, or follow the guidelines provided to elicit connected speech:

- Tell me about your family. *Ake ungitshela ngomndeni wakini.*
- Who is your best friend? Why? *Ubani umngani wakho omkhulu? Kungani wakhetha lowo?*
- What is your favorite sport? *Yimuphi umdlalo owuthanda kakhulu?*
- What are your hobbies? *Yikuphi othanda ukukwenza uma uziphumulele?*
- Which do you like best: *Yikuphi okuthanda kakhulu kulokhu okulandelayo:*
  - Puppy dogs or kittens? *Imidlwane noma amakati amancane?*
  - Baby dolls or teddy bears? *Ingane kanodoli noma uteddy bear?*
  - Singing or dancing? *Ukucula noma ukudansa?*
- What do you want to be when you grow up? Why? *Ufuna ukuba yini uma usukhulile? Kungani ukhethe ukuba yilokho?*
- Explain the game of soccer / tennis / cricket to me. *Ake ungichazele ngalemidalo elandelayo: ibhola lezinyawo/ ithubeni/ icricket.*
- What does a teacher / fireman / doctor do? *Ake ungichazele imisebenzi yalaba: uthishela/ abazecima-mlilo/ udokotela?*

#### 5 GUIDELINES FOR THE ANALYSIS OF THE ELICITED SPEECH SAMPLE:

| <u>Characteristics of cleft palate speech:</u>  | <u>Judgment/Categories:</u><br><u>Circle the rating for each parameter</u>   |
|---|--|
| <b>Nasality:</b><br>Hyper /~/<br><br>Hypo /~/<br><br>Mixed resonance<br><br>Cul-de-sac                                  | Within normal limits, Mild, Moderate, Severe<br><br>Within normal limits, Mild, Moderate, Severe<br><br>Within normal limits, Mild, Moderate, Severe<br><br>Within normal limits, Mild, Moderate, Severe |
| <b>Nasal airflow:</b><br>Audible nasal air escape /~/<br><br>Inaudible nasal air escape /~/<br><br>Nasal turbulence /~/ | Within normal limits, present- intermittent or frequent<br><br>Within normal limits, present: intermittent or frequent<br><br>Within normal limits, present: intermittent or frequent                    |
| <b>Consonant Production Errors</b>  | Within normal limits<br>Errors Present:<br>_ abnormal backing of oral targets to post-   |



|   |  |
|---|--|
|   | <p>uvular place: pharyngeal/glottal</p> <p>_ abnormal backing of oral targets, place remains oral: mid-dorsum palatal/ velar/ uvular</p> <p>_ nasal fricative: phoneme specific / not phoneme specific</p> <p>_ nasal consonant for oral production</p> <p>_ nasalized voiced pressure consonant</p> <p>_ weak oral pressures</p> <p>_ other misarticulations, list:</p> <p>_____</p> <p>_____</p> <p>_ developmental articulation / phonological error, list:</p> <p>_____</p> <p>_____</p> |
| <p><b>Voice disorder</b></p>  | <p>_ Absent</p> <p>_ Present</p>   |
| <p><b>Intelligibility</b></p> <p><input type="checkbox"/> Speech Understandability<br/>(<b>mild:</b> speech is occasionally difficult to understand, <b>moderate:</b> speech is often difficult to understand, <b>severe:</b> speech is difficult to understand most or all of the time)</p> <p><input type="checkbox"/> Speech Acceptability<br/>(<b>mild:</b> speech deviates from normal to a mild degree, <b>moderate:</b> speech deviates from normal to a moderate degree, <b>severe:</b> speech deviates from normal to a severe degree)</p>   | <p>_ Within normal limits / none</p> <p>_ Mild</p> <p>_ Moderate</p> <p>_ Severe</p><br><p>_ Within normal limits</p> <p>_ Mild</p> <p>_ Moderate</p> <p>_ Severe</p>  |
| <p><b>Cleft characteristics</b></p> <p><input type="checkbox"/> Dentilisation /ɲ/</p> <p><input type="checkbox"/> Lateralisation /ʎ/</p> <p><input type="checkbox"/> Palatalisation /,/</p> <p><input type="checkbox"/> Assimilation / Co-articulation /˘/</p> <p><input type="checkbox"/> Backing to velar /&gt;/</p> <p><input type="checkbox"/> Backing to uvular /&gt;/</p> <p><input type="checkbox"/> Pharyngeal articulation / ʕ /</p> <p><input type="checkbox"/> Glottal articulation /ʔ /</p> <p><input type="checkbox"/> Active nasal fricatives /~/</p> <p><input type="checkbox"/> Nasal realization of fricatives / ~/</p> <p><input type="checkbox"/> Nasal realization of plosives / ~/</p> <p><input type="checkbox"/> Absent pressure consonants / ɾ /</p> <p><input type="checkbox"/> Gliding of fricatives / affricates /ɔ/</p> | <p>Error types present / absent</p>  |



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## **Appendix 1**

### **Perceptual speech assessment protocol for Zulu-speaking children with cleft palate**

**Dorette Swiegers**

**2009**



**Zulu words used to elicit speech during the assessment**

| Manner of Airstream release          | Traditional Orthography | Phonetic Symbol | Initial word position             | Elicited Response | Medial word position    | Elicited Response | Final word position | Elicited Response |
|--------------------------------------|-------------------------|-----------------|-----------------------------------|-------------------|-------------------------|-------------------|---------------------|-------------------|
| P<br>L<br>O<br>S<br>I<br>V<br>E<br>S | p                       | p'              | -peta (to dig with a spade)       |                   | ipipi (a pipe)          |                   | -                   |                   |
|                                      | t                       | t'              | -taklaza (to hit on body/stomach) |                   | itiye (tea)             |                   | -                   |                   |
|                                      | k                       | k'              | -kabha (to chop wood)             |                   | ikati (cat)             |                   | -                   |                   |
|                                      | ph                      | ph              | -phefumula (to breathe)           |                   | ilipheya (pear)         |                   | -                   |                   |
|                                      | th                      | th              | -thandaza (to pray)               |                   | ubuthongo (sleep)       |                   | -                   |                   |
|                                      | kh                      | kh              | -khala (to cry)                   |                   | ukhezo (spoon)          |                   | -                   |                   |
|                                      | bh                      | b               | -bhala (to write)                 |                   | hhabhula (apple)        |                   | -                   |                   |
|                                      | d                       | d               | -dansa (to dance)                 |                   | idada (duck)            |                   | -                   |                   |
|                                      | g                       | g               | -gawula (to chop)                 |                   | ugogo (grandmother)     |                   | -                   |                   |
|                                      | (m)b                    | ḃ               | -mbatha (to dress)                |                   | imbali (flower)         |                   | -                   |                   |
|                                      | (n)d                    | ḏ               | -ndiza (to fly)                   |                   | indoda (man)            |                   | -                   |                   |
|                                      | (n)g                    | ḡ               | -ngoma (to sing)                  |                   | -anga (kiss)            |                   | -                   |                   |
|                                      | k                       | ḵ               | -kuhle (good)                     |                   | qakatha (to plait hair) |                   | -                   |                   |
| IMPLOSIVE                            | b                       | ḅ               | -bala (to count)                  |                   | udlubu (peanut)         |                   | -                   |                   |



|   |       |       |                           |  |                                      |  |   |  |
|---|-------|-------|---------------------------|--|--------------------------------------|--|---|--|
| A<br>F<br>F<br>R<br>I<br>C<br>A<br>T<br>E | (n)dl | dɬ    | -ndlala (to spread)       |  | indlovu (elephant)                   |  | - |  |
|   | (m)v  | ːv    | -mvenene (to run fast)    |  | imvula (rain)                        |  | - |  |
|   | (n)z  | dʒ    | -nzima (black)            |  | inzonzo (legs of bird)               |  | - |  |
|   | (n)j  | dʒ    | -njoza (to cover)         |  | inja (dog)                           |  | - |  |
|   | j     | dʒ    | -jikijela (to throw)      |  | ijuba (dove)                         |  | - |  |
|   | (m)f  | ʔf/ʔv | -mfimfa (to ooze out)*    |  | imfene (baboon)                      |  | - |  |
|   | ts    | ts'   | -tsatsaza (to spray)      |  | -tsatsaza (to spray)                 |  | - |  |
|   | tsh   | tʃ'   | -tshala (to plant trees)  |  | utshani (grass)                      |  | - |  |
|   | (n)hl | tʰ    | -nhlo (to flower)         |  | inhlanzi (fish)                      |  | - |  |
|   | kl    | kʰ    | -klikliza (to choke)      |  | -taklaza (to hit on body/in stomach) |  | - |  |
| C<br>L<br>I<br>C<br>K<br>S                | q     | !     | -qakatha (to plait hair)  |  | iqoqo (a collection)*                |  | - |  |
|   | c     | l     | -cula (to sing)           |  | isicabucabu (spider)                 |  | - |  |
|   | qh    | lh    | -qhinqa (to wait)*        |  | iqhude (a rooster)                   |  | - |  |
|   | ch    | lh    | -chitha (to throw out)    |  | -chitha (to throw out)               |  | - |  |
|   | gq    | !g    | -gqagqaza (to scatter)    |  | -gqagqaza (to scatter)               |  | - |  |
|   | gc    | !g    | -gcwigcwiza (to bubble)   |  | -gcwigcwiza (to bubble)              |  | - |  |
|   | (n)gq | !g    | -ngqabitha (to jump down) |  | -fengqa (to use nickname)*           |  | - |  |



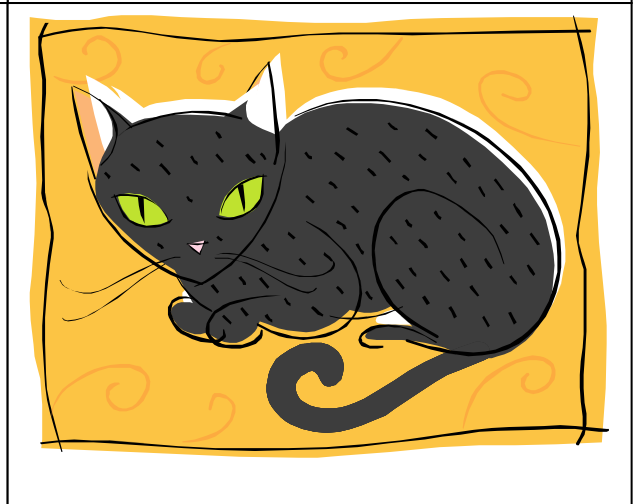
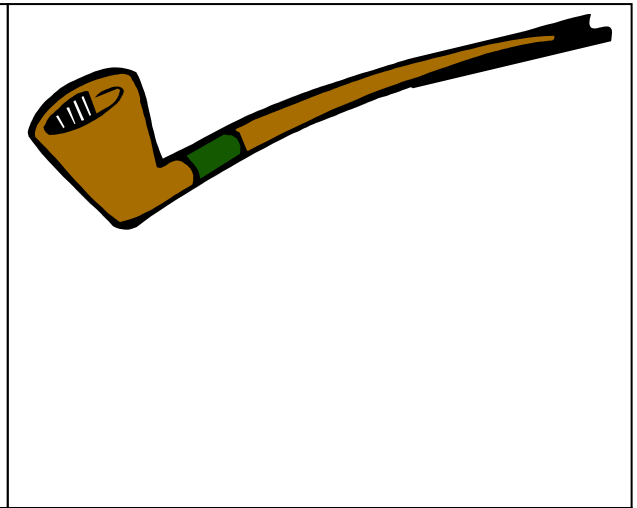
|                            |       |     |                              |                         |                                     |   |   |  |
|----------------------------|-------|-----|------------------------------|-------------------------|-------------------------------------|---|---|--|
| C<br>L<br>I<br>C<br>K<br>S | (n)gc | lg  | -ngcolile (is dirty)         |                         | -bhangcuzela (to walk unarmed)      |   | - |  |
|                            | nq    | ŋj  | -nqaka (to catch)            |                         | inqama (ram)                        |   | - |  |
|                            | nc    | ŋj  | -ncenga (to deplore)*        |                         | -bhinca ( to put on/ wear)          |   | - |  |
|                            | (n)kq | ŋ   | -                            |                         | -qonkqela ( to amass)*              |   | - |  |
|                            | (n)kc | ŋj  | -                            |                         | chonkco (perched)(ideophone)*       |   | - |  |
|                            | x     | ll  | -xoxa (to chat)              |                         | ixixo (frog)                        |   | - |  |
|                            | xh    | llh | -xhaka (to grip/catch)       |                         | isixhobo (heaps of rock and stones) |   | - |  |
|                            | gx    | llg | -gxabalaza (to sit at ease)  |                         | -gxiba (to slander)*                |   | - |  |
|                            | (n)gx | llg | ngxi! (tight) (ideophone)*   |                         | -ngxangxasha (to hop)               |   | - |  |
|                            | (n)x  | ŋll | nxese (regret ) (ideophone)* |                         | -bhonxula (to pull out)             |   | - |  |
| (n)kx                      | ŋll   | -   |                              | -xhonkxa (to sow thick) |                                     | - |   |  |
| FRICATIVES                 | f     | f   | -fela (to spit)              |                         | ishalufu (shelf)                    |   | - |  |
|                            | s     | s   | -saha (to saw)               |                         | isicathulo (shoe)                   |   | - |  |
|                            | sh    | ʃ   | -shayana (to punish)         |                         | ihhashi (horse)                     |   | - |  |
|                            | h     | x   | -hamba (to walk)             |                         | ukuhola (to earn money)             |   | - |  |
|                            | h     | h   | -hamba (to walk)             |                         | heha (to breath hard)               |   | - |  |

