DEVELOPMENT OF A PERCEPTUAL SPEECH ASSESSMENT PROTOCOL FOR ZULU-SPEAKING CHILDREN WITH CLEFT PALATE

DORETHEA SWIEGERS

Submitted in fulfilment of the requirements for the degree of
M. Communication Pathology
In the Faculty of Humanities
University of Pretoria

Supervisor: Prof. B. Louw
Co-Supervisor: Prof. A. Kritzinger

July 2009

ACKNOWLEDGEMENTS

I would like to express my gratitude towards the following people for their invaluable assistance with this research project

- My Lord and Savior, for giving me the strength to complete this project. Without You, nothing is possible. *"You, Lord, give me all I need; my future is in your hands" (Psalms 16:5).*
- My husband Gilliam, for encouraging me through the whole process. Thank you for your support and assistance and that you always believed in me. You carried me through the tough times. *I love you not only for who you are but for what I am when I'm with you.*
- My parents and parents-in-law: Thank you for always motivating and encouraging me. Thank you for being there for me and for giving me the confidence to believe in myself. "*You were prepared to let me shine."*
- My family: Thank you for supporting me and for showing an interest in my project.
- Professor Brenda Louw: Thank you for the effort and time you have put into this project and for guiding me. Thank you for showing me that I can produce something I never believed was possible.
- Professor Alta Kritzinger: For all your words of encouragement, the hours that you have spent with my project and all the valuable guidance I am very grateful.
- Mia le Roux: All your remarkable effort and assistance with the compilation of the protocol and the study is appreciated. Thank you.
- Sister Daleen du Plessis and Sister Hester van den Berg – your willingness to assist with this project are greatly appreciated.
- Minka, Alta, Teresa, Lisl, Linda and Tania – your encouragement and support motivated me. Thank you.
- My friends and colleagues: Thank you for your interest, advice and encouragement.
- All the participants – without you this study would not have been possible.
- Mrs. Tertia de Villiers for the language editing. Thank you.

ABSTRACT

TITLE: Development of a perceptual speech assessment protocol for Zulu-speaking children with cleft palate

NAME: Dorette Swiegers

SUPERVISOR: Professor Brenda Louw

CO-SUPERVISOR: Professor Alta Kritzinger

DEPARTMENT: Communication Pathology, University of Pretoria

DEGREE: M. Communication Pathology

Currently a need exists in South Africa for an age-, linguistically- and culturally appropriate perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate. The aim of this study was to develop a reliable perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate based on the international guidelines (www.eurocran.org). Furthermore the clinical applicability and relevance of these guidelines for the perceptual assessment of cleft palate speech in the Zulu language were determined. The aims were reached by following a mixed methods research approach and by conducting the research in four phases. In phase one the protocol was compiled with the assistance of an expert Zulu linguist, in phase two the protocol was pre-tested on 12 normal Zulu-speaking pre-school children between three and six years of age; in phase three the perceptions of speech-language therapists regarding the clinical applicability of the protocol were determined after administration thereof on 12 Zulu-speaking pre-school children with cleft palate between the ages of three and six years; and finally in phase four the relevance of applying the international guidelines to the Zulu language was reflected on. A critical analysis of the protocol indicated that the international guidelines (www.eurocran.org) could be used to develop a perceptual speech assessment protocol in an African language namely Zulu. Results of the pilot study revealed that the protocol was age, culturally and linguistically appropriate for normal Zulu-speaking pre-school children. The speech-language therapist participants indicated that the protocol was clinically applicable to Zulu-speaking pre-school children with cleft lip and palate in terms of cultural sensitivity, administration time and its ability to elicit and identify cleft palate speech characteristics. The international guidelines (www.eurocran.org) could be applied to the Zulu language with an

emphasis on the click sounds in Zulu. The results have clinical implications for cleft palate service delivery in South Africa. These implications were for in-service training of speech-language therapists regarding cleft palate to provide them with evidence-based guidelines for clinical practice. Implications for further research included the development of norms of speech development in the Zulu language and the standardization of the perceptual speech assessment protocol. This study is valuable as it is the first tool for the perceptual assessment of cleft palate speech in Zulu. The research methodology may serve as an example for the development of similar speech assessment protocols for children with cleft palate in other African languages.

KEY WORDS: Perceptual assessment, cleft lip and palate, Zulu perceptual speech assessment protocol, clinical applicability, international guidelines for the perceptual assessment of cleft palate speech, culturally sensitive.

OPSOMMING

Tans bestaan daar ‘n behoefte in Suid-Afrika vir ‘n ouderdoms-, taal- en kultureel toepaslike persepsuele spraak assesseringsmateriaal vir Zoeloe-sprekende voorskoolse kinders met gesplete lip en verhemelte. Die doel van hierdie studie was om ‘n betroubare en geldige Zoeloe persepsuele spraak assesseringsprotokol vir voorskoolse kinders met gesplete lip en verhemelte te ontwikkel gebasseer op die internasionale riglyne (www.eurocran.org). Die kliniese toepaslikheid en relevansie van die internasionale riglyne vir die persepsuele assessering van gesplete lip en verhemelte is bepaal. Die doelwitte is bereik deur ‘n gemengde kwalitatiewe en kwantitatiewe navorsingsmetode te volg asook deur die navorsing in vier fases uit te voer. In fase een is die protokol ontwikkel met die bystand van ‘n Zoeloe taalkundige, in fase twee is die protokol getoets op 12 normale Zoeloe-sprekende kinders tussen drie en ses jaar, in fase drie is die persepsies van drie spraak-taalterapeute verkry aangaande die kliniese toepaslikheid van die protokol na afloop van evaluasies op 12 Zoeloe-sprekende voorskoolse kinders met gesplete lip en verhemelte tussen drie en ses jaar, in fase vier is gereflekteer op die toepaslikheid van die internasionale riglyne vir Zoeloe. ‘n Kritiese analise van die protokol het aangedui dat die internasionale riglyne (www.eurocran.org) gebruik kon word om ‘n persepsuele spraak assesseringsprotokol in ‘n Afrika taal, naamlik Zoeloe, op te stel. Resultate van die voorstudie het aangedui dat die protokol taal-, ouderdoms- en kultureel toepaslik was vir die normale Zoeloe-sprekende voorskoolse kinders. Die spraak-taalterapeute as deelnemers het aangedui dat die protokol klinies toepaslik was vir voorskoolse kinders met gesplete lip en verhemelte in terme van die kulturele sensitiwiteit van die protokol, administrasie tyd asook die vermoë om die spesifieke gesplete lip en verhemelte spraakkenmerke te ontlok. Die internasionale riglyne (www.eurocran.org) kon gevolg word vir Zoeloe met insluiting van die suigklanke in die Zoeloe taalstruktuur. Die resultate het implikasies vir dienslewering in Suid-Afrika met betrekking tot gesplete lip en verhemelte. Hierdie implikasies sluit in-diens opleiding van spraak-taalterapeute in om aan hul riglyne te verskaf vir beste praktyk. Implikasies vir verdere navorsing omsluit die ontwikkeling van norme in terme van die spraak ontwikkeling in Zoeloe asook die moontlike standardisering van die persepsuele spraak asesseringsprotokol. Die studie is waardevol aangesien dit die eerste poging was om ‘n persepsuele spraak assesseringsprotokol in Zoeloe te ontwikkel vir die evaluasie van kinders met gesplete lip en verhemelte. Die