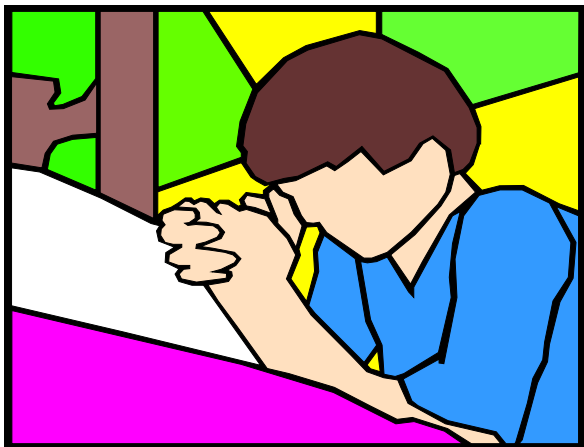


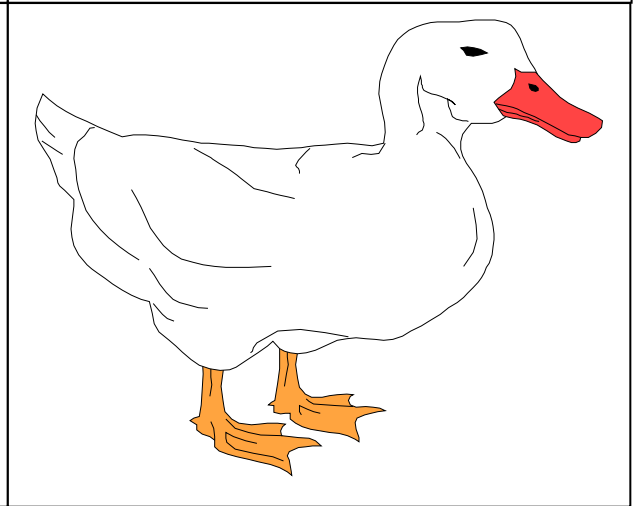
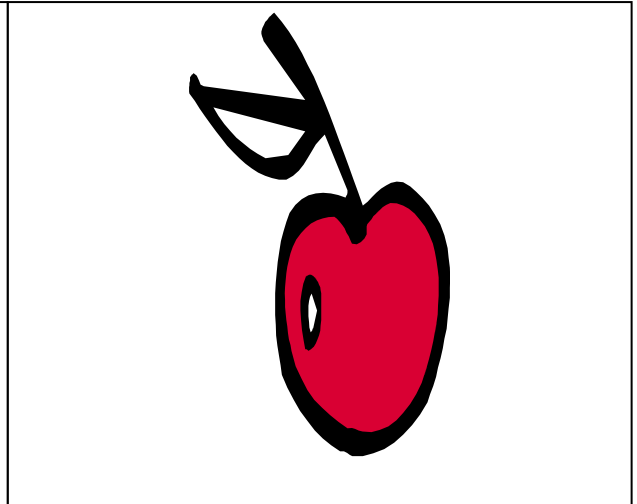
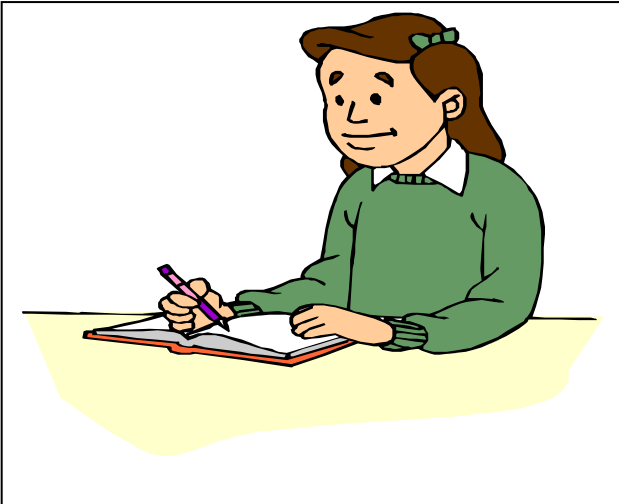
|             |      |     |   |   |   |
|-------------|------|-----|---|---|---|
| FRICATIVES  | v    | v̥  | -vula (to open)   | indlovu (elephant)  | - |
|             | z    | z̥  | -zalela (to lay eggs)   | ukhezo (spoon)  | - |
|             | hh   | h̥  | -hhala (to rake)  | ihhashi (horse)   | - |
|             | hl   | l̥  | -hlala (to sit/stay)  | isihlahla (tree)  | - |
|             | dl   | l̥  | -dlala (to play)  | udlubu (peanut)   | - |
| TRILL       | r    | r̥  | -reka (to act to music)   | irayisi (rice)  | - |
| APPROXIMANT | l    | l   | -lakalaka (swinging /hanging down)  | -umvula (rain)  | - |
|             | l̥   | l̥̥ | (variation of [l] above; [l] can be pronounced with breathy voiced, thus l̥̥) | (variation of [l] above; [l] can be pronounced with breathy voiced, thus l̥̥) | - |
|             | w    | w   | -washa (to do laundry)  | -gawula (to chop)   | - |
|             | y    | j   | -yenca (to cut)   | ipheya (pear)   | - |
| NASALS      | m    | m   | -maklaka (to smash to pieces)   | ikamu (comb)  | - |
|             | (m)v | m̥  | mvu (sound made when hitting) ideophone                                       | imvula (rain)   | - |
|             | n    | n   | -nabuzela (to crawl)  | utshani (grass)   | - |
|             | ny   | n̥  | -nyaliza (to lick; cat licking itself)  | inyoni (bird)   | - |

|                            |      |   |   |  |   |  |                     |  |
|----------------------------|------|---|---|--|---|--|---------------------|--|
| NASALS                     | (n)g | ŋ | -ngena (to come in)   |  | iketanga (chain)  |  | -                   |  |
|                            | m    | ṃ | (variation of [m] above; [m] can be pronounced with breathy voiced, thus ṃ) |  | (variation of [m] above; [m] can be pronounced with breathy voiced, thus ṃ) |  | -                   |  |
|                            | nh   | ɲ | -nhinhiza (to speak through nose)*  |  | -nhinhiza (to speak through nose)*  |  | -                   |  |
| V<br>O<br>W<br>E<br>L<br>S | a    | a | -anga (to kiss)   |  | iketanga (chain)  |  | -anga (to kiss)     |  |
|                            | e    | ɛ | -enza (to do)*  |  | iketanga (chain)  |  | yembe (shirt)       |  |
|                            | e    | e | -ephula (to break)  |  | isethulo (gift/present)   |  | isikhele (scissors) |  |
|                            | i    | i | insipho (soap)  |  | insipho (soap)  |  | inyoni (bird)       |  |
|                            | o    | ɔ | -onga (to gather) *   |  | indoda (man)  |  | insipho (soap)      |  |
|                            | o    | o | -ongula (to skim off)*  |  | ingelosi (angel)  |  | ubuthongo (sleep)   |  |
|                            | u    | u | utshani (grass)   |  | -gawula (to chop)   |  | indlovu (elephant)  |  |

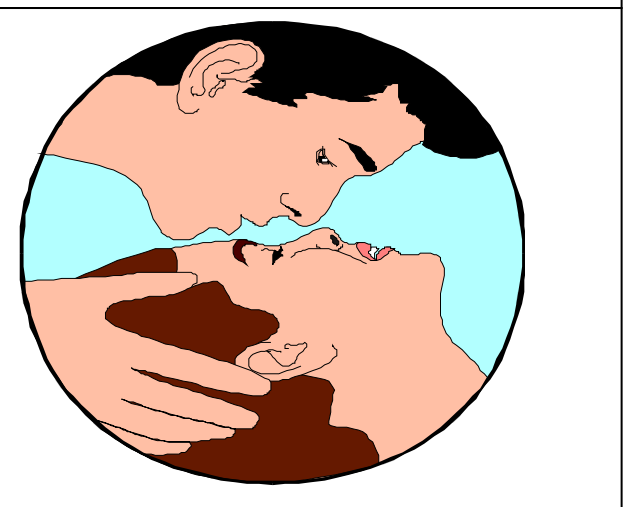
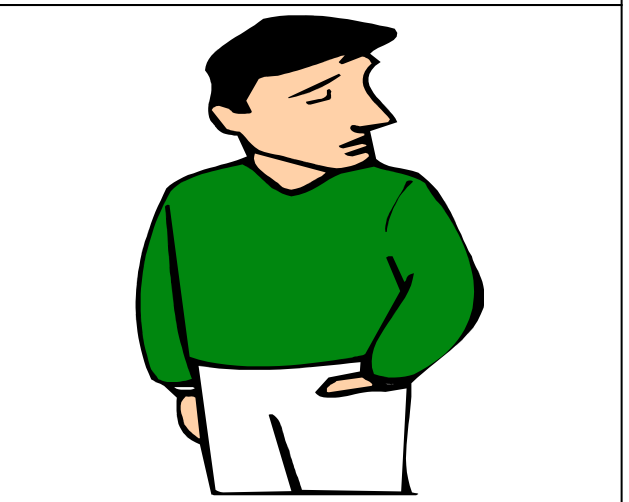
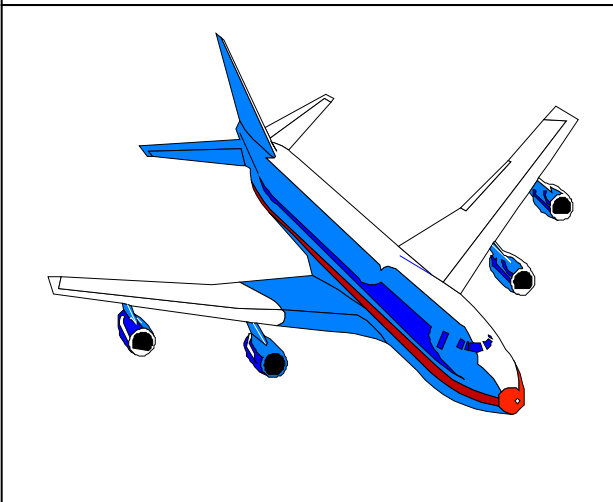
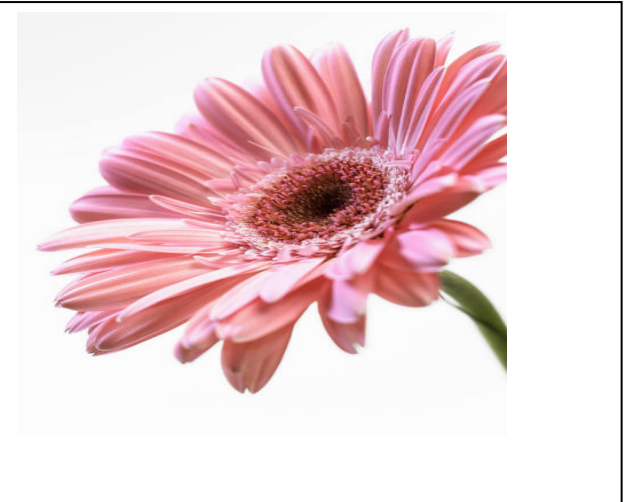
\* Words marked with a \* are the words elicited without pictures, elicited and responses indicated in 4.1.

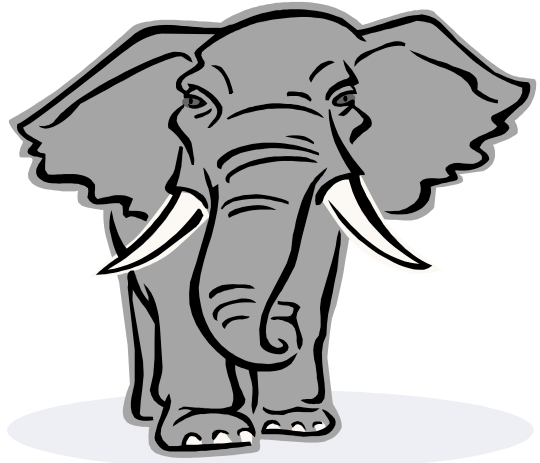
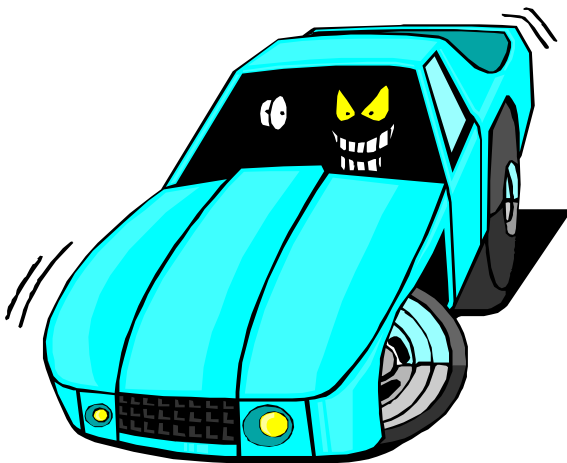
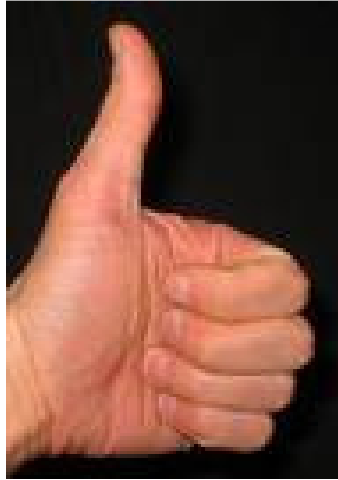


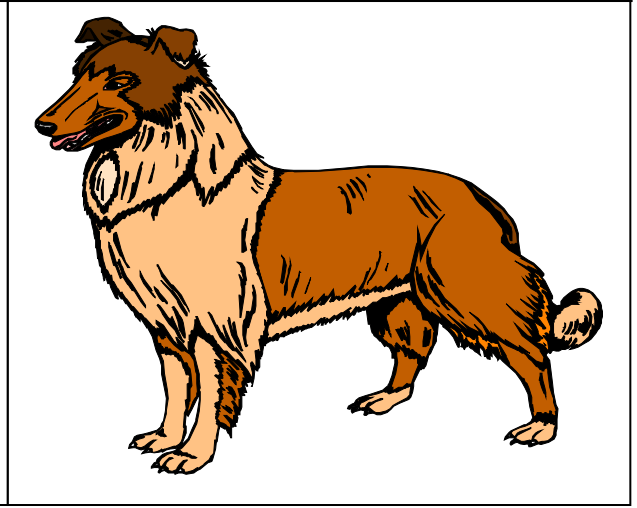
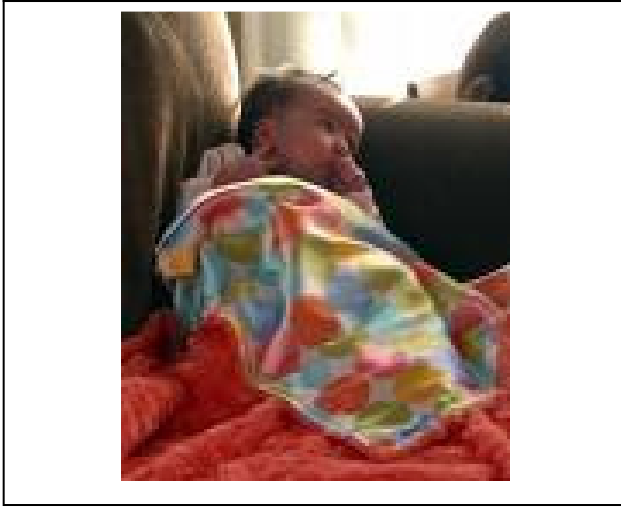
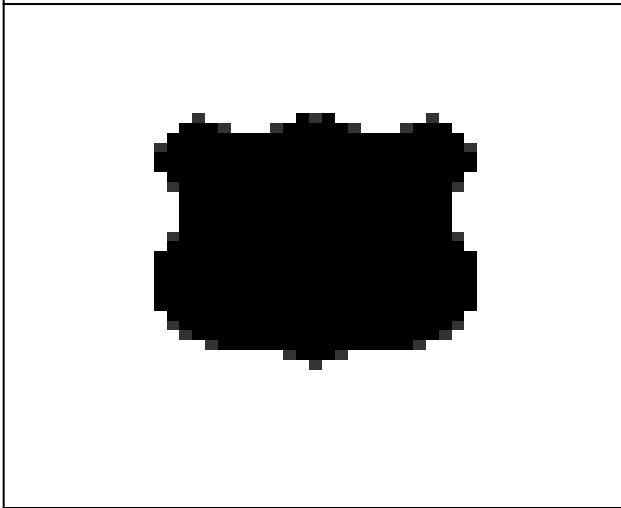
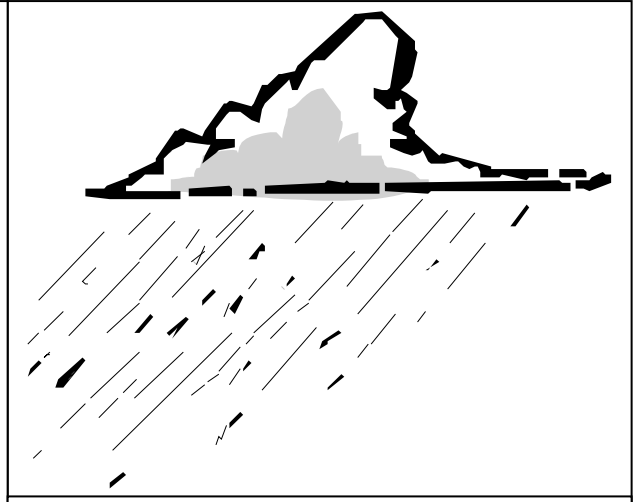


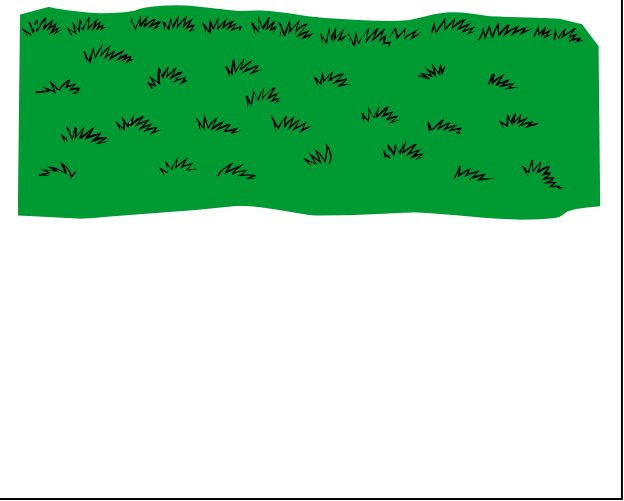
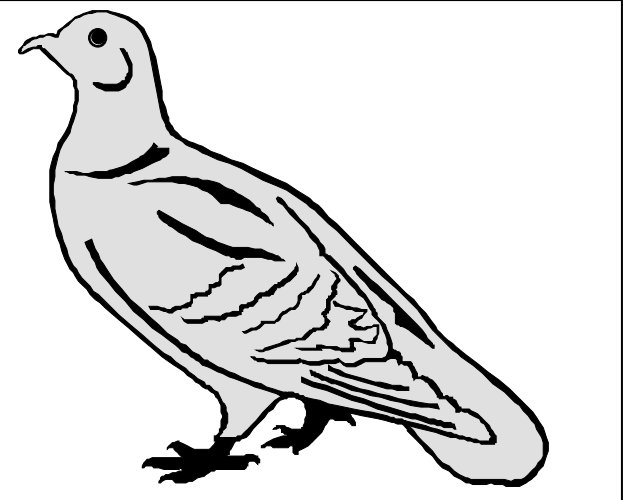
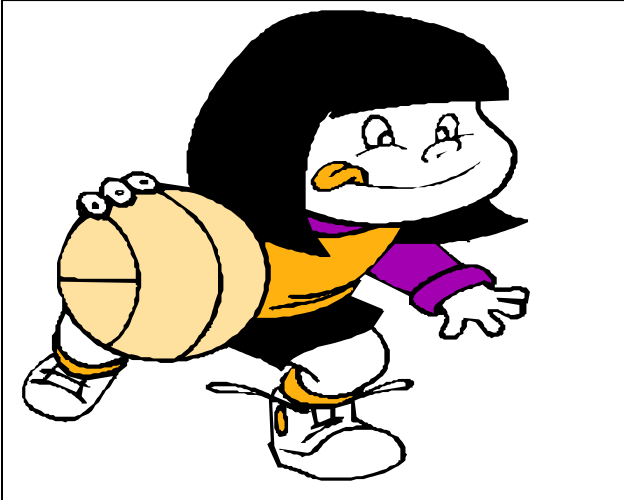


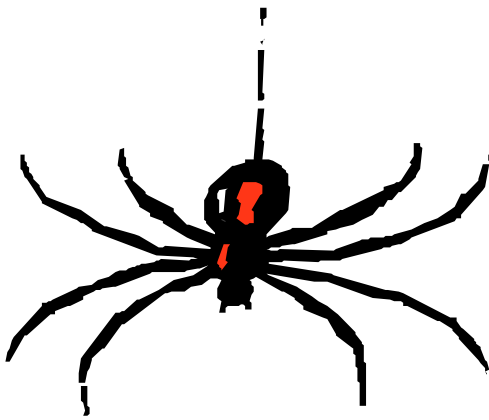
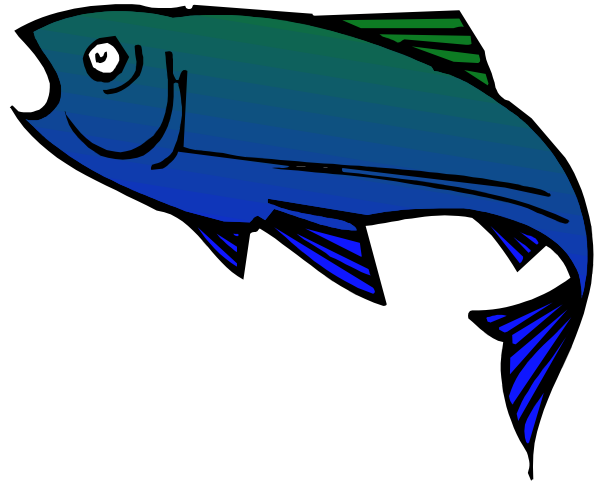


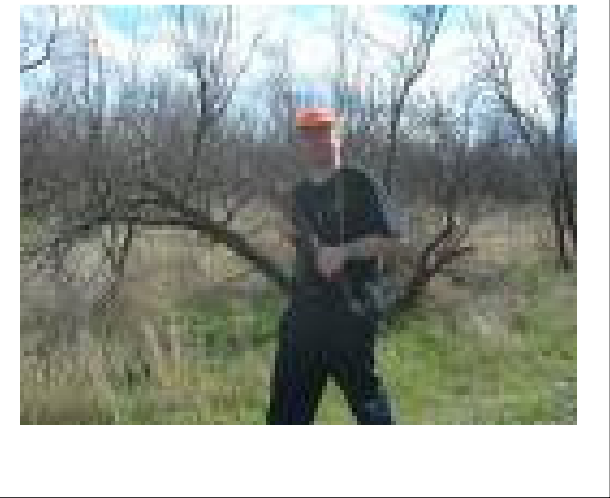
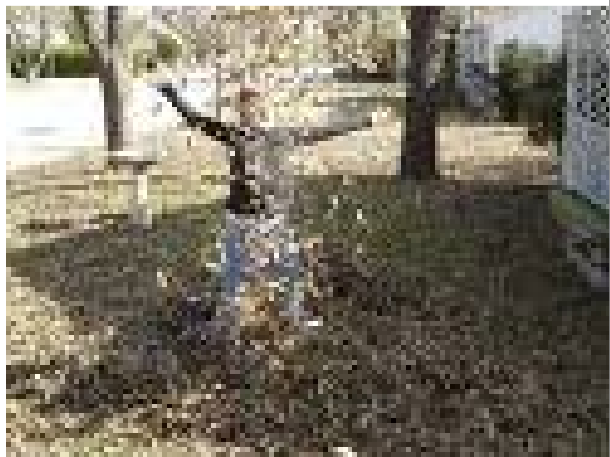
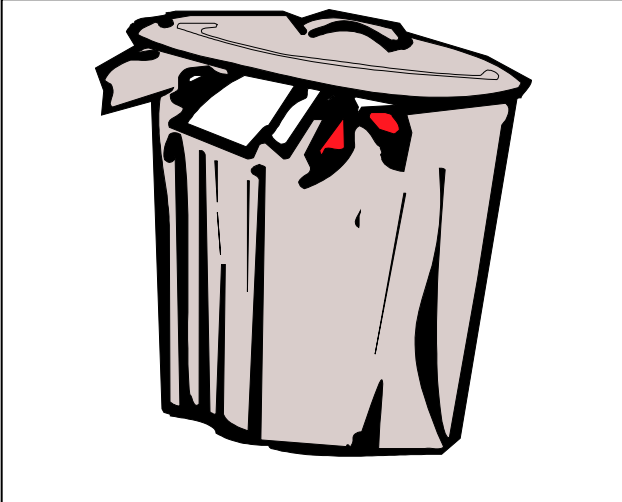


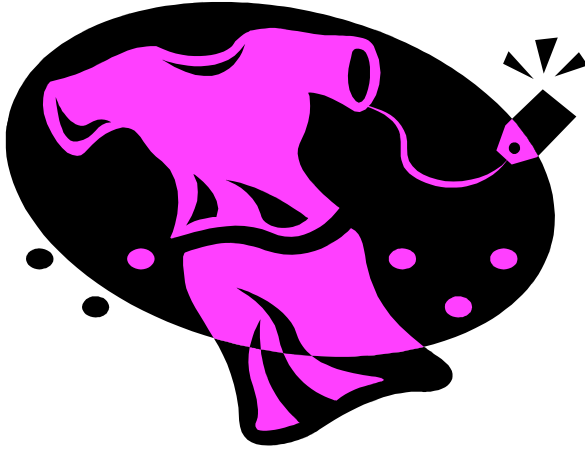
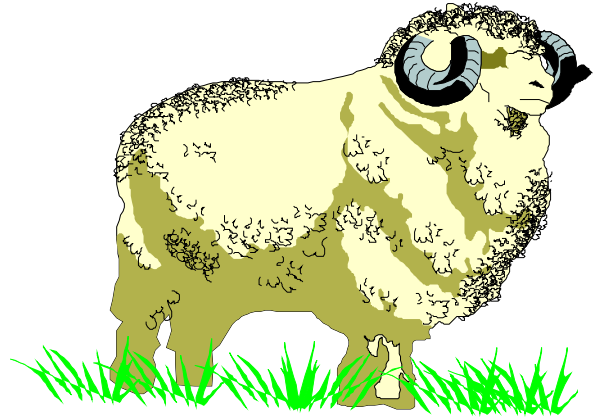
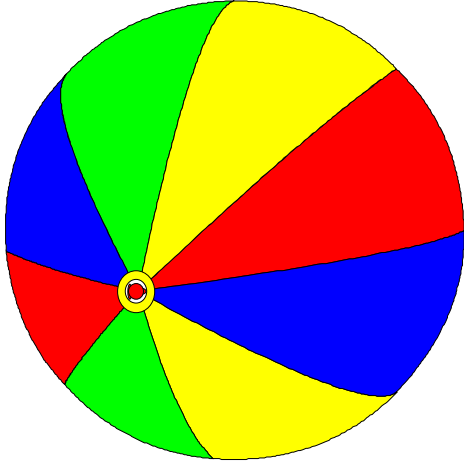


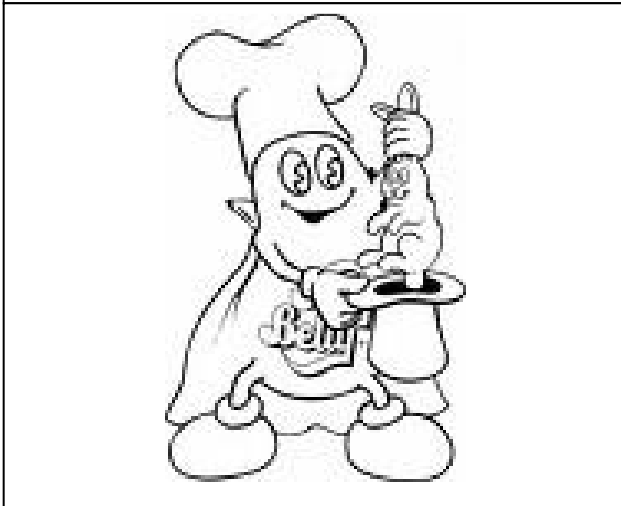
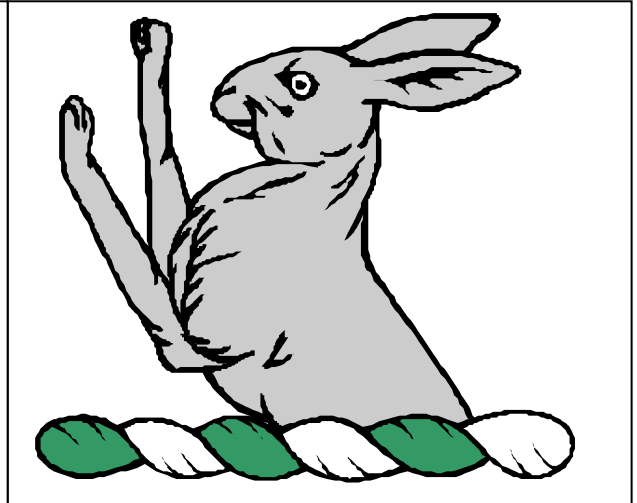
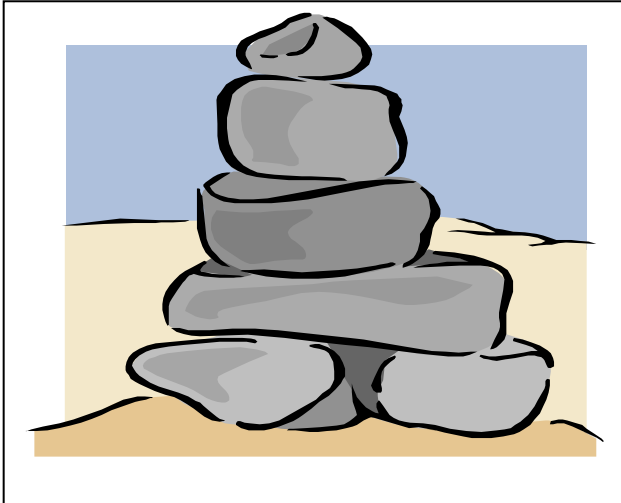




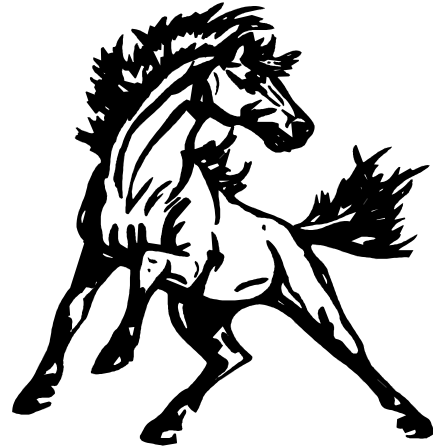




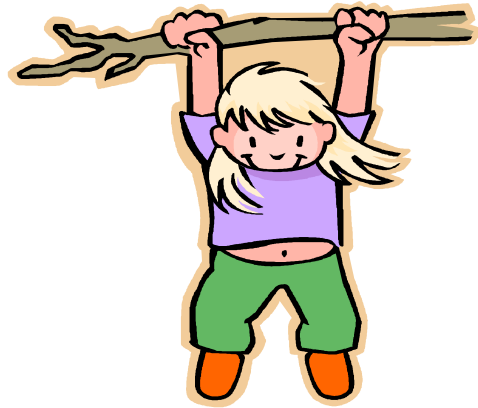


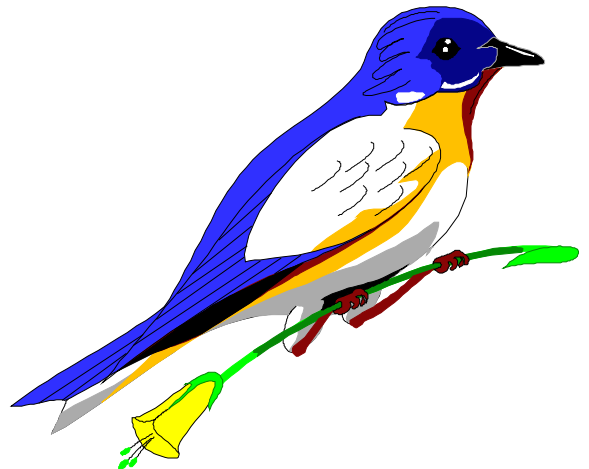
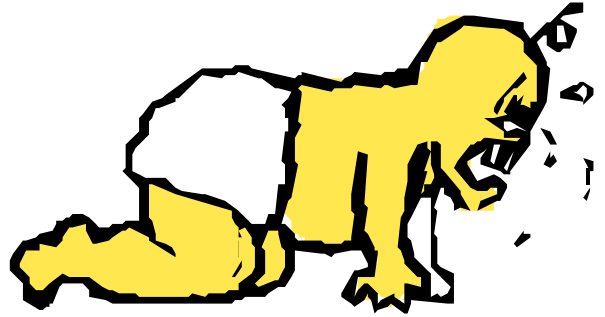