navorsingsmetodologie kan gevolg word vir die ontwikkeling van soortgelyke spraak assesseringprotokolle vir kinders met gesplete lip en verhemelte in ander Afrika tale.

SLEUTELTERME: Persepsuele assessering, gesplete lip en verhemelte, Zoeloe persepsuele spraak assesseringsprotokol, klinies toepaslik, internasionale riglyne vir die persepsuele assessering van gesplete lip en verhemelte, kultureel sensitief.

TABLE OF CONTENTS

CHAPTER 4

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

Page

CHAPTER 1
INTRODUCTION TO THE CHILDREN WITH CLEFT PALATE IN SOUTH AFRICA

This chapter aims to describe the challenges posed by the limited linguistically and culturally appropriate assessment and treatment materials available for children with cleft palate in South Africa. A research question is formulated and a statement of problem and the rationale for the study are presented as an introduction and orientation for the development of a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate.

1.1 Introduction

1.1.1 General Orientation

Treatment of cleft palate has changed and improved substantially over the past 50 years. Positive changes such as the incorporation of new team members into the treatment team, enhanced intervention and surgical techniques and attempts to compare treatment outcomes of the procedures across teams, have occurred in cleft palate service delivery (Hardin-Jones & Jones, 2005:9; Hutters & Henningsson, 2004:545). As a result, new developments in all the disciplines involved have led to improved outcomes for these patients (Hardin-Jones & Jones, 2005:8).

Developed countries are increasingly paying more attention to the plight of individuals with cleft palate from developing countries in an attempt to provide quality cleft care for all. These attempts range from outreach programmes to research collaboration and capacity building. Organizations such as The Smile Train (www.smiletrain.com), Operation Smile (www.operationsmile.org) and Rotaplast (www.rotaplast.org) aim to make cleft palate care accessible to the children of developing countries by means of various methods. Even with attempts like these, approximately only 20% of children with cleft palate worldwide have access to the cleft palate teams (Mars, 2005:32). An estimated

80% of the population with cleft palate is born in the developing or less developed world and may not have access to adequate cleft care (Mars, Sell & Habel, 2008:1). When the treatment of these individuals is delayed, it results in poor speech outcomes (Flinn, Long, Garattini & Semb, 2005:254) such as delayed acquisition of sounds that require palatal function, compensatory articulation errors and slow onset and progression of expressive language development. Resolving speech and language disorders in children with cleft palate who do not receive early communication intervention, remains challenging (Scherer & Kaiser, 2007:357).

When considering the treatment outcomes of children with cleft palate, the only way to ensure the development of self-sustaining, accountable treatment and improving the accessibility to cleft care lies within a team approach as the way forward (Mars, 2005:32). Every team needs well-trained members, as committed teams ensure best practice. Members often participate in continuing professional development activities which further ensures quality treatment and promotes Evidence-Based Practice (Kathard, Naudé, Pillay & Rodd, 2007:5). This leads to the promotion of evidence-based treatment as children with cleft palate are monitored by committed professional cleft palate teams (Scherer & Kaiser, 2007:356).

Evidence-based practice originated in the health sciences and relates to the outcomes of surgical procedures (www.asha.org). Evidence-based practice has the potential to improve the quality of clinical practice in speech-language pathology and ultimately to improve the quality of services to patients with speech and language disorders (ASHA, 2002:1). Therefore, speech-language therapists working with children with cleft palate are urged to conduct assessments and treatments in a manner that has been proven by research to be effective or recommended by experts in the field to be best practice. Assessment and treatment presented several challenges in the past, due to the

different treatment protocols used for the primary and secondary surgical management of children with cleft palate (Flinn *et al*. 2005:254).

Effective clinical service delivery for children with cleft palate will be achieved if scientific methods are used to treat these patients to ensure that bias and confounding results are minimized (Henningsson *et al*. 2007:3). The use of scientific methods leads to effective service delivery which also pertains to the treatment of children with cleft palate. Speech-language therapists working with individuals with cleft palate are required to use assessment and intervention strategies which have been proven by research and ultimately strive to improve quality of clinical services (www.asha.org).

The focus on evidence-based practice in measuring outcomes after treatment identified a need for effective treatment, as there are several factors in the developing countries that influence effective treatment. One of these factors is that surgeons have no formal training in measuring speech outcomes after treatment. Surgery may therefore be provided without satisfactory accompanying speech evaluation or follow-up, as is evident in many of the cleft palate missions in developing countries (Kuehn & Henne, 2003:13). Such a limited approach leads to poor speech results, especially in countries where the treatment team consists mainly of surgeons who are neither skilled in cleft repair nor trained in speech, or speech-language therapists who are not experienced in cleft care and even the absence of speech-language therapists (Kuehn & Henne, 2003:103).

Due to the diverse treatment protocols for children with cleft palate, best practice is difficult to determine. A need was identified to compare speech outcomes after treatment across centres (Hutters & Henningsson, 2004:545). The comparison of treatment outcomes may provide valuable information on the common elements shared by the different centres and information on the treatment approaches leading to patients with superior results. This will in turn provide valid scientific information to form the foundation for evidence-based decisions (Flinn *et al*.

2005:254). Treatment results include the results of cleft palate surgery, orthodontic treatment and speech-language therapy to obtain the best outcome for the given condition (Hutters & Henningsson, 2005:545). Therefore, comparable data is required to ensure effective comparisons between different cleft palate centres. The provision of quality cleft care for all necessitates evidence-based decisions.

The provision of quality cleft care requires the consideration of the speech outcomes after treatment. Several difficulties were, however, encountered by researchers when considering speech outcomes after treatment. Hutters and Henningsson (2005) identified some of these difficulties which included speaker demographics, the gender- and age of the speakers, the cleft type, ages at surgery and assessment, the different languages spoken by the child with a cleft palate and the usage of different professionals as raters (Hutters & Henningsson, 2005:545, Lohmander & Olsson, 2004:64). These variables were found to influence the validity and reliability of results, complicating comparisons between centres.

Due to the different role-players in the multi-disciplinary cleft palate treatment team (Bütow, 1995:2), comparison of outcomes after treatment from each discipline's point of view is challenging. This is ascribed to the different perspectives obtained from and interactions between individuals (Bütow, 1995:2). Furthermore, cleft lip and palate affect multiple areas of a child's development, which all interact with one another (Konst, Rietveld, Peters & Weersink-Braks, 2003:598). Despite the challenges confronting inter-centre comparisons of outcomes, teams remain committed to achieve the objective of improving the quality of cleft care.

In attempting to improve the quality of cleft care, speech-language therapists became vital role-players in the cleft palate team (Bütow, 1995:2). Speech-language therapists examine the speech quality of each individual with cleft

palate due to them exhibiting typical speech characteristics that are evident in the cleft palate speech (Henningsson *et al*. 2007:2; Hutters & Henningsson, 2005:545). These children's communication development needs to be assessed, treated and monitored regularly by the cleft palate team and specifically the speech-language therapists to ensure normal speech and language development (Peterson-Falzone, Trost-Cardamone, Karnell & Hardin-Jones, 2006:105). Children born with cleft palate are faced with significant challenges during their first years of life, including barriers to speech development. These barriers consist of early vocalizations that are produced in an abnormal oral environment (Peterson-Falzone *et al*. 2006:1), leading to poor and distorted speech with poor intelligibility (Henningsson *et al*. 2007:2).

Speech is therefore the most important indicator of quality of care, as delayed and poor repair of cleft palate lead to poor speech outcomes (Flinn *et al*. 2005:4). To determine the outcomes of surgical, orthodontic and speech-language management, comparisons of different treatment procedures are required (Hutters & Henningsson, 2005:546). This will enable speech-language therapists to determine the effects of cleft palate after surgery and possible velopharyngeal incompetence of speech post treatment and to make appropriate clinical decisions to improve the quality of services for children with cleft palate (Pannbacker, 2004:195).

Speech outcomes validate the evaluation and comparison of data collected according to various diverse approaches to improve service delivery to children with cleft palate (Lohmander & Olsson, 2004:64). Currently however there is a lack of universally accepted speech-sampling procedures across cleft palate centres, making comparisons difficult and hampering the determination of best practice. The recent focus on best practice highlighted the speech disorders that may be present in children with cleft palate.

Although advances in the management of individuals with cleft lip and palate have reduced the number of children demonstrating severe speech disorders, an appreciable number of children with cleft palate still demonstrate significant speech problems during the pre-school years (Mars, 2005:32; Peterson-Falzone *et al*. 2006:7). Achieving normal speech outcomes is one of the aims of the management of cleft lip and palate around the world (Lohmander & Olsson, 2004:64). Many children still receive care that is substantially inferior to what can be provided (ACPA, 2004:23-24). Inadequate care may result from a lack of a team approach, diagnostic errors, failure to recognize and treat the full spectrum of health problems associated with these anomalies, unnecessary and poorly timed treatment and inappropriate or poorly performed procedures (ACPA, 2004:23).

To ensure high quality care for children with cleft lip and palate, the ACPA used a consensus conference to develop guidelines for the assessment and treatment of children with cleft palate (ACPA, 2004:23). These guidelines are based on several fundamental principles which need to be adhered to in the speech and language evaluation of children with cleft lip and palate (ACPA, 2004:24). One aspect that ACPA guidelines focuses on is the speech and language evaluation of individuals with cleft lip and palate or other craniofacial anomalies to provide optimal information for treatment and treatment outcomes (ACPA, 2004:24).

The ACPA guidelines (ACPA, 2007) recommend speech-language evaluations of children with cleft lip and palate before or by 6 months of age with appropriate documentation at least annually until the age of four years (ACPA, 2007:4). After the age of four years, even if speech and language development has been appropriate and no problems noted, screenings should take place on a regular basis after adenoid involution and at least every three years thereafter until dental and skeletal maturity are reached. Re-evaluations in conjunction with local care providers are recommended as well as evaluations that include perceptual assessments of laryngeal functions, arrangements for early speech-language

services, perceptual speech evaluations and pre- and post surgery evaluations (ACPA, 2004:23). Speech-language evaluations should occur regularly to assure adequate documentation of each child's progress and to develop appropriate recommendations for intervention (ACPA, 2007:4).

The emphasis on effective and accountable services to children with cleft palate has highlighted the lack of resources available in the developing countries, as surgical as well as speech-language therapy services are often not readily available to the children in need of these services (Kuehn & Henne, 2003:103). There might be a filter effect present where expert speech-language therapists from developed countries provide guidelines. The local speech-language therapists in developing countries use these guidelines as basis for service delivery, but these children may still not receive the full benefit from treatment as their peers in the developed countries, as not all professionals are familiar with current best practice in the evaluation and treatment of children with cleft palate (Kuehn & Henne, 2003:103). In the majority of developing countries the services available are not sufficient to address the complex needs of children with cleft palate yet (Mars *et al*. 2008:1).

Johnson (2006) provides a graphic representation of effective clinical service delivery for children with cleft palate as illustrated in Figure 1.1.