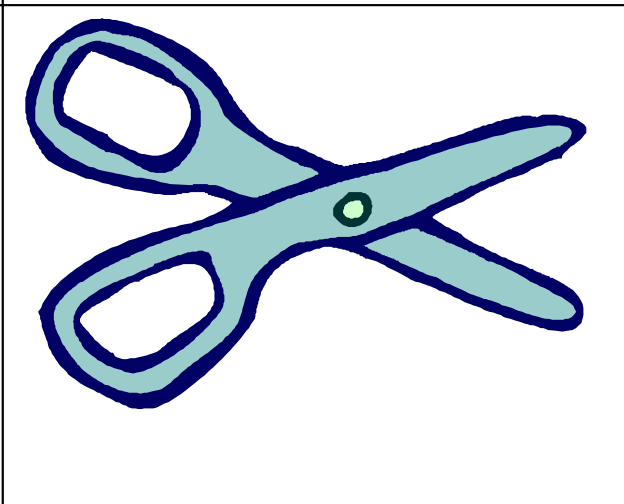
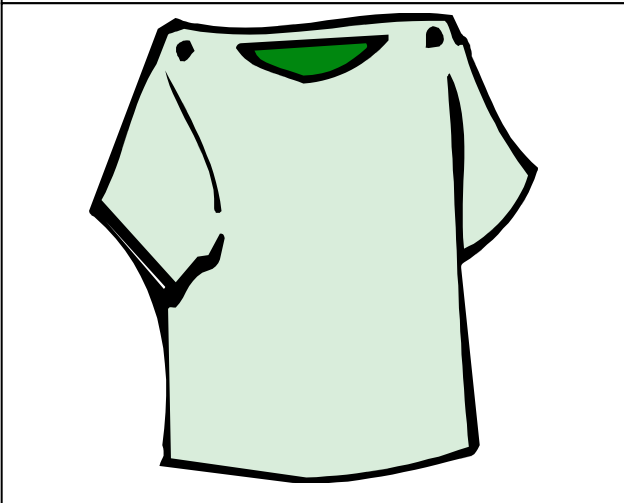


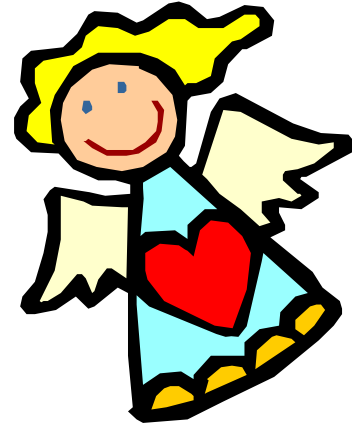














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## **APPENDIX L**

### **SOURCES ON CLEFT PALATE SPEECH CHARACTERISTICS**

**Table 1: Sources on Cleft Palate Speech Characteristics, assessment and normal vocabulary development**

| <u>Literature Review:</u>                         | <u>Characteristics:</u>  | <u>Sources:</u>  |
|---|--|--|
| <b>Cleft palate speech characteristics</b>        | <ul style="list-style-type: none"> <li>• Articulation deficits</li> <li>• Compensatory articulation</li> <li>• Audible nasal emission</li> <li>• Inaudible nasal emission</li> <li>• Hyponasality (denasality)</li> <li>• Hypernasality</li> <li>• Hyper-hyponasality</li> <li>• Nasal substitution</li> <li>• Laryngeal/voice symptoms</li> <li>• Cul-de-sac resonance</li> <li>• Poor pressure consonants</li> <li>• Sibilant distortion</li> <li>• Velopharyngeal inadequacy</li> <li>• Nasal blockage</li> <li>• Nasal Turbulence</li> <li>• Nasal Grimace</li> <li>• Intelligibility of speech</li> </ul> | <ul style="list-style-type: none"> <li>• Brodsky et al., 1992</li> <li>• Bütow, 1995</li> <li>• Golding-Kushner, 2001</li> <li>• Harding, Harland &amp; Razzell, 1997</li> <li>• Hardin-Jones &amp; Jones, 2005</li> <li>• Hutter &amp; Henningsson, 2004</li> <li>• Kritzinger, Louw &amp; Hugo, 1996</li> <li>• Kuehn &amp; Henne, 2003</li> <li>• Kuehn &amp; Moller, 2000</li> <li>• Kummer, 2008</li> <li>• McWilliams, 1990</li> <li>• Peterson-Falzone et al. 2001</li> <li>• Peterson-Falzone et al. 2006</li> <li>• Sell, Harding &amp; Grunwell, 1999</li> <li>• Sell, Harding &amp; Grunwell, 1994</li> <li>• Sphrintzen &amp; Bardach, 1995</li> <li>• Van Lierde et al, 2004</li> </ul> |
| Assessment of cleft palate speech characteristics | <ul style="list-style-type: none"> <li>• Articulation tests e.g. The Iowa Pressure Articulation Test,</li> </ul>   | <ul style="list-style-type: none"> <li>• Bauman &amp; Waengler, 2000</li> <li>• Brodsky et al., 1992</li> </ul>  |



|  |  |   |
|--|--|---|
|  | <p>Goldman-Fristoe Test of Articulation</p> <ul style="list-style-type: none"> <li>• Cold Mirror test</li> <li>• Nostril Pinching tests</li> <li>• Stimulability testing</li> <li>• Observation of voice characteristics to determine the quality or normality</li> <li>• Perceptual judgements</li> <li>• Ratings of nasality</li> <li>• Video recording of speech characteristics</li> </ul> | <ul style="list-style-type: none"> <li>• Bütow, 1995</li> <li>• Golding-Kushner, 2001</li> <li>• Harding, Harland &amp; Razzell, 1997</li> <li>• Hardin-Jones &amp; Jones, 2005</li> <li>• Hutter &amp; Henningsson, 2004</li> <li>• Kritzinger, Louw &amp; Hugo, 1996</li> <li>• Kuehn &amp; Henne, 2003</li> <li>• Kuehn &amp; Moller, 2000</li> <li>• Kummer, 2008</li> <li>• McWilliams, 1990</li> <li>• Peterson-Falzone et al. 2001</li> <li>• Peterson-Falzone et al. 2006</li> <li>• Sphrintzen &amp; Bardach, 1995</li> <li>• Sell, Hardin &amp; Grunwell, 1999</li> <li>• Sell, Harding &amp; Grunwell, 1994</li> <li>• Van Lierde et al, 2004</li> </ul> |
| <p>Normal development of vocabulary in pre-school children</p> | <ul style="list-style-type: none"> <li>• 2 to 3 years: Development of semantic relations, case relations and case grammar. Meaning dictates the kind of noun or verb. First sentence usage always a verb.</li> </ul>   | <ul style="list-style-type: none"> <li>• Kuder, 2003</li> <li>• Nicolosi, Harryman &amp; Kresheck, 1996</li> <li>• Owens, 2001</li> <li>• Roth &amp; Worthington, 2001</li> <li>• Shipley &amp; McAfee, 1998</li> </ul>   |

|  |  |  |
|--|--|--|
|  | <p>Develops space, time and quantity, time and possession. Understands prepositions “in” and “on”. Points to five or more pictures and at least four body parts. Follows one stage commands. Begins to use complex sentences.</p> <ul style="list-style-type: none"><li>• 3 to 4 years: Develops location and ongoing action, plurals, past tense, possessions, third person, questions and negatives. Follows two-stage commands, recognizes basic colors, and categorizes items into basic groups. Produces multi-word utterances and over regularizes past tense.</li><li>• 4 to 5 years: Develops semantic classifications, comparatives, same-different relations, temporal</li></ul> |  |
|--|--|--|

|  |  |  |
|--|--|--|
|  | <p>conjunctions, causal conjunctions, verbs, commands/requests, passive-voice, conditional verb tenses, perfect tense, gerunds and participles. Responds correctly to most questions about daily living. Uses complex sentences more frequently, uses pronouns accurately, uses negative and question forms correctly and uses relative pronouns.</p> <ul style="list-style-type: none"><li>• 5 to 6 years: Understands temporal concepts, follows three-stage commands and recognizes some alphabet letters understand short paragraph-length material. Understand simple and some complex sentence constructions, reversible</li></ul> |  |
|--|--|--|

|  |  |  |
|--|--|--|
|  | <p>passive statements and subordinating conjunctions.</p> <p>Mastered most syntactic rules, use past and future verb tenses and continues to master irregular morphological and syntactic forms.</p> |  |
|--|--|--|



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**APPENDIX M**  
**DATA RECORDING SHEET USED IN PHASE TWO**



**DATA RECORDING SHEET**

**Name of Participant:** \_\_\_\_\_

**Participation number:** \_\_\_\_\_

**Age of Participant:** \_\_\_\_\_

**Counting from 1 to 10:** \_\_\_ Zulu / \_\_\_ English

**Days of the week:** \_\_\_ Zulu / \_\_\_ English

**Sentence Repetition:** Conducted \_\_\_ Yes / \_\_\_ No

**Difficulty with sentence repetition:**  
\_\_\_\_\_  
\_\_\_\_\_

**Conversation speech:** Elicited \_\_\_ Yes / \_\_\_ No

**If no, reasons for not elicited:**  
\_\_\_\_\_  
\_\_\_\_\_

**Familiar words on the protocol:**  
\_\_\_\_\_  
\_\_\_\_\_

**Unfamiliar words on the protocol:**  
\_\_\_\_\_  
\_\_\_\_\_

**Length of Administration:** \_\_\_\_\_

**Difficulties with completion of protocol:**  
\_\_\_\_\_  
\_\_\_\_\_

**Possible reasons for non-compliance:**  
\_\_\_\_\_  
\_\_\_\_\_

**Pictures:** \_\_\_ Abstract / \_\_\_ Unknown

**Articulation Errors:**  
\_\_\_\_\_  
\_\_\_\_\_

**Developmental phonological disorders:**

- \_\_\_ Fronting
- \_\_\_ Substitution
- \_\_\_ Nasalization
- \_\_\_ Other, specify \_\_\_\_\_
- \_\_\_ Backing
- \_\_\_ Deletion
- \_\_\_ Vowel processes (centralization)



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**APPENDIX N**  
**PHONETIC TRANSCRIPTIONS OF ARTICULATION ABILITIES – PHASE**  
**TWO**

**Table 1: Elicited responses of participants in phase two**

| Participation number | Elicited Response   | Articulation and phonological development abilities  | References   |
|----------------------|---|--|--|
| 1                    | <p>[v̥vi̯va vs. vi̯va], [iqoq̥o vs. iqoqo], [!hiŋja vs. !hiŋja], [ve!ga vs. ve!ga], [ŋ!eŋa vs. ŋ!eŋa], [!oŋela vs. !oŋela], [!ho:ŋo vs. !ho:ŋo], [!lgi̯ba vs. !lgi̯ba], [!lgi vs. !lgi], [ŋ!ese vs. ŋ!ese], [ŋi̯zi̯za vs. ŋi̯zi̯za], [oŋula vs. oŋula], [p'eta vs. p'eta], [i:p'i:pi vs. i:p'i:pi], [t'aklaza vs. k'laza], [it'i:je vs. it'i:je], [k'aba vs. k'aba], [ik'ati vs. ik'ati], [p'hevu:mula vs. p'hevu:mula], [ilip'heja vs. p'heja], [thaɖaza vs. thaɖaza], [ubuthoŋo vs. ubuthoŋo], [khala vs. khala], [ukhez̥o vs. ukhez̥o], [bala vs. bala], [ɸiabula vs. ɸiabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. !ho:pa ], [ug̥oŋo vs. ug̥oŋo], [ɸatha vs. ɸatha], [iɸali vs. v̥lao:ver], [ɖi̯za vs. ɖi̯za], [iɖoɖa vs. iɖoɖa], [g̥oma vs. g̥oma], [aga vs. aga], [k̥u:ɬe vs. k̥u:ɬe], [!akatha vs. !a'atha], [ɸala vs. ɸala], [u:lɓbu: vs. pi:nat], [dlɓala vs. khu:lu], [idlɓovu vs. idlɓovu], [v̥ene:ne vs. v̥ene:ne], [i:v̥u:la vs. i:v̥u:lele], [ɖzi̯ma vs. ɖzi̯ma], [iɖoɖz̥o vs. iɖoɖz̥o], [ɖz̥oza vs. ɖz̥oza], [idz̥a vs. idz̥a], [ɖz̥kidz̥ela vs. ɖz̥kidz̥ela], [idz̥uba vs. idz̥uba], [iɖvene vs. iɖvene], [ts'ats'a:za vs. ts'ats'a:za], [tɸala vs. tɸala], [utɸani vs. utɸani], [tɸo vs. tɸo], [itɸadzi vs. itɸadzi], [kɸikɸi:za</p> | <ul style="list-style-type: none"> <li>• Deletion of unstressed syllable e.g. [v̥], [t'a], [ili].</li> <li>• Backing of sounds e.g. [t'] for [k]</li> <li>• Addition / epenthesis of sounds e.g. [n]</li> <li>• Idiosyncratic processes e.g. [ispaidɛr]</li> <li>• Substitution of sounds e.g. [t] for [l].</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson, 2004</li> <li>• Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |



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|   | <p>vs. kʰikʰiʒa], [lulavS. lula], [isilabulabu vs. ispaider], [ʰhudevS. ʰhude], [ʰhitha vs. ʰhitha], [ʰgaʰgaza vs. ʰgaʰgaza], [ʰgviʰgviza vs. ʰgviʰgviza], [ʰgabitha vs. ʰgabitha], [ʰgɔlilevS. ʰgɔlile], [baʰguzela vs. baʰguzela], [ʰŋaka vs. ʰŋaka], [iʰŋamavS. iʰŋama], [biʰŋa vs. biʰŋa], [ʰllɔlla vs. ʰllɔlla], [ʰillillɔ vs. ifɔgi], [ʰʰakavS. ʰʰaka], [ʰisiʰʰɔbɔvS. isiʰʰɔbɔ], [ʰʰgabalaza vs. ʰʰgabalaza], [ʰʰgaʰʰgafa vs. ʰʰgaʰʰgafa], [bɔʰŋʰula vs. bɔʰŋʰula], [ʰʰhɔŋʰa vs. ʰʰhɔŋʰa], [fela vs. fela], [iʰfalufu vs. iʰfalufu], [saha vs. saha], [isilathulu vs. isilathulu], [ʰajana vs. ʰajana], [ʰiʰafi vs. iʰfɔʰfi], [xamba vs. xamba], [ukuxɔlavS. ukuxɔla], [ʰheha vs. heha], [ʰyulavS. ʰyula], [ʰzalela vs. ʰzalela], [ʰfiʰala vs. fiʰala], [ʰtala vs. tala], [ʰisitʰala vs. isitʰala], [ʰlʰalavS. lʰala], [ʰreka vs. reka], [iʰrajisi vs. iʰrajisi], [lakalaka vs. lakalaka], [wafa vs. wafa], [jeʰŋa vs. jeʰŋa], [makʰak'a vs. makʰak'a], [ik'amu vs. ik'amu], [ŋu vs. ŋu], [nabuzela vs. nabuzela], [naliza vs. naliza], [iŋɔni vs. iŋɔni], [ŋena vs. ŋena], [iketana vs. ikentana], [jembe vs. jembe], [ephula vs. ephula], [isethulo vs. isethulo], [isikhele vs. isikhele], [insiphɔ vs. insiphɔ], [igelɔsi vs. igelɔsi]</p> |   |  |
| 2 | <p>[ɔviɔva vs. ɔviɔa], [iqoqɔ vs. iqoqo], [!hiŋʰa vs. !hiŋʰa], [ve!ga vs. ve!ga], [ŋʰeŋa vs. ˘eŋa], [!ɔŋela vs. ɔŋela], [ʰho:ŋɔ vs. ʰho:ŋɔ], [ʰʰgiba vs. ʰʰgiba], [ʰʰgi vs. ʰʰgi], [ŋʰese vs. ʰese], [ŋiŋiza vs. ʰiŋiza], [ɔŋula vs. ɔŋula], [p'eta vs. p'eta], [i:p'i:pi vs. i:p'i:pi], [t'aklaza vs. t'ak'laza], [it'ije vs. it'ije], [k'aba vs. k'aba], [ik'ati vs. k'ati], [pʰevu:mula vs.</p>   | <ul style="list-style-type: none"> <li>• Normal speech development</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson,</li> </ul> |

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|  | <p>phevu:mula], [ilipheja vs. pheja], [thad̥aza vs. thad̥aza], [ubuthoŋo vs. buthoŋo], [khala vs. khala], [ukhez̥o vs. kukhez̥o], [bala vs. bala], [ɸabula vs. ɸabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugog̥o vs. ugog̥o], [ɸatha vs. batha], [iɸali vs. bali], [di̯za vs. di̯za], [id̥oda vs. id̥oda], [g̥oma vs. g̥oma], [aga vs. aga], [k̥u:ɛ vs. k̥u:ɛ], [!akatha vs. !at'atha], [ɸala vs. ɸaja], [u:l̥bu: vs. u:l̥bu:], [dl̥zala vs. dl̥ala], [idl̥zovu vs. idl̥zovu], [ˀvenene vs. ˀvenene], [iːvu:la vs. iːvu:la], [d̥zima vs. ʒima], [id̥od̥z̥o vs. z̥od̥z̥o], [d̥z̥oʒa vs. d̥z̥oʒa], [id̥za vs. id̥za], [d̥z̥kid̥z̥ela vs. d̥z̥kid̥z̥ela], [id̥zuba vs. id̥zuba], [iɔ̯vene vs. vene], [ts'ats'aʒa vs. ts'ats'aʒa], [tʃala vs. tʃala], [utʃani vs. utʃani], [tʰo vs. tʰo], [itʰad̥zi vs. itʰad̥zi], [kʰikʰiʒa vs. kʰikʰiʒa], [lulav̥s. luj̥a], [isilabulabu vs. isilabulabu], [ɸhude vs. ɸhude], [ɸhitha vs. ɸhitha], [g̥aɸg̥aʒa vs. g̥aɸg̥aʒa], [g̥viɸg̥viʒa vs. g̥viɸg̥viʒa], [g̥abitha vs. g̥ambitha], [g̥olile vs. g̥olile], [baɸg̥uz̥ela vs. baɸg̥uz̥ela], [ɸŋaɸka vs. ɸŋank̥a], [iɸŋamav̥s. iɸŋama], [biɸŋa vs. biɸŋa], [l̥olla vs. l̥olla], [ill̥illo vs. ill̥illo], [ɸhaka vs. ɸhaka], [isiɸhob̥o vs. isiɸhob̥o], [l̥g̥abal̥aʒa vs. l̥g̥abal̥aʒa], [l̥g̥aɸg̥aʒa vs. g̥aɸg̥aʒa], [b̥oɸŋiɸula vs. b̥oɸŋiɸula], [ɸh̥oɸŋiɸa vs. ɸh̥oɸŋiɸa], [f̥ela vs. f̥ela], [iɸalufu vs. iɸalufu], [saha vs. saha], [isilathulu vs. isilathulu], [ɸajana vs. ɸajana], [iɸɸaɸi vs. iɸɸaɸi], [xamba vs. xamba], [ukux̥oɸav̥s. ukux̥oʒa], [heha vs. heha], [y̥ulav̥s. y̥uja], [ʒal̥ela vs. ʒajeja], [ɸiɸala vs. ɸiɸaja], [ɸala vs. ɸala], [isiɸala vs. isiɸala], [l̥z̥alav̥s. l̥z̥ala], [ɸeka vs. jeka], [iɸajisi</p> |  | <p>2004</p> <ul style="list-style-type: none"> <li>Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |
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|   | <p>vs. irajisi], [lakalaka vs. lakalaka], [wafa vs. wafa], [jerja vs. jerja], [mak'aka vs. mak'aka], [ik'amu vs. ik'amu], [mu vs. mu], [nabuzela vs. nabuzela], [naliza vs. naliza], [inoni vs. inoni], [nena vs. nena], [iketana vs. iketana], [jembe vs. jembe], [ephula vs. ephula], [isethulo vs. isethulo], [isikhele vs. isikhele], [insipho vs. insipho], [igelosi vs. igelosi]</p>   |   |  |
| 3 | <p>[ɔviɔva vs. ɔviɔa], [iqoqo vs. iqoqo], [!hiŋja vs. !hiŋja], [ve!ga vs. ve!ga], [ŋeŋa vs. eŋa], [!ɔŋela vs. ɔŋela], [ho:ŋo vs. ho:ŋo], [lgiɓa vs. lgiɓa], [lgi vs. gi], [ŋese vs. ŋese], [niɓiza vs. niɓiza], [ɔŋula vs. ɔŋula], [p'eta vs. p'eta], [i:pi:pi vs. i:pi:pi], [t'aklaza vs. t'aklaza], [it'ije vs. t'ije], [k'aba vs. k'aba], [ik'ati vs. k'ati], [phevu:mula vs. phevu:mula], [ilipheja vs. pheja], [thadza vs. thadza], [ubuthoŋo vs. ubuthoŋo], [khala vs. khala], [ukhezɔ vs. kukhezɔ], [bala vs. bala], [fiabula vs. fiabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugogɔ vs. gogɔ], [batha vs. batha], [ibali vs. bali], [diza vs. diza], [idoda vs. kedoda], [goma vs. goma], [aga vs. naga], [ku:te vs. tu:te], [!akatha vs. !at'atha], [bala vs. kɔbaja], [u:lɓbu: vs. u:lɓbu:], [dlzala vs. dlala], [idlɓvu vs. dlɓvu], [venene vs. venene], [i:vu:la vs. ke:vu:la], [dzima vs. zmima], [idɔdzɔ vs. zɔdzɔ], [dɓɔza vs. dɓɔza], [idza vs. idza], [dɓkidzela vs. dɓkidzela], [idzuba vs. midzuba], [iɔvene vs. evene], [ts'ats'aza vs. ts'ats'afa], [tjala vs. tjala], [utjani vs. etjani], [t'ɔ vs. t'ɔ], [it'adzi vs. ladzi], [k'ik'iza vs. k'ik'iza], [lula vs. lula], [isilabulabu vs.</p> | <ul style="list-style-type: none"> <li>• Normal speech development</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson, 2004</li> <li>• Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |



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|   | <p>labu], [hudevs. hude], [hitha vs. hitha], [ga!gaza vs. p'ap'aza], [gvi!gviza vs. p'lvip'lviza], [gabitha vs. k'abitha], [gɔlilevs. kɔlile], [ba!guzela vs. ba!guzela], [ŋ!aka vs. ɔka!ka], [iŋ!ama vs. iŋ!ama], [biŋ!a vs. biŋ!a], [llɔlla vs. llɔlla], [illillɔ vs. kɛllillɔ], [h!haka vs. h!haka], [isi!hɔbɔ vs. h!hɔbɔ], [!gabalaza vs. !gabalaza], [!ga!ga!fa vs. ga!ga!fa], [bɔŋ!ula vs. p'ɛŋ!ula], [h!hɔŋ!a vs. h!hɔŋ!a], [fɛla vs. fɛla], [i!jalufu vs. jalufu], [saha vs. saha], [isilathulu vs. lathulu], [!ajana vs. !ajana], [i!h!afi vs. i!h!afi], [xamba vs. xamba], [ukuxɔ!a vs. ukuxɔ!a], [heha vs. heha], [y!ula vs. y!ula], [z!alela vs. z!alela], [f!ala vs. f!ala], [!ala vs. !ala], [isi!ata vs. isi!ata], [!zala vs. !zala], [r!eka vs. r!eka], [i!rajisi vs. i!rajisi], [lakalaka vs. lakalaka], [w!afa vs. w!afa], [j!eŋ!a vs. j!eŋ!a], [mak!ak'a vs. mak!ak'a], [ik'amu vs. ik'amu], [ŋu vs. ŋu], [nabu!zela vs. nabu!zela], [naliza vs. naliza], [i!nɔni vs. i!nɔni], [ŋena vs. ŋena], [iketana vs. ikentana], [jembe vs. jembe], [ephula vs. ephula], [isethulɔ vs. isethulɔ], [isikhele vs. isikhele], [insiphɔ vs. insiphɔ], [igelɔsi vs. igelɔsi]</p> |   |  |
| 4 | <p>[ɔvi!va vs. ɔvi!va], [iqoqɔ vs. iqoqɔ], [!hiŋ!a vs. !hiŋ!a], [ve!ga vs. ve!ga], [ŋ!eŋa vs. ŋ!eŋa], [!ɔŋela vs. ɔŋela], [h!o:ŋ!ɔ vs. h!o:ŋ!ɔ], [!gi!ba vs. p!aba], [!gi vs. !gi], [ŋ!ese vs. ŋ!ese], [n!n!iza vs. n!n!iza], [ɔŋula vs. ɔŋula], [p!eta vs. p!eta], [i:p'i:pi vs. i:p'i:pi], [t!aklaza vs. t!aklaza], [i!t!ije vs. t!ije], [k!aba vs. k!aba], [ik'ati vs. ik'ati], [p!hevu:mula vs. p!hevu:mula], [ilip!heja vs. ilip!heja], [th!adza vs.</p>   | <ul style="list-style-type: none"> <li>• Normal speech development</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson,</li> </ul> |

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|  | <p>thadaza], [ubuthoŋo vs. thoŋo], [khala vs. khala], [ukhezo vs. ukhezo], [bala vs. bala], [ḥabula vs. ḥabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. kavula], [ugogo vs. gogo], [ḥatha vs. ebatha], [iḥali vs. ibali], [ḍiza vs. ḍiza], [idoda vs. idoda], [goma vs. goma], [aga vs. aga], [ku:te vs. ku:te], [!akatha vs. !at'atha], [bala vs. bala], [u:lzbu: vs. u:lzbu:], [dlzala vs. lala], [idlzovu vs. idlzovu], [venene vs. venene], [i:vu:la vs. i:vu:la], [dzima vs. dzima], [idodzō vs. izodzō], [dzoza vs. dzoza], [idza vs. idza], [dzkidzela vs. zekidzela], [idzuba vs. idzuba], [iqvene vs. iqvene], [ts'ats'aza vs. ts'ats'aza], [tjala vs. tjala], [utjani vs. udzani], [t'ō vs. unt'ō], [it'adzi vs. it'adzi], [k'ik'iza vs. k'ik'iza], [lulav. lula], [isilabulabu vs. labulabu], [hude vs. hude], [hitha vs. hitha], [ga!gaza vs. !ga!gaza], [gvi!gviza vs. !gvi!gviza], [gabitha vs. k'abitha], [gōlile vs. gōlile], [baguzela vs. bagujela], [ḥaḳa vs. ḥaḳa], [iḥama vs. iḥama], [biḥa vs. biḥa], [lōlla vs. lōlla], [illillō vs. illillō], [ḥakav. ḥaka], [isiḥobō vs. isiḥobō], [lgabalaza vs. lgabalaza], [llgallgafa vs. gallgafa], [bōḥḥula vs. bōḥḥula], [ḥḥōḥḥa vs. ḥḥōḥḥa], [fela vs. fela], [ifalufu vs. ifalufu], [saha vs. saha], [isilathulu vs. isilathulu], [sajana vs. sajana], [iḥafi vs. iḥafi], [xamba vs. xamba], [ukuxola vs. ukuxola], [heha vs. heha], [yulav. yula], [zalēla vs. zalēla], [ḥḥala vs. ḥḥala], [tala vs. tala], [isitāta vs. isitāta], [lzalav. lzala], [reka vs. leka], [irajisi vs. irajisi], [lakalaka</p> |  | <p>2004</p> <ul style="list-style-type: none"> <li>Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |
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|   | <p>vs. lakalaka], [wafa vs. wafa], [jeŋja vs. jeŋja], [makʔakʔa vs. makʔakʔa], [ikʔamu vs. kʔamu], [ŋu vs. ŋu], [nabuzela vs. nabuzela], [naliza vs. naliza], [iŋoni vs. iŋoni], [ŋena vs. ŋela], [iketana vs. iketana], [jembe vs. jembe], [ephula vs. ephula], [isethulo vs. isethulo], [isikhele vs. isikhele], [insipho vs. insipho], [igelosi vs. gelosi]</p>  |   |  |
| 5 | <p>[ɔviɔva vs. viɔa], [iqoqo vs. iqoqo], [!hiŋja vs. !hiŋja], [ve!ga vs. ve!ga], [ŋjeŋa vs. ŋjeŋa], [!oŋela vs. !oŋela], [ho:ŋo vs. ho:ŋo], [llgiɓa vs. pʔaba], [llgi vs. llgi], [ŋjeŋe vs. kʔese], [ŋiŋiza vs. ŋiŋiza], [oŋula vs. oŋula], [pʔeta vs. pʔeta], [i:pʔi:pi vs. i:pʔi:pi], [taklaza vs. taklaza], [itʔije vs. itʔije], [kʔaba vs. kʔaba], [ikʔati vs. ikʔati], [pʔevu:mula vs. mɔmamula], [ilipheja vs. ilipheja], [thaɗaza vs. thaɗaza], [ubuthoŋo vs. ubuthoŋo], [khala vs. khala], [ukhezɔ vs. amakhezɔ], [bala vs. bala], [ɸabula vs. ɸabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugogɔ vs. ŋogɔ], [ɸatha vs. habatha], [iɸali vs. iɸali], [ɗiza vs. ɗiza], [iɗoda vs. aɗoda], [gɔma vs. gɔma], [aga vs. aga], [kʔu:te vs. kʔu:te], [!akatha vs. !aʔatha], [ɓala vs. ɓala], [u:lɓu: vs. u:lɓu:], [dlɓala vs. dlɓala], [idlɓovu vs. idlɓovu], [ːvenene vs. ːvenene], [iːvu:la vs. aːvu:la], [dɗima vs. dɗima], [iɗodɗo vs. iɗodɗo], [dɓoɗa vs. dɓoɗa], [idɓa vs. idɓa], [dɓkidɓela vs. dɓkidɓela], [idɓuba vs. idɓuba], [iɔvene vs. iɔvene], [tsʔatsʔaɗa vs. tsʔatsʔaɗa], [tʔala vs. tʔala], [utʔani vs. utʔani], [tʔo vs. tʔo], [itʔadzi vs. itʔadzi], [kʔikʔiza vs. kʔikʔiza], [lula vs. lula], [isilabulabu vs.</p> | <ul style="list-style-type: none"> <li>• Normal speech development</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson, 2004</li> <li>• Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |