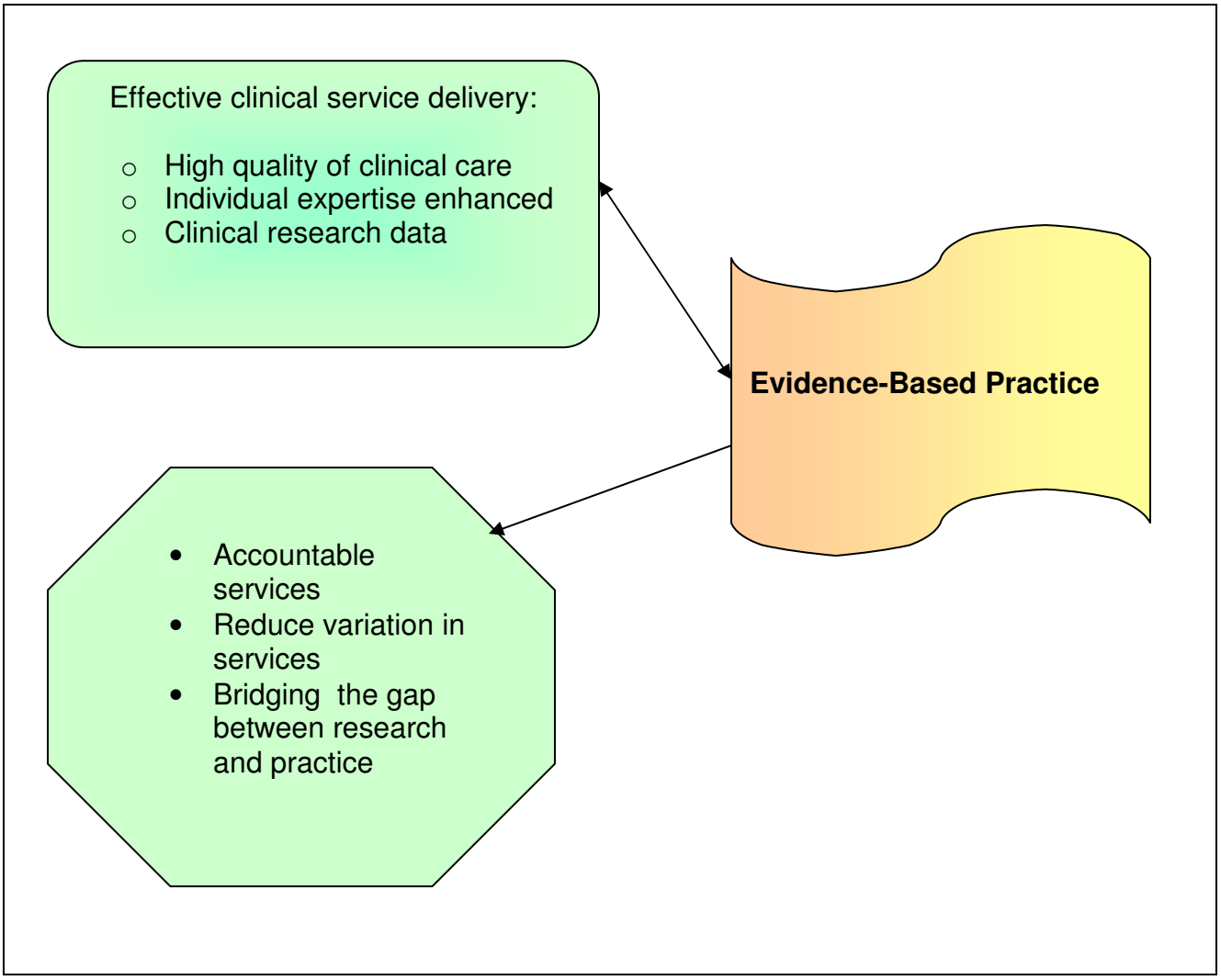


Figure 1.1 A graphic representation of the outcomes of effective clinical service delivery (Johnson, 2006)

In an attempt to address the complex needs of children with cleft palate, speech-language therapists strive towards best care for these children. The service delivery for children with cleft palate includes an approach of high quality clinical services to ensure accountability. If liable services are provided, variation in services will be reduced and the divergence between research and clinical practice will be overcome.

When providing effective services to children with cleft palate, it is important to conduct this from a best practice approach, to ensure that children with cleft palate in the developing countries also receive high quality services.

1.1.2 Different approaches in treating children with cleft palate

In the strive to provide best care to children with cleft palate by implementing the guidelines and parameters for the assessment and treatment of these children developed by experts in the field of cleft palate care, it was recognized that the services they receive in developing countries are still often inadequate in comparison with the international advances (ACPA, 2007:5). It further became evident that there is a lack of universally accepted operational definitions of speech measures and speech sampling procedures across individual evaluation systems (Henningsson *et al*. 2007:2). Lohmander and Olsson (2004:65) indicated that there is a dearth of reported information and large differences in the manner of collecting and analyzing data of the perceptual assessment of speech in patients with cleft palate, leading to variability in data collection and analysis procedures (Henningsson *et al*. 2007:2). This complicates objective comparisons of important data between centres for the determination of post-treatment outcomes of each individual (Henningsson *et al*. 2007:2).

As a result several international attempts were initiated to develop guidelines for the assessment and treatment of children with cleft palate, e.g. the “Eurocleft” and “GOSLON” projects, as no standard guidelines existed for inter-centre comparisons (Hathorn *et al*. 2006:3; www.eurocran.org). The focus on the development of international guidelines created a worldwide awareness of state-of-the-art assessment and treatment procedures (Henningsson *et al*. 2007:2). In South Africa, among other countries, no national standard speech assessment protocol is used. Furthermore, the dearth of assessment materials in African languages makes the assessment and treatment of these individuals even more challenging (Pakendorf, 1998:1). Many of these children receive speech-language therapy assessments and intervention in languages other than their

native language, placing them at a disadvantage to perform well due to language barriers (Pakendorf, 1998:1). These also compromise the validity and reliability of the assessment which impacts on treatment planning.