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|   | <p>labulabu], [hudeVS. !hude], [hitha vs. !hitha], [ga!gaza vs. !ga!gaza], [gvi!gviza vs. !gvi!gviza], [gabitha vs. !gabitha], [goleVS. !gole], [balguzela vs. !balguzela], [haka vs. !haka], [in!ama vs. !in!ama], [bi!ha vs. !bi!ha], [lola vs. !lola], [illil vs. !illil], [haka vs. !haka], [isi!hob vs. !isi!hob], [lgabalaza vs. !lgabalaza], [gaga vs. !gaga], [bon!ula vs. !bon!ula], [hona vs. !hona], [fela vs. !fela], [ifalufu vs. !ifalufu], [saha vs. !saha], [isilathulu vs. !isilathulu], [ajana vs. !ajana], [ifa vs. !ifa], [xamba vs. !xamba], [ukuxola vs. !ukuxola], [heha vs. !heha], [yula vs. !yula], [zalela vs. !zalela], [hala vs. !hala], [hala vs. !hala], [isihala vs. !isihala], [lala vs. !lala], [reka vs. !reka], [irajisi vs. !irajisi], [lakalaka vs. !lakalaka], [wafa vs. !wafa], [jeha vs. !jeha], [mak!ak'a vs. !mak!ak'a], [ik'amu vs. !ik'amu], [nu vs. !nu], [nabuzela vs. !nabuzela], [naliza vs. !naliza], [inoni vs. !inoni], [hena vs. !hena], [iketana vs. !iketana], [jembe vs. !jembe], [ephula vs. !ephula], [isethulo vs. !isethulo], [isikhele vs. !isikhele], [insipho vs. !insipho], [igelosi vs. !igelosi]</p> |   |   |
| 6 | <p>[viva vs. !viva], [iqoqo vs. !iqoqo], [hiha vs. !hiha], [ve!ga vs. !ve!ga], [heha vs. !heha], [!hela vs. !hela], [hona vs. !hona], [giba vs. !giba], [gi vs. !gi], [hese vs. !hese], [niza vs. !niza], [hula vs. !hula], [p'eta vs. !p'eta], [i:pi vs. !i:pi], [taklaza vs. !taklaza], [it'ije vs. !it'ije], [k'aba vs. !k'aba], [ik'ati vs. !ik'ati], [phevu:mula vs. !phevu:mula], [ilipheja vs. !ilipheja], [thadza vs. !thadza]</p>   | <ul style="list-style-type: none"> <li>• Normal speech development</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson, 2004</li> </ul> |

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|  | <p>thadaza], [ubuthoŋo vs. ubuthoŋo], [khala vs. khala], [ukhezɔ vs. ukhezɔ], [bala vs. bala], [ɸiabula vs. ɸiabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔgɔ vs. gɔgɔ], [ɸatha vs. ɸatha], [iɸali vs. iɸali], [ɸiza vs. ɸiza], [idɔda vs. idɔda], [gɔma vs. gɔma], [aga vs. aga], [kɸu:tɛ vs. kɸu:tɛ], [!akatha vs. !at'atha], [ɸala vs. ɸala], [u:lɸbu: vs. u:lɸbu:], [dlɸala vs. dlɸlala], [idlɸvu vs. idlɸvu], [ɸvenene vs. ɸvenene], [iɸvu:la vs. miɸvu:la], [dɸima vs. dɸima], [idɔdɸɔ vs. idɔdɸɔ], [dɸɔɸa vs. dɸɔɸa], [idɸa vs. idɸa], [dɸkidɸela vs. dɸkidɸela], [idɸuba vs. idɸuba], [iɸvene vs. iɸvene], [ts'ats'aza vs. ts'ats'aza], [tɸala vs. tɸala], [utɸani vs. utɸani], [tɸɔ vs. tɸɔ], [itɸadɸi vs. itɸadɸi], [kɸikɸiza vs. kɸikɸiza], [lulav. lula], [isilabulabu vs. isilabulabu ], [ɸhude vs. ɸhude], [ɸhitha vs. ɸhitha], [gɸagaɸa vs. !gɸagaɸa], [gɸvi gɸviza vs. gɸvi gɸviza], [gɸabitha vs. !gɸabitha], [gɸɔlile vs. gɸɔlile], [ba gɸuzela vs. ba gɸujela], [ɸɸaka vs. ɸɸaka], [iɸɸama vs. iɸɸama], [biɸɸa vs. biɸɸa], [ɸɸlla vs. ɸɸlla], [illillɔ vs. illillɔ], [ɸɸhaka vs. ɸɸhaka], [isiɸɸɔbɔ vs. insiɸɸɔbɔ], [ɸɸgabalaza vs. ɸɸgabalaza], [ɸɸga ɸɸfa vs. k'a ɸɸfa], [bɔɸɸula vs. bɔɸɸula], [ɸɸhɔɸa vs. ɸɸhɔɸa], [fela vs. fela], [iɸalufu vs. ɸalufu], [saha vs. saha], [isilathulu vs. lathulu], [ɸajana vs. ɸajana], [iɸɸafi vs. iɸɸafi], [xamba vs. xamba], [ukuxɔlav. ukuxɔla], [heha vs. heha], [ɸulav. ɸula], [ɸalela vs. ɸalela], [ɸɸala vs. ɸɸala], [ɸala vs. ɸala], [isiɸata vs. ɸata], [ɸalav. ɸala], [ɸeka vs. jeka], [iɸajisi vs. iɸajisi], [lakalaka vs.</p> |  | <ul style="list-style-type: none"> <li>Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |
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|   | lakalaka], [wafa vs. wafa], [jeŋa vs. jeŋa], [makʔak'a vs. makʔak'a], [ik'amu vs. ik'amu], [ŋu vs. ŋu], [nabuzela vs. babuzela], [naliza vs. naliza], [iŋoni vs. iŋoni], [ŋena vs. ŋena], [iketana vs. kentana], [jembe vs. hembɛ], [ephula vs. ephula], [isethulo vs. isethulo], [isikhele vs. isikhele], [insiphɔ vs. insiphɔ], [igelosi vs. igelosi]  |   |  |
| 7 | [ɔviɔva vs. ɔviɔa], [iqoqɔ vs. qoqo], [!hiŋja vs. !hiŋja], [ve!ga vs. ve!ga], [ŋjɛŋa vs. ɔŋjɛŋa], [!ɔŋela vs. !ɔŋela], [!ho:ŋɔ vs. !ho:ŋɔ], [!lgiɓa vs. !lgiɓa], [!lgi vs. m!lgi], [ŋjɛɛ vs. ŋjɛɛ], [ŋiŋiɓa vs. ŋiŋiɓa], [ɔŋula vs. ɔŋula], [p'eta vs. p'eta], [i:p'i:pi vs. i:p'i:pi], [t'aklaza vs. k'laza], [it'ije vs. t'ije], [k'aba vs. k'aba], [ik'ati vs. ik'ati], [p'hevu:mula vs. p'hevu:mula], [ilipheja vs. pheja], [thaɗaza vs. thaɗaza], [ubuthoŋɔ vs. ubuthoŋɔ], [khala vs. khala], [ukhezɔ vs. ukhezɔ], [bala vs. bala], [ɸabula vs. ɸabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔɔ vs. gɔɔ], [ɸatha vs. ɸatha], [iɸali vs. iɸali], [ɗiza vs. ɗiza], [idɔda vs. idɔda], [gɔma vs. gɔma], [aga vs. aga], [k'u:ɸe vs. k'u:ɸe], [!akatha vs. !at'atha], [ɸala vs. ɸala], [u:lɓbu: vs. u:lɓbu:], [dlɓala vs. dlɓala], [idlɓovu vs. idlɓovu], [ɸvenene vs. ɸvenene], [i:vu:la vs. i:vu:la], [ɗzima vs. ɗzima], [idɔɗzɔ vs. idɔɗzɔ], [ɗɔza vs. ɗɔza], [idɓa vs. idɓa], [ɗɓkidzela vs. ɗɓkidzela], [idɓuba vs. idɓuba], [iɔvene vs. iɔvene], [ts'ats'aɓa vs. ts'ats'aɓa], [tɸala vs. tɸala], [utɸani vs. utɸani], [t'ɔ vs. t'ɔ], [it'adzi vs. it'adzi], [k'ɸik'ɸiza vs. k'ɸik'ɸiza], [lula vs. lula], [isilabulabu vs. isilabulabu], | <ul style="list-style-type: none"> <li>• Deletion of unstressed syllable e.g. [t'a], [ili],</li> <li>• Omission of sounds e.g. [i], [u]</li> <li>• Addition / epenthesis of sound e.g. [ɔ], [m]</li> <li>• Backing of sound e.g. [k'] sound for [t'] sound</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson, 2004</li> <li>• Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |

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|   | <p>[!hudeVS. !hude], [!hitha VS. !hitha], [!ga!gaza VS. !ga!gaza], [!gvi!gviza VS. !gvi!gviza], [!gabitha VS. !gabitha], [!golileVS. !golile], [!baguzela VS. !bagujela], [!ŋa!ka VS. !ŋa!ka], [!iŋ!amaVS. !iŋ!ama], [!biŋ!a VS. !biŋ!a], [!lolla VS. !lolla], [!illill! VS. !illill!], [!!hakavS. !!haka], [!isi!!hob!VS. !isi!!hob!], [!!gabalaza VS. !!gabalaza], [!!ga!!ga!fa VS. !!ga!!ga!fa], [!b!oŋ!ula VS. !b!oŋ!ula], [!!h!oŋ!a VS. !!h!oŋ!a], [!fela VS. !fela], [!i!falufu VS. !falufu], [!saha VS. !saha], [!isilathulu VS. isilathulu], [!!ajana VS. !ajana], [!i!fi!fi VS. !fi!fi], [!xamba VS. !xamba], [!ukux!olaVS. !kux!ola], [!heha VS. !heha], [!yulavS. !yula], [!zalela VS. !zalela], [!fi!ala VS. !fi!ala], [!tala VS. !tala], [!isi!tala VS. !tala], [!l!zalaVS. !zala], [!reka VS. !reka], [!i!ra!jisi VS. !ra!jisi], [!lakalaka VS. !lakalaka], [!wa!fa VS. !wa!fa], [!je!ŋa VS. !je!ŋa], [!mak!ak'a VS. !mak!ak'a], [!ik'amu VS. !ik'ama], [!ŋu VS. !ŋu], [!nabuzela VS. !nabuzela], [!naliza VS. !naliza], [!i!ŋoni VS. !i!ŋoni], [!ŋena VS. !ŋena], [!iketana VS. !iketana], [!jembe VS. !jembe], [!ephula VS. !ephula], [!isethulo VS. !sethulo], [!isikhele VS. !isikhele], [!insiph! VS. !insiph!], [!igel!osi VS. !igel!osi]</p> |   |   |
| 8 | <p>[!o!vi!o!va VS. !o!vi!o!va], [!iqoq! VS. !iqoq!], [!hiŋ!a VS. !hiŋ!a], [!ve!ga VS. !ve!ga], [!ŋ!eŋa VS. !ŋ!eŋa], [!o!ŋela VS. !o!ŋela], [!!ho:ŋ! VS. !!ho:ŋ!], [!!gi!ba VS. !!gi!ba], [!!gi VS. !gi], [!ŋ!eŋe VS. !eŋe], [!niŋ!iza VS. !miza], [!o!ŋula VS. !o!ŋula], [!p'eta VS. !p'eta], [!i:p'i:pi VS. !p'i:pi], [!t'aklaza VS. !saklaza], [!it'ije VS. !it'ije], [!k'aba VS. !k'aba], [!ik'ati VS. !ik'ati], [!phevu:mula VS. !phevu:mula], [!ilipheja VS. !idipheja], [!tha!daza VS. !tha!daza]</p>   | <ul style="list-style-type: none"> <li>• Deletion of unstressed syllable e.g. [!], [i:], [isi]</li> <li>• Omission of sounds e.g. [u],[ i], [e]</li> <li>• Cluster reduction e.g. [!] for [ŋŋ] cluster, [m] for [ni]</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson, 2004</li> </ul> |