Collaborative attempts are currently made to standardize procedures and universal assessments for service delivery and to allow for inter-centre comparisons of treatment outcomes (Hathorn *et al*. 2006:3). The implementation of a universal system would incorporate speech measures that are truly universal in spite of differences in phonetic structures across languages that could have an effect on the measures that are evaluated (Henningsson *et al*. 2007:2). The universal system suggested by experts in the field (Henningsson *et al*. 2007) aims at reporting the major perceptual speech outcomes obtained from individuals with cleft palate, regardless of the individual's country of origin, languages spoken and other variables such as velopharyngeal incompetence that may affect speech behaviour (Henningsson *et al*. 2007:3). This will in turn contribute towards best care for children with cleft palate as comparable data will be obtained to conduct inter-centre comparisons.

The recent emphasis on inter-centre comparisons and the focus on providing best care for children with cleft palate identified that speech-language therapists in South Africa are challenged in their service delivery.

1.1.3 Challenges to cleft palate team care in South Africa

The South African context challenges practicing professionals in unique ways. A comprehensive understanding of the South African situation is required for the delivery of relevant services (Swanepoel, 2004:11). The South African population is heterogeneous with mixed sections of developed and developing contexts (Fair & Louw, 1999:13).

Children with cleft palate form part of the estimated half a million children in South Africa with disabilities requiring special services (Department of Health,

2001:6; Swanepoel, 2004:12). Cleft lip and palate has been identified as one of the priority conditions that the Department of Health aims to prevent and manage (Department of Health, 2001:6). Treating children with cleft palate require various monetary contributions towards medical care together with special education and training of service providers and caregivers. This emphasizes the urgent need for the provision of appropriate and effective assessment and intervention (Department of Health, 2001:1; Kummer, 2001:226; Peterson-Falzone, Hardin-Jones & Karnell, 2001:162). It is therefore essential that guidelines for best practice be applied and local cleft palate care be improved to reduce the burden on society and to ensure successful outcomes and quality care for all.

In South Africa, cleft palate teams are limited to the major centres, currently comprising of seven teams to serve the entire population (Dekker, 2007:5). Furthermore, there are limited numbers of speech-language therapists and audiologists qualified to work with these children, namely only 1762 (HPCSA, 2009) to serve a population of 47 million (Louw, 2008). Few of these registered speech-language therapists and audiologists are specialized in assessing and treating individuals with cleft lip and palate. Another challenge to these professionals is the large diversity of languages among children with cleft palate, affecting the different teams in providing their services. Additionally, the lack of state funding that is evident makes it difficult to ensure the timely repair of cleft palate (Du Plessis, 2006).

Further challenges experienced by teams in South Africa, include the HIV/AIDS pandemic and the prioritization thereof in the South African Health Care budget which limits funding of other services such as cleft palate repairs. Many South Africans consult traditional healers regarding their children born with cleft palate and do not seek timely medical treatment (Louw, Shibambu & Roemer, 2006:51). This leads to long waiting lists, interferes with the time schedules of treatment protocols and impacts negatively on the outcomes and quality of cleft care in South Africa.

Another aspect that impacts negatively on outcomes after treatment is the dearth of culturally and linguistically appropriate assessment materials that is evident in the South African context.

1.1.4 The dearth of culturally and linguistically appropriate assessment materials

Currently, a need exists for test materials in African languages (Pakendorf, 1998:2) and for normative data in the different indigenous languages. Few locally developed speech and language assessment instruments exist, and a limited number of these can be used for the assessment of children with cleft palate. Speech-language therapists have relied on translated and adapted materials for the multilingual and multicultural population. The South African Speech-Language-Hearing Association (SASLHA) developed a set of guidelines for assessment and intervention in respect of multilingual speakers in an attempt to limit bias during service delivery (SASLHA, 2003). These guidelines need to be adhered to in order to provide culturally competent professional services in the client's native language (Pakendorf, 1998:2; SASLHA, 2003).

In an attempt to address the local need and to comply with international guidelines for the perceptual assessment of cleft palate, a preliminary perceptual speech assessment protocol for Sepedi- speaking pre-school children with cleft palate was designed (Streicher, 2005). It was received favourably by clinicians requested to evaluate it as part of determining its clinical applicability. This preliminary perceptual speech assessment protocol was designed to provide detailed information regarding the patient's speech characteristics and individual's speech errors to be used in treatment. This was the first assessment protocol for children with cleft palate following the Eurocran guidelines (www.eurocran.org) in a South African language. The speech-language therapist participants in the study indicated a need for the translation thereof into other African languages (Streicher, 2005:46).

1.1.5. The need for a Zulu assessment tool for cleft palate children in South Africa

The attempt to improve quality of cleft care in South Africa emphasized a need for culturally and linguistically appropriate materials in Zulu, one of the frequently spoken languages in South Africa (Streicher, 2005:46). Zulu is one of the 11 official languages of South Africa. Of the 47 million inhabitants of South Africa, 10,667,305 are first language Zulu speakers (23,82% of the South African population), making it the language in South Africa with the most first language speakers (www.cia.gov). All nine provinces in South Africa have Zulu-speaking inhabitants with the majority residing in Kwa-Zulu Natal and secondly in Gauteng. South Africa's largest province is Kwa-Zulu Natal (9,4 million people) followed by Gauteng (8,8 million people). The population comprise of a mixture of races, namely Black African, White, Indian or Asian and Coloured (Swanepoel, 2004:12). The "rainbow nation" of South Africa has eleven official languages of which Zulu is spoken the most frequently (24%), with Afrikaans third (13%) and English fifth (8%). The majority of speech-language therapists in South Africa are Afrikaans and English first language speakers (SASLHA, 2003:1).

Cleft care in South Africa is provided to children from diverse language backgrounds (Louw *et al*. 2006:48). Zulu was identified as one of the languages most frequently used. Currently there are a limited number of Zulu tests available for the speech assessment of Zulu-speaking children (Mphalhele, 2006:22). These tests provide data on the speech sound development of Zulu, and some of these tests are adapted materials from English tests, namely the *Peabody Picture Vocabulary Test* for the Zulu vocabulary and the translated *Performance of Zulu-speaking children on a literal translation of the RDLS* (Masiloane,1983) for Zulu children with language learning disorders (Mphahlele, 2006:22).