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|  | <p>thadaza], [ubuthoŋo vs. ubuthoŋo], [khala vs. khala], [ukhezo vs. khezo], [bala vs. bala], [fiabula vs. fiabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugogo vs. gogo], [batha vs. batha], [ibali vs. ibali], [diza vs. diza], [idoda vs. idoda], [goma vs. goma], [aga vs. aga], [ku:te vs. ku:te], [!akatha vs. !at'atha], [bala vs. bala], [u:lzbu: vs. u:lzbu:], [dlzala vs. dlzala], [idlzovu vs. idlzovu], [venene vs. venene], [i:vu:la vs. i:vu:la], [dzima vs. zima], [idodzɔ vs. idodzɔ], [dzoza vs. dzoza], [idza vs. idza], [dʒkidzɛla vs. dʒkidzɛla], [idzuba vs. idzuba], [iɔvene vs. iɔvene], [ts'ats'aza vs. ts'ats'aza], [tʃala vs. tʃala], [utʃani vs. utʃani], [tʰo vs. tʰo], [itʰadzi vs. itʰadzi], [kʰikʰiza vs. kʰikʰiza], [lulav. lula], [isilabulabu vs. isilabulabu ], [hude vs. hude], [hitha vs. hitha], [ga!gaza vs. !ga!gaza], [gvi!gviza vs. !g'vu!gviza], [gabitha vs. gabitha], [gɔlile vs. gɔlile], [baguzɛla vs. bagujela], [iŋakʌ vs. kʌkʌ], [iŋamav. iŋama], [biŋa vs. biŋa], [lɔlla vs. llɔlla], [illillɔ vs. illillɔ], [haka vs. haka], [isi!hɔbɔ vs. !hɔbɔ], [lgabalaza vs. !lgabalaza], [llga!gafa vs. ga!gafa], [bɔŋ!ula vs. bɔŋ!ula], [!hɔŋ!a vs. !hɔŋ!a], [fela vs. fela], [ifalufu vs. falufu], [saha vs. saha], [isilathulu vs. lathulu], [sajana vs. sajana], [ifafi vs. ifafi], [xamba vs. xamba], [ukuxɔlav. ukuxɔla], [heha vs. heha], [yulav. yula], [zalela vs. zalela], [hala vs. hala], [ɬala vs. ɬala], [isitʰata vs. isitʰata], [lʒalav. lʒala], [reka vs. reka], [irajisi vs. irajisi], [lakalaka vs.</p> | <p>cluster, [g] for [g]<br/>cluster, [z] sound for [dʒ] cluster, [g] sound for [!g] cluster, [g] sound for [g] cluster, [k] sound for [ŋ] cluster</p> <ul style="list-style-type: none"> <li>• Substitution of sound e.g. [s] sound for [tʰ] sound, [u] sound for [i] sound</li> <li>• Gliding of [d] sound for [l] sound</li> <li>• Addition / epenthesis of sound e. g. [n]</li> </ul> | <ul style="list-style-type: none"> <li>• Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |
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|   | lakalaka], [wafa vs. wafa], [jeŋa vs. jeŋa], [makʔakʔa vs. makʔakʔa], [ikʔamu vs. kʔama], [ŋu vs. ŋu], [nabuzela vs. nabuzela], [naliza vs. naliza], [iŋoni vs. iŋoni], [ŋena vs. ŋena], [iketana vs. kentana], [jembe vs. jembe], [ephula vs. phula], [isethulo vs. thulo], [isikhele vs. isikhele], [insipho vs. insipho], [igelosi vs. igelosi]  |  |  |
| 9 | [ɔviɔva vs. ɔviɔa], [iqoqo vs. iqoqo], [!hiŋa vs. !hiŋa], [ve!ga vs. ve!ga], [ŋeŋa vs. ŋeŋa], [!oŋela vs. !oŋela], [!ho:ŋo vs. !ho:ŋo], [!giɓa vs. !giɓa], [!gi vs. !gi], [ŋese vs. ŋese], [niŋiza vs. niŋiza], [oŋula vs. oŋula], [pʔeta vs. pʔeta], [i:pʔi:pi vs. pʔi:pi], [tʔaklaza vs. tʔaklaza], [itʔije vs. itʔije], [kʔaba vs. kʔaba], [ikʔati vs. ikʔati], [pʔhevu:mula vs. pʔhevu:mula], [ilipheja vs. idiplheja], [thadaza vs. thadaza], [ubuthoŋo vs. ubuthoŋo], [khala vs. khala], [ukhezɔ vs. ukhezɔ], [bala vs. bala], [ɸabula vs. ɸabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔɔ vs. gɔɔ], [ɸatha vs. ɸatha], [iɸali vs. iɸali], [diza vs. diza], [idoda vs. idoda], [gɔma vs. gɔma], [aga vs. aga], [kʔu:te vs. kʔu:te], [!akatha vs. !atʔatha], [ɸala vs. ɸala], [u:lɔbu: vs. lɔbu:], [dlɔala vs. dlɔlala], [idlɔvu vs. idlɔvu], [!venene vs. !venene], [i:vu:la vs. i:vu:la], [dɔzima vs. dɔzima], [idɔdɔ vs. idɔdɔ], [dɔɔza vs. dɔɔza], [idɔa vs. idɔa], [dɔkidzela vs. dɔkidzela], [idɔuba vs. dɔuba], [iɔvene vs. iɔvene], [tsʔatsʔa vs. tsʔatsʔa], [tʔala vs. tʔala], [utʔani vs. utʔani], [tʔo vs. tʔo], [itʔadzi vs. itʔadzi], [kʔikʔiza vs. kʔikʔiza], [lula vs. lula], [isilabulabu vs. isilabulabu ], | <ul style="list-style-type: none"> <li>• Deletion of unstressed syllable e.g. [u:], [!], [isi]</li> <li>• Omissions of sounds e.g. [i], [u]</li> <li>• Gliding of sound e.g. [d] for [l]</li> <li>• Addition / epenthesis of sound e.g. [l], [i]</li> <li>• Cluster reduction of [g] sound for [!g] cluster, [l] sound for [lɔ] cluster</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson, 2004</li> <li>• Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |

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|    | <p>[!hudeVS. hude], [!hitha vs.  hitha], [!ga!gaza vs. !ga!gaza], [!gvi!gviza vs.  g'vul!gviza], [!gabitha vs. gabitha], [!gɔlileVS. gɔlile], [!ba!guzɛla vs. ba!gujela], [!ŋ!aɔa vs. ŋ!aɔa], [!iŋ!amaVS. iŋ!ama], [!biŋ!a vs. biŋ!a], [!llɔlla vs. llɔlla], [!illillɔ vs. illillɔ], [! !hakavS.  !haka], [!isi  !hɔbɔVS. isi  !hɔbɔ], [! !gabalaɔa vs.   !gabalaɔa], [!  !ga  !ga!fa vs. ga  !ga!fa], [!bɔŋ! !ula vs. bɔŋ! !ula], [! !hɔŋ  !a vs.  !hɔŋ  !a], [!fela vs. fela], [!i!falufu vs. !falufu], [!saha vs. saha], [!isilathulu vs. lathulu], [! !ajana vs. !ajana], [!i!fi!afi vs. i!fi!afi], [!xamba vs. xamba], [!ukuxɔ!aVS. ukuxɔ!a], [!heha vs. heha], [!y!ulavS. y!ula], [!z!alela vs. z!alela], [!fi!ala vs. fi!ala], [!ɬ!ala vs. ɬ!ala], [!isil!ata vs. isil!ata], [!l!zalavS. l!ala], [!r!eka vs. r!eka], [!i!ra!jisi vs. i!ra!jnisi], [!lakalaka vs. lakalaka], [!w!afa vs. w!afa], [!j!e!ŋ!a vs. j!e!ŋ!a], [!mak!f!ak'a vs. mak!f!ak'a], [!ik'amu vs. ik'ami], [!ŋu vs. ŋu], [!nabuzɛla vs. nabuzɛla], [!naliz!a vs. naliz!a], [!i!ŋɔni vs. i!ŋɔni], [!ŋena vs. iŋena], [!iket!aŋa vs. kent!aŋa], [!jembe vs. jembe], [!ephula vs. ephula], [!isethulɔ vs. isethulɔ], [!isikhele vs. sikhele], [!insiphɔ vs. insiphɔ], [!igelɔsi vs. igelɔsi]</p> |   |   |
| 10 | <p>[!ɔvi!ɔva vs. ɔvi!ɔa], [!iqoqɔ vs. qoqo], [! !hiŋ!a vs. !hiŋ!a], [!ve!ga vs. ve!ga], [!ŋ!eŋa vs. leŋa], [! !ɔŋela vs. !ɔŋela], [! !ho:ŋ!ɔ vs.  !ho:ŋ!ɔ], [! !gi!fa vs.  !gi!fa], [! !gi vs. gi], [!ŋ!eŋe vs. eŋe], [!ni!ni!za vs. ni!ni!za], [!ɔŋula vs. ɔŋula], [!p'eta vs. p'eta], [!i:p'i:pi vs. ip'i:pi], [!t!aklaza vs. t!aklaza], [!it'ije vs. tije], [!k'aba vs. k'aba], [!ik'ati vs. k'ati], [!phevu:mula vs. phevu:mula], [!ilipheja vs. ilipheja], [!th!ad!aza vs. th!ad!aza]</p>  | <ul style="list-style-type: none"> <li>• Normal speech development</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson, 2004</li> </ul> |

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|  | <p>thad̩aza], [ubuthoŋo vs. ubuthoŋo], [khala vs. khala], [ukhezo vs. pekhezo], [bala vs. bala], [fiabula vs. fiabula], [dansa vs. dansa], [idada vs. dada], [gavula vs. havula], [ugogo vs. ugogo], [b̩atha vs. b̩atha], [i̩bali vs. b̩ali], [di̩za vs. di̩za], [i̩doda vs. i̩doda], [goma vs. goma], [aga vs. aga], [ku:te vs. ku:te], [!akatha vs. !a'atha], [bala vs. bala], [u:l3bu: vs. u:l3bu:], [dl3ala vs. dl3lala], [idl3ovu vs. idl3ovu], [ːvenene vs. ːvenene], [iːvu:la vs. iːvu:la], [dzima vs. dzima], [i̩dodzo vs. i̩dodzo], [dzoza vs. dzoza], [idza vs. idza], [d3kidzela vs. d3kidzela], [idzuba vs. idzuba], [i̩vene vs. i̩vene], [ts'ats'aza vs. ts'ats'aza], [tʃala vs. tʃala], [utʃani vs. utʃani], [tʃo vs. tʃo], [itʃadzi vs. itʃadzi], [kʰikʰiza vs. kʰikʰiza], [lula vs. lula], [isilabulabu vs. isilabulabu], [!hude vs. !hude], [hitha vs. hitha], [ga!gaza vs. !ga!gaza], [gvi!gvi vs. g!vul!gvi], [gabitha vs. !gabitha], [gole vs. gole], [baguzela vs. bagujela], [ŋaka vs. ŋaka], [iŋama vs. iŋama], [biŋa vs. biŋa], [lola vs. lola], [illilo vs. illilo], [haka vs. haka], [isi hobo vs. isi hobo], [lgabalaza vs. lgabalaza], [gaga vs. gaga], [bonjula vs. bonjula], [hona vs. hona], [fela vs. fela], [ifalufu vs. falufu], [saha vs. saha], [isilathulu vs. isilathulu], [ajana vs. ajana], [ifaji vs. ifaji], [xamba vs. xamba], [ukuxola vs. ukuxola], [heha vs. heha], [yula vs. yula], [zalela vs. zalela], [hala vs. hala], [tala vs. tala], [isitata vs. isitata], [l3alav vs. l3ala], [reka vs. reka], [irajisi vs. irajisi], [lakalaka</p> |  | <ul style="list-style-type: none"> <li>Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |
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|    | <p>vs. lakalaka], [wafa vs. wafa], [jeŋa vs. jeŋa], [makʔakʔa vs. makʔakʔa], [ikʔamu vs. kʔamu], [ŋu vs. ŋu], [nabuzela vs. nabuzela], [naliza vs. naliza], [iŋoni vs. iŋoni], [ŋena vs. kʔena], [iketana vs. kentaŋa], [jembe vs. jembɛ], [ephula vs. aphula], [isethulo vs. sethulo], [isikhele vs. sikhele], [insiphɔ vs. insiphɔ], [igelosi vs. igelosi]</p>  |   |  |
| 11 | <p>[ɔviɔva vs. ɔviɔa], [iqoqɔ vs. iqoqo], [!hiŋa vs. !hiŋa], [ve!ga vs. ve!ga], [ŋeŋa vs. ŋeŋa], [!ɔŋela vs. !ɔŋela], [!ho:ŋɔ vs. !ho:ŋɔ], [!giɓa vs. !giɓa], [!gi vs. !gi], [ŋese vs. !ese], [niŋiza vs. niŋiza], [ɔŋula vs. ɔŋula], [pʔeta vs. pʔeta], [i:pʔi:pi vs. ipʔi:pi], [tʔaklaza vs. tʔaklaza], [itʔije vs. itʔije], [kʔaba vs. kʔaba], [ikʔati vs. kʔati], [pʔevu:mula vs. pʔevu:mula], [ilipheja vs. pheja], [thaɗaza vs. thaɗaza], [ubuthoŋɔ vs. ubuthoŋɔ], [khala vs. khala], [ukhezɔ vs. khezɔ], [bala vs. bala], [fiabula vs. fiabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔgɔ vs. gɔgɔ], [batha vs. batha], [ibali vs. ibali], [ɗiza vs. ɗiza], [idɔda vs. idɔda], [gɔma vs. gɔma], [aga vs. aga], [kʔu:te vs. kʔu:te], [!akatha vs. !atʔatha], [ɓala vs. ɓala], [u:lɓbu: vs. lɓbu:], [dlɓala vs. dlɓlala], [idlɓɔvu vs. idlɓɔvu], [!venene vs. !venene], [i:vu:la vs. i:vu:la], [ɗzima vs. ɗzima], [idɔɗzɔ vs. idɔɗzɔ], [ɗzɔza vs. ɗzɔza], [idza vs. idza], [ɗzɔkɔzela vs. ɗzɔkɔzela], [idzuba vs. idzuba], [iɔvene vs. iɔvene], [tsʔatsʔa vs. tsʔatsʔa], [tʔala vs. tʔala], [utʔani vs. utʔani], [tʔɔ vs. tʔɔ], [itʔadzi vs. itʔadzi], [kʔikʔiza vs. kʔikʔiza], [lula vs. lula], [isilabulabu vs. labulabu ],</p> | <ul style="list-style-type: none"> <li>• Normal speech development</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson, 2004</li> <li>• Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |

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|    | <p>[!hudevs. !hude], [!hitha vs. !hitha], [!ga!gaza vs. !ga!gaza], [!gvi!gviza vs. !g'vul!gviza], [!gabitha vs. !gabitha], [!golilevs. golile], [!ba!guzela vs. ba!gujela], [!i!ka vs. ka], [!i!ama vs. i!ama], [!bi!ja vs. ebi!ja], [!l!la vs. l!la], [!ill!l vs. ill!l], [!h!ka vs. h!ka], [!isi!h!b! vs. isi!h!b!], [!g!ab!ala vs. g!ab!ala], [!g!a!g!a vs. g!a!g!a], [!b!o!n!u!la vs. b!o!n!u!la], [!h!o!n!a vs. h!o!n!a], [!f!ela vs. f!ela], [!i!f!alufu vs. f!alufu], [!s!aha vs. saha], [!i!s!il!ath!ulu vs. isilathulu], [!s!aj!ana vs. sajana], [!i!h!a!f!i vs. ih!a!f!i], [!x!amba vs. xamba], [!u!k!ux!o!la vs. ukuxo!la], [!h!e!ha vs. heha], [!y!ula vs. yula], [!z!ala vs. z!ala], [!h!ala vs. h!ala], [!t!ala vs. t!ala], [!i!s!i!t!ala vs. it!ala], [!l!z!ala vs. lz!ala], [!r!eka vs. r!eka], [!i!r!aj!isi vs. ir!aj!isi], [!l!ak!al!aka vs. lakalaka], [!w!a!fa vs. wa!fa], [!j!e!n!ja vs. je!n!ja], [!m!ak!f!ak!a vs. mak!f!ak!a], [!i!k!a!mu vs. ik!a!mu], [!n!ju vs. n!ju], [!n!ab!uz!ela vs. nabuz!ela], [!n!al!iza vs. nal!iza], [!i!n!oni vs. in!oni], [!n!e!na vs. ne!na], [!i!k!e!ta!n!a vs. ketan!a], [!j!em!be vs. jem!be], [!e!ph!ula vs. eph!ula], [!i!s!e!th!ulo vs. the!ulo], [!i!s!ik!he!le vs. isikhe!le], [!i!n!s!iph!o vs. insiph!o], [!i!g!el!osi vs. igel!osi]</p> |   |   |
| 12 | <p>[!o!vi!o!va vs. o!vi!o!va], [!i!q!o!q!o vs. q!o!q!o], [!h!i!n!ja vs. !h!i!n!ja], [!v!e!ga vs. ve!ga], [!n!e!n!ja vs. ne!n!ja], [!o!n!e!la vs. !o!n!e!la], [!h!o!n!o vs. ho!n!o], [!g!i!ba vs. gi!ba], [!g!i vs. gi], [!n!e!se vs. ne!se], [!n!i!n!iza vs. nin!iza], [!o!n!ula vs. on!ula], [!p!e!ta vs. pe!ta], [!i!p!i!pi vs. ip!i!pi], [!t!ak!l!aza vs. tak!l!aza], [!i!t!ije vs. it!ije], [!k!aba vs. ka!ba], [!i!k!ati vs. ka!ti], [!p!he!vu!m!ula vs. phe!vu!m!ula], [!i!l!i!p!he!ja vs. l!i!p!he!ja], [!t!h!a!za vs. th!a!za]</p>  | <ul style="list-style-type: none"> <li>• Deletion of unstressed syllable e.g. [ː], [isi], [la]</li> <li>• Omission of sounds e.g. [i]</li> <li>• Cluster reduction [k] sound for [n]</li> <li>• Cluster, [g] sound for</li> </ul> | <ul style="list-style-type: none"> <li>• Bauman – Waengler, 2000</li> <li>• Bernthal &amp; Bankson, 2004</li> </ul> |