The dearth of available norms for Zulu-speaking children in South Africa is also challenged by the distribution of the South African population. Half of the South African population lives in rural areas, with the distribution of urban to non-urban

according to race (Swanepoel, 2004:12). This emphasizes that children with special needs such as cleft lip and palate are not receiving adequate treatment in South Africa as services are often not easily accessible and readily available (Fair & Louw, 1999:14).

Speech-language therapists have been very resourceful in adapting and translating assessment materials for use on Zulu children in clinical practice, but many of these tests have not been formally researched (Naudé, 2005:3), leading to poor validity and reliability of these tests. Apart from the Zulu Expressive and Receptive Language Assessment (Bortz, 1995) there are currently only informal methods to assess speech and language abilities of Zulu-speaking pre-school children as far known, providing limited information on the communication abilities of these children. This led to inaccurate data obtained from these tests as normative information were lacking. This questions the validity of such data.

1.2 Statement of problem and rationale for the study

Based on the preceding argument, the statement of the problem, research question and rationale for this study is formulated as follows.

The importance of culturally and linguistic appropriate assessment materials for Zulu-speaking pre-school children with cleft palate has been the recurrent theme in this chapter (Hutters & Henningsson, 2005:545; Kuehn & Henne, 2003:13). The recent emphasis on evidence-based practice has also highlighted the need for culturally and linguistically appropriate assessment materials (Pakendorf, 1998:2).

Valuable international research exists regarding the perceptual assessment of children with cleft palate (Hutters & Henningsson, 2005, Kuehn & Henne, 2003, Lohmander & Olsson, 2004). Limited research has however been conducted in South Africa regarding the perceptual assessment of children with cleft palate in the African languages (Streicher, 2005:5). The current situation in South Africa

regarding service delivery to Zulu-speaking pre-school children with cleft palate intensifies and can be summarized as follows:

- A lack of research into the assessment of children with cleft palate in the African languages exists;
- The importance of culturally and linguistically appropriate services to children with cleft palate is emphasized as these children have been under-served in the past;
- The shortcoming regarding appropriate assessment tools for children with cleft palate needs to be rectified since this is a vulnerable population;
- Speech-language therapists strive towards evidence-based care (Johnson, 2006:21) and best practice for children with cleft palate, and with the limited resources currently available to serve this population, best practice cannot be achieved.

Based on these challenges, a thorough investigation into the characteristics of the Zulu language, cleft palate speech characteristics and perceptual speech assessment procedures in South Africa is necessary. To obtain an in-depth understanding of the Zulu-speaking pre-school children with cleft palate in South Africa, their speech characteristics must be determined.

Against this background, the following research question was formulated: Can a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate be developed for the reliable assessment of these children?

The current study will address a clinical need expressed by local practitioners (Streicher, 2005:46) by developing an assessment tool in accordance with the universal guidelines, which will enable speech-language therapists to conduct appropriate and accurate perceptual evaluations of Zulu-speaking pre-schoolers with cleft palate. This may lead to more accurate referrals and intervention which may improve cleft palate speech outcomes and allow quality cleft care for all.

The aim of the study is therefore to develop and test the clinical applicability of a perceptual speech assessment protocol for Zulu-speaking pre-schoolers with cleft palate in Provincial Hospitals and at the FCDC in the Gauteng region.

1.3 Outline of chapters

Table 1.1 serves as an outline for each chapter in the dissertation.

Table 1.1 Outline of Chapters

Chapter	Content
1. Introduction to children with cleft palate in South Africa	This chapter introduces the topic and describes the statement of the problem, the rationale of the study and the research question to be answered, as well as an overview of the chapters included in the dissertation.
2. The speech assessment of children with cleft palate	The chapter comprises of the theoretical underpinning of the research as it integrates relevant available literature findings in the field of cleft palate assessment, internationally and within the South African context. The speech and language development of children with cleft palate, both pre- and post-linguistically, the speech assessment of children with cleft palate, including an in-depth emphasis on instrumental and perceptual speech assessment of children with cleft palate are critically reviewed. It further concentrates on evidence-based practice in assessing children with cleft palate, international guidelines for the assessment of these children and the contextual approach to the assessment of

	Zulu-speaking children with cleft palate.
3. Multilingual and multicultural service delivery to children with cleft palate in South Africa	This chapter provides an introduction to cultural and linguistic diversity in South Africa. Cross-cultural speech and language service delivery is explained with the statement of problem, possible cultural mismatch between the patient and speech-language therapists and a focus on cultural competence as part of the cultural service delivery. The South African context and the limited resources within this context are described. The current service delivery approaches to children with cleft palate are discussed, highlighting speech-language services, assessment procedures and assessment instruments. The need for assessment instruments in Zulu and the Zulu language characteristics are described.
4. Methodology	The research method is discussed in terms of the aims of the study, research design, ethical implications, population, sampling, material and apparatus used during the research project, including the data recording, data analysis and data processing procedures.
5. Results and discussion	The developed, collected and statistically processed data are presented in this chapter. The results obtained from the different phases of the study are discussed according to the aims and sub-aims of the study.
6. Conclusion and recommendations	The results obtained from the four different

	phases in the research design as well as previous research direct several conclusions and implications for future research.
7. References	All-inclusive and thorough lists of all the sources of information referred to in this thesis are presented in this section.
8. Appendixes	All the relevant documents relevant to this study, but not included in the main text, is located in this section.

1.4 Terminology and list of abbreviations

The terminology and abbreviations used in the current dissertation is explained and justified as follows:

1.4.1 Terminology

.1 Cleft lip and palate

Cleft lip and palate is a congenital disorder of structural defects that occur during embryogenesis and early fetogenesis and are present at birth (Peterson-Falzone *et al*. 2001:1). Cleft lip and palate can occur as a syndromic cleft lip and palate, non-syndromic cleft lip and palate or a sequence of anomalies. This includes children born with cleft lip and palate in the rainbow nation of South Africa and those in need of speech-language therapy services.

.2 Craniofacial anomalies

Craniofacial anomalies refer to additional structural anomalies that are present in children with cleft palate (Peterson-Falzone *et al*. 2001:31). Craniofacial anomalies are multi-anomaly disorders involving various types of oro-facial clefts and the most common anomalies associated with cleft palate are van der Woude Syndrome, Pierre Robin Sequence and Stickler Syndrome (Peterson-Falzone *et al*. 2001:31).

.3 Multilingualism

Multilingual refers to a person who demonstrate native-like proficiencies for both speaking and understanding the person's first or home language, a person competent in and exposed to one or more languages (Naudé, 2005:22; Wessels & Van den Berg, 2007:411). The participants of the current study were not necessarily multilingual although they all functioned in a multilingual context with daily contact with more than one language. This term refers to the children in this study being exposed to more than one language and functioning in a multilingual context on a daily basis.

.4 Multicultural

The term multicultural indicates contexts where people are exposed to a number of cultures on a daily basis, reflecting the quality of a society, not of an individual (Wessels & Van den Berg, 2007:411). Multicultural refers to a member of the community interacting with individuals from a different cultural background as their own, with different behaviours, beliefs and values (Klein & Moses, 1999:11). In this study the term is often used to describe the rainbow nation of South Africa where numerous cultures are represented by a group of people.

.5 Evidence-based practice

Evidence-based practice refers to an approach in which current, high-quality research evidence is integrated with practitioner expertise and client preferences and values into the process of making clinical decisions (ASHA, 2005:1). Evidence-based practice occurs on four levels of quality and credibility in treatment efficacy. The highest quality of evidence comes from a well-designed meta-analysis in a controlled trial, leading to a controlled study without randomization or a quasi-experimental study and a correlational study. The lowest quality of evidence involves expert opinions and consensus conferences from respected authorities (Johnson, 2006:21). This definition suggests that cleft lip and palate practice guidelines are on the level of expert opinions of evidence-

based practice and needs to be supported by a well-designed study to become more credible.

1.4.2 List of abbreviations

Table 1.2 provides an overview of the abbreviations used in this study.

Table 1.2 List of abbreviations

Abbreviation	Description
FCDC	Facial Cleft Deformity Clinic, Department of Maxillo-Facial and Oral Surgery, University of Pretoria
ACPA	American Cleft Palate-Craniofacial Association
ASHA	American Speech-Language-Hearing Association
SASLHA	South African Speech-Language- Hearing Association
ELoLT	English as Language of Learning and Teaching

1.5 Conclusion

In the past political dispensation children with cleft palate in South Africa mainly received speech-language therapy services in Afrikaans or English (Pakendorf, 1998:2), which placed African language speaking children with cleft palate at a disadvantage during assessment as they did not receive services in their first language. This led to inaccurate assessment results, which did not provide adequate information on the child's speech characteristics, resulting in inadequate intervention planning and therapy. The dearth of assessment materials for the Zulu-speaking pre-school population together with the need for improved service delivery to children with cleft palate provided the justification for the planned research.

1.6 Summary

In this chapter the need for a culturally appropriate perceptual speech assessment protocol for Zulu speaking children with cleft palate was identified and described. The dearth in assessment materials in South Africa led to the formulation of a statement of problem and rationale for the current study. The challenges of the South African context emphasize the need for a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate to assist speech-language therapists in making accurate assessments and for providing optimal services to these children. This will allow the speech-language therapists working with the cleft palate population to improve their service delivery.

CHAPTER TWO
THE SPEECH ASSESSMENT OF CHILDREN WITH CLEFT PALATE

The aim of this chapter is to present the theoretical underpinnings for the speech assessment of Zulu-speaking pre-school children with cleft palate in South Africa.

2.1 Introduction

Speech is considered to be one of the primary outcomes measures of cleft lip and palate management, but its measurement remains elusive and challenging (Sell, 2005:103). In order to overcome these challenges, speech-language therapists are increasingly making use of psycholinguistic models such as the different levels of speech processing involved in the discrimination and production of speech to investigate the nature of a child's speech and language disorders (Vance, Stackhouse & Wells, 2005:29-30). Such models hypothesize that there are different levels of speech processing, namely auditory speech input, storage of information and speech output processing involved in the discrimination and production of speech. In the case of developmental speech disorders, it is suggested that the analysis of a child's performance on assessment tasks provides insight into underlying deficits that may be causing the speech difficulty (Vance *et al*. 2005:30).

These psycholinguistic models of speech processing proposed by Vance *et al*. (2005) enable speech-language therapists to analyse the child's performance on a range of assessment tasks and to compare children's' productions with accepted adult realizations of the same words (Owens, 2005:92; Vance *et al*. 2005:30). Such an analysis provides insight into the descriptions of the child's phonological system and is used to identify the number of errors within the child's speech. It also provides information on the reasons why children make such errors in their speech and allows for the use of this information as a basis for planning intervention (Klein & Moses, 1999:46; Vance *et al*. 2005:29). This may

contribute to improved service delivery, as the analysis of the child's speech is used to lead the intervention process.

Children with cleft palate usually perform poorer on speech assessment tasks than their non-cleft peers due to their obligatory and developmental misarticulations and velopharyngeal incompetence. An in-depth assessment is therefore needed to guide the best possible speech outcome for these children (Hutters & Henningsson, 2004:545).

Speech production is one of the primary targets in the current treatment of children with cleft palate as these children are often more likely to demonstrate normal speech productions in comparison with children managed in past generations (Hardin-Jones & Jones, 2005:8). This is attributed to speech-language therapists intervening at earlier ages and improved surgical techniques, as research has proven that early palatal surgery followed by speech therapy is associated with better speech results (Hardin-Jones & Jones, 2005:8). However, in the treatment of children with cleft palate it became evident that the different protocols and methods used to assess these children and pose several challenges to researchers, leading to difficulties in comparing speech production outcomes (Lohmander & Olsson, 2003:64).

The speech of children with cleft palate is characterised by several developmental and cleft related errors, which need to be addressed in treatment. In order to ensure effective treatment and good speech outcomes for these children, standardised and universally applicable speech assessment methods are needed to accommodate the specific cleft palate speech characteristics (Henningsson *et al*. 2007:3).