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|  | <p>thad̩aza], [ubuthoŋo vs. ubuthoŋo], [khala vs. khala], [ukhez̩o vs. ukhez̩o], [bala vs. bala], [ɸ̩abula vs. ɸ̩abula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ug̩oŋo vs. ug̩oŋo], [ɸ̩atha vs. ɸ̩atha], [iɸ̩ali vs. iɸ̩ali], [d̩ɪza vs. ɛd̩ɪza], [id̩oda vs. id̩oda], [g̩oma vs. g̩oma], [aga vs. aga], [k̩u:ɛ vs. k̩u:ɛ], [!akatha vs. !at̩'atha], [ɸ̩ala vs. ɸ̩ala], [u:l̩zbu: vs. ul̩zbu:], [dl̩zala vs. dl̩zala], [idl̩zoŋu vs. dl̩zoŋu], [v̩enene vs. venene], [i:v̩u:la vs. i:v̩u:la], [d̩zima vs. ɛd̩zima], [id̩od̩zo vs. id̩od̩zo], [d̩zoza vs. d̩zoza], [id̩za vs. id̩za], [d̩z̩kid̩z̩ela vs. d̩z̩kid̩z̩ela], [id̩zuba vs. id̩zuba], [iɔ̩vene vs. iɔ̩vene], [ts'ats'a̩za vs. ts'ats'a̩za], [t̩fala vs. t̩fala], [ut̩fani vs. ut̩fani], [t̩'ɔ vs. t̩'ɔ], [it̩'ad̩zi vs. it̩'ad̩zi], [k̩'ik̩'iz̩a vs. k̩'ik̩'iz̩a], [l̩ula vs. l̩ula], [isil̩abul̩abu vs. labul̩abu ], [ɸ̩hude vs. !hude], [ɸ̩hitha vs. ɸ̩hitha], [g̩a!g̩aza vs. !g̩a!g̩aza], [g̩vi!g̩viza vs. !g̩vul̩g̩viza], [g̩abitha vs. !g̩abitha], [g̩ol̩ile vs. g̩ol̩ile], [ba!g̩uz̩ela vs. ba!g̩uj̩ela], [ɸ̩ɸ̩ak̩a vs. ɸ̩ɸ̩ak̩a], [iɸ̩ɸ̩ama vs. iɸ̩ɸ̩ama], [biɸ̩ɸ̩a vs. biɸ̩ɸ̩a], [l̩olla vs. l̩olla], [ill̩ill̩o vs. ill̩ill̩o], [ɸ̩ɸ̩ak̩a vs. ɸ̩ɸ̩ak̩a], [isiɸ̩ɸ̩ob̩o vs. ɸ̩ɸ̩ob̩o], [l̩g̩abal̩aza vs. l̩g̩abal̩aza], [l̩g̩a!g̩a!f̩a vs. ga!g̩a!f̩a], [b̩oŋ!ula vs. b̩oŋ!ula], [ɸ̩ɸ̩oŋ!a vs. ɸ̩ɸ̩oŋ!a], [f̩ela vs. f̩ela], [i!f̩alufu vs. !f̩alufu], [saha vs. saha], [isil̩athulu vs. l̩athulu], [!ajana vs. !ajana], [iɸ̩ɸ̩a!fi vs. iɸ̩ɸ̩a!fi], [xamba vs. xamba], [ukux̩ola vs. ukux̩ola], [h̩eha vs. h̩eha], [ɸ̩ɸ̩ula vs. ɸ̩ɸ̩ula], [z̩alela vs. z̩alela], [ɸ̩ɸ̩ala vs. ɸ̩ɸ̩ala], [ɸ̩ala vs. ɸ̩ala], [is̩iɸ̩a!a vs. ɸ̩a!a], [l̩z̩ala vs. l̩z̩ala], [ɸ̩ɸ̩eka vs.</p> | <p>[l̩g̩] cluster</p> <ul style="list-style-type: none"> <li>• Addition / epenthesis of sound e.g. [n], [ɛ], [k]</li> <li>• Substitution of sound e.g. [b] sound for [n] sound</li> </ul> | <ul style="list-style-type: none"> <li>• Naidoo, van der Merwe, Groenewald &amp; Naudé, 2005</li> </ul> |
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|  | <p>reka], [iɾajisi vs. iɾajnisi], [lakalaka vs. lakaka], [waʃa vs. waʃa], [jeŋa vs. jeŋa], [makʔakʔa vs. makʔakʔa], [ikʔamu vs. kʔamu], [ŋu vs. ŋu], [nabuzela vs. babuzela], [naliza vs. naliza], [iɾoni vs. iɾoni], [ɾena vs. iɾena], [iketana vs. iketana], [jembe vs. jembe], [ephula vs. ephula], [isethulo vs. thulo], [isikhele vs. isikhele], [insipho vs. insipho], [igelosi vs. kigelosi]</p> |  |  |
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**APPENDIX O**  
**UNFAMILAR WORDS AND PICTURES ON THE PROTOCOL ELICITED IN**  
**PHASE TWO**

| Participant number | Unfamiliar words and pictures on the Zulu perceptual speech assessment protocol  |
|--------------------|--|
| 1                  | kabha (to chop), phefumula (to breathe), udlubu (peanut), ndlala (to speed), mvenene (to run fast), iqhude (rooster), njoza (to cover), inzonzo (legs of bird), jikijela (throw), gcagqaza (throw out), bhangcuzela (walk unarmed), bhonxula (pull out), xhonkxa (sow thick) |
| 2                  | kabha (to chop), phefumula (to breathe), ndlala (to speed), mvenene (to run fast), njoza (to cover), jikijela (throw), gcagqaza (throw out), bhangcuzela (walk unarmed), bhonxula (pull out)   |
| 3                  | kabha (to chop), phefumula (to breathe), ndlala (to speed), mvenene (to run fast), njoza (to cover), gcagqaza (throw out), bhangcuzela (walk unarmed), bhonxula (pull out), xhonkxa (sow thick)  |
| 4                  | kabha (to chop), phefumula (to breathe), thandaza (to pray), mvenene (to run fast), inzonzo (legs of bird), ngcolile (dirty), inqama (ram), bhangcuzela (walk unarmed), isixhobo (heaps of rock and stones), ngxangxasha (to hop), bhonxula (pull out), xhonkxa (sow thick)  |
| 5                  | kabha (to chop), phefumula (to breathe), ndlala (to speed), mvenene (to run fast), njoza (to cover), bhangcuzela (walk unarmed), bhonxula (pull out), xhonkxa (sow thick)  |
| 6                  | kabha (to chop), phefumula (to breathe), gawula (to chop), udlubu (peanut), ndlala (to speed), njoza (to cover), jikijela (throw), klikliza (to choke), gcagqaza (throw out), bhangcuzela (walk unarmed), bhonxula (pull out), xhonkxa (sow thick)                           |
| 7                  | kabha (to chop), phefumula (to breathe), ndlala (to speed), mvenene (to run fast), njoza (to cover), inzonzo (legs of bird), jikijela (throw), gcagqaza (throw out), bhangcuzela (walk unarmed), bhonxula (pull out), nyaliza (to lick; cat licking itself)                  |
| 8                  | taklaza (to hit on body/stomach), kabha (to chop), phefumula (to breathe), ndlala (to speed), mvenene (to run fast), njoza (to cover), inzonzo (legs of bird), jikijela (throw), gcagqaza (throw out), bhangcuzela (walk unarmed), bhonxula (pull out), xhonkxa (sow thick)  |
| 9                  | taklaza (to hit on body/stomach), phefumula (to breathe), qakatha (to plait hair), udlubu (peanut), ndlala (to speed), njoza (to cover), inzonzo (legs of bird), chitha (to throw out), inqama (ram), bhangcuzela (walk unarmed)   |
| 10                 | phefumula (to breathe), gawula (to chop), mbatha (to dress), qakatha (to plait hair), udlubu (peanut), ndlala (to speed), mvenene (to run fast), njoza (to cover), inzonzo (legs of bird), klikliza (to choke), gcagqaza (throw out), bhonxula (pull out)                    |
| 11                 | taklaza (to hit on body/stomach), kabha (to chop), phefumula (to breathe), gawula (to chop), mvenene (to run fast), qakatha (to plait hair), njoza (to cover), bhangcuzela (walk unarmed), bhonxula (pull out), zalela (to lay eggs), ephula (to break)                      |
| 12                 | phefumula (to breathe), thandaza (to pray), taklaza (to hit on body/stomach), qakatha (to plait hair), ndlala (to speed), mvenene (to run fast), njoza (to cover), bhangcuzela (walk unarmed), ngqabitha (to jump down), ngxangxasha (to hop)                                |



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**APPENDIX P**  
**EXAMPLES OF THE APPLICATIONS OF INTERNATIONAL GUIDELINES ON**  
**THE ZULU LANGUAGE**

**Table 5.13 Examples of the applicability of the international guidelines on a Zulu perceptual speech analysis**

| International guideline   | Applicability   |
|---|---|
| Guideline 1: Single word lists and short sentences (www.eurocran.org)   | <ul style="list-style-type: none"> <li>• Applied by compiling a word list with all the Zulu phonemes in initial, medial and final positions to be elicited via pictures (See Appendix K, Zulu word lists)</li> <li>• Selected Zulu phonemes and developed short sentences with the assistance of the Zulu linguist (See Appendix K, 4.3).</li> </ul>  |
| Guideline 2: Single word lists- Single consonant inventory should include all pressure consonants, all or some non-pressure oral consonants one or more nasal consonants (www.eurocran.org) | <ul style="list-style-type: none"> <li>• Followed as the complete Zulu phoneme inventory was included in the word lists of the protocol.</li> <li>• Included pressure consonants [p] in peta (to dig with a spade), [k] in kabha (to chop wood) and [b] in mbatha (to dress)</li> <li>• Non-pressure oral consonants included were [β] in bala (to count)</li> <li>• Nasal consonants included words for elicitation consisting of nasal consonants only (see Appendix K, 4.4) e.g. umfula (river) and indoda (man).</li> </ul> |
| Guideline 3: Single word lists – A vowel inventory should include some or all high vowels, all or some low vowels and some non-high or non-low vowels (www.eurocran.org)                    | <ul style="list-style-type: none"> <li>• Vowel inventory in the protocol included all the vowels in Zulu in different positions e.g. [i] in insipho (soap) in the high position, [e] in ephula (to break) in the low</li> </ul>   |



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|   | <p>position, [o] in ingelosi (angel) in the non-high position and [a] in anga (to kiss) in the non-low position</p>   |
| <p>Guideline 4: Single word lists: the number of contextual sounds should be limited (www.eurocran.org)</p>   | <ul style="list-style-type: none"><li>• Applied by eliminating the number of words included in the protocol by using one word to elicit more than one Zulu sound e.g. tsatsaza (to spray) for the [tsʰ] sound in initial and medial positions and iketanga (chain) for the [a] and [ɛ] sounds.</li></ul>  |
| <p>Guideline 5: Single word lists – Clusters with non-pressure consonants, clusters with nasal consonants and other types of clusters should be included (www.eurocran.org)</p>                             | <p>The Zulu language have no consonants clusters (Taljaard &amp; Snyman, 1993), this was used with click sounds, as they are combined Zulu phonemes (See appendix K, Zulu word used to elicit speech during the assessment)</p> <ul style="list-style-type: none"><li>• The (n)gq sound [ŋ] in ngqabitha (to jump down).</li><li>• The (n)gc sound [ŋ] in ngcolile (is dirty).</li><li>• The nc sound [ŋ] in bhinca ( to put on/ wear).</li></ul> |
| <p>Guideline 6: Single word lists- The position of consonants should be in “strong” and other positions in words (www.eurocran.org)</p>   | <ul style="list-style-type: none"><li>• Applied in the [b] sound in bhala (to write) and in bhangcuzela (to walk unarmed).</li></ul>  |
| <p>Guideline 7: Single word lists – The number of representations of each test consonant should occur 3 times in strong positions and twice in other positions and twice in clusters (www.eurocran.org)</p> | <ul style="list-style-type: none"><li>• Adhered to by ensuring that all consonants were in the initial, medial and if possible final position in words</li><li>• Evident in [th] in thandaza (to pray) and ubuthongo (sleep) and qakatha (to plait hair) in the strong positions;</li></ul>   |



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|   | <p>isicathulo (shoe) and isethulo (gift/present) in other positions</p> <ul style="list-style-type: none"><li>• The Zulu language did not consist of sound clusters; this was not observed in sound clusters.</li></ul>  |
| <p>Guideline 8: Single word lists – Other requirements included that test consonants should be randomly ordered and high vowels should occur in approximately ten of the words which also have a test consonant in “strong” position (<a href="http://www.eurocran.org">www.eurocran.org</a>)</p> | <ul style="list-style-type: none"><li>• Consonants were randomly ordered according to manner of articulation e.g. plosives, implosives, affricates, clicks, fricatives, trill, approximant and nasals</li><li>• High vowels occurred in words in the strong positions e.g. [a] in anga (to kiss), [i] in insipho (soap), [ɔ] in onga (to gather), in indoda (man) and in insipho (soap), [o] in ongula (to skim off), ingelosi (angel) and in ubuthongo (sleep), [u] in utshani (grass), in gawula (to chop) and in indlovu (elephant)</li></ul> |
| <p>Guideline 9: Short sentences – Single consonants should occur in sentences, as well as a nasal consonant and other consonant as required. Vowel height should be considered regarding the phonetic content of sentences (<a href="http://www.eurocran.org">www.eurocran.org</a>)</p>           | <ul style="list-style-type: none"><li>• Short sentences included consonants consisting of the Zulu sound structure e.g. Umfana <b>udlala ngebhola</b> (The boy plays with a ball)</li><li>• Short sentences included nasal consonants e.g. Ubaba <b>ulungisa umnyango</b> (Father is mending the door)</li><li>• Vowel height was considered e.g. Inja ilambile futhi iyadla (The dog is hungry and eats his food) with vowels in high positions and Ngiyayibona indlu (I see the house)</li></ul>   |





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|   | with vowels in low positions.   |
| Guideline 10: Restricted speech material for cross-linguistic comparisons should include similar phonetic content and occur in similar phonetic context<br>(www.eurocran.org) | <ul style="list-style-type: none"><li>• This will be applicable when words in the protocol are compared to other word lists.</li><li>• Important to compare similar phonetic content and contexts.</li></ul>  |
| Guideline 11: Elicitation of single word lists by using naming or semantic prompting<br>(www.eurocran.org)  | <ul style="list-style-type: none"><li>• Used by eliciting single words by showing it to children and if necessary to explain by semantic prompting.</li></ul>   |
| Guideline 12: Data should include rote speech and counting (www.eurocran.org)   | <ul style="list-style-type: none"><li>• Included counting from one to ten and naming the days of the week (See Appendix K, 4.2).</li></ul> <p>Children mostly counted and named days of the week in English, due to the influence of multilingual languages in South Africa (Dawber &amp; Jordaan, 2002:4).</p> |
| Guideline 13: Collecting a spontaneous speech sample (www.eurocran.org)   | <ul style="list-style-type: none"><li>• A 2 minute spontaneous speech sample section was included in protocol (See Appendix K, 4.5).</li><li>• Topics used were family, friends, sport, hobbies, animals, jobs and explanations of sport games.</li></ul>   |