In ensuring effective treatment of all children with cleft palate and attaining optimal outcomes, speech-language therapists also need to meet the challenges posed by the assessment and treatment of multicultural and multilingual

populations. In South Africa speech-language therapists are faced with treating children and their families who may use one or more of the 11 official languages and their various dialects. In order to overcome language and cultural barriers speech-language therapists need to provide services that are family focused and culturally sensitive (Louw *et al.* 2006:48; Pakendorf, 1998:1). Therefore, an increasing need exists for assessment and treatment materials that are culturally and linguistically appropriate and applicable to the nature of the population in South Africa (Louw *et al*. 2006:48; Pakendorf, 1998:2). Currently, however, there is a lack of culturally and linguistically appropriate materials in South Africa, as the majority of assessment materials are only available in English and Afrikaans (Naudé, 2005:9; Pakendorf, 1998:2), emphasising that accurate assessment and effective treatment of children with cleft palate in South Africa is a daunting task. The available assessment and treatment materials are often translated, but these versions of tests do not always take into account important information regarding the culture, language, vocabulary and communication behaviour of the specific cultural group. Such materials do not comply with best practice as the assessment materials may not be designed according to the guidelines suggested in the literature (www.pansalb.org). Children are at a disadvantage when they are assessed in a language that they are not competent in or when inadequate assessment materials are used, leading to unreliable and invalid assessment results and inaccurate representations of each child's speech and language abilities.

The need for cultural and linguistically appropriate assessment materials to elicit the speech characteristics and speech behaviours related to cleft palate has been recognized internationally (Henningsson *et al*. 2007:2). In order to ensure accurate assessment and optimal treatment, assessment materials should be compiled in such a manner that they include the phonetic characteristics of the specific language that may be influenced by the cleft palate (Hutters & Henningsson, 2003:545).

To enable speech-language therapists in South Africa to assess multilingual and multicultural children with cleft palate in an accountable manner, assessment materials need to be developed. The aim of this chapter is to provide a critical review of the speech assessment of children with cleft palate and the importance of language specific information as underpinnings for the proposed development of an assessment instrument. The organisation of the chapter content is summarised in Figure 2.1.

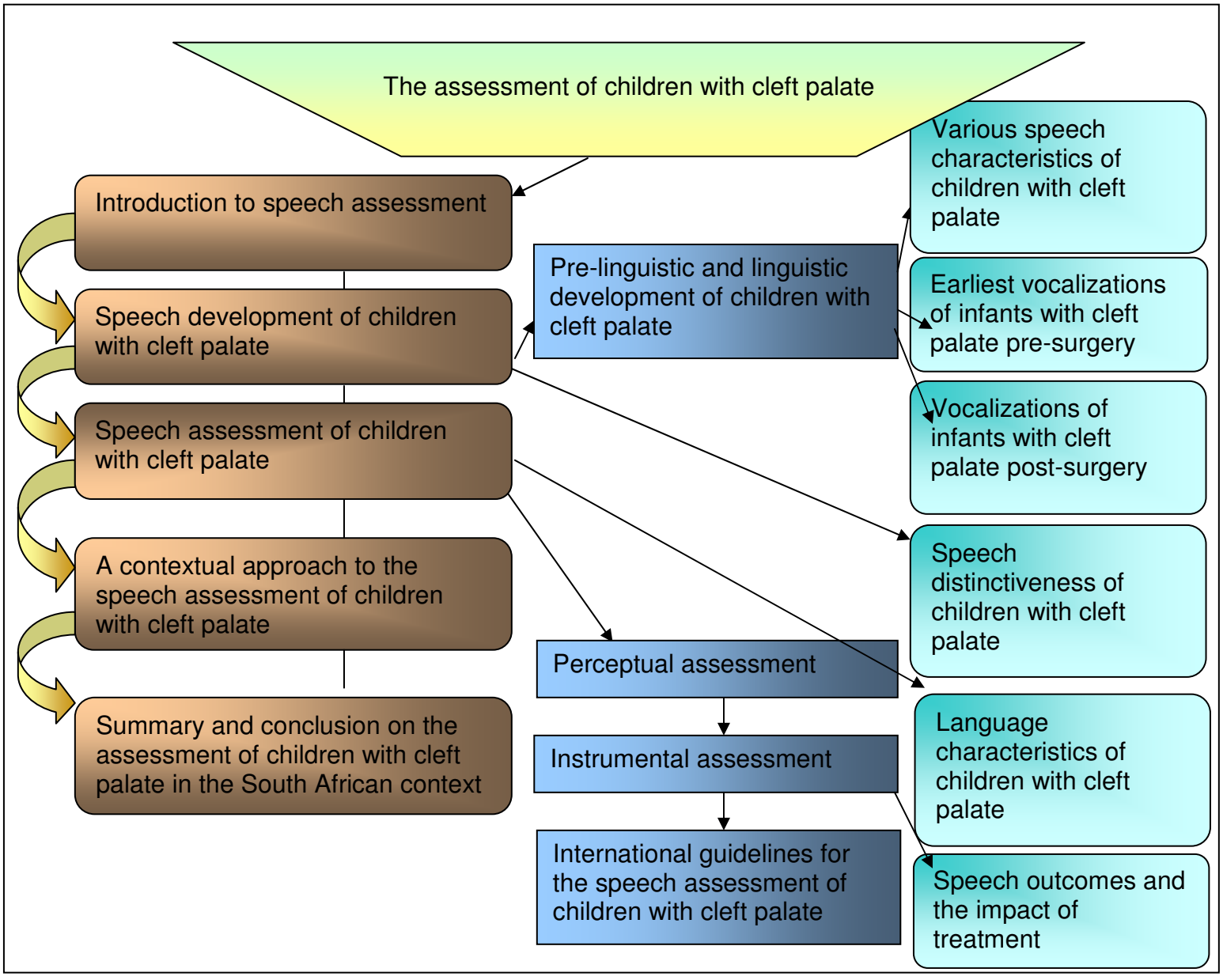


Figure 2.1 Overview of the assessment of children with cleft palate

2.2 Speech development of children with cleft palate

2.2.1 Introduction

Children born with cleft lip and palate are at risk to develop resonance, articulation and expressive language problems that may impair their communication for many years. The impact of a palatal cleft may be evident during early vocalizations of infants before surgery and may persist after surgical repair (Peterson-Falzone *et al*. 2001:162). In order for speech-language therapists to optimally assess the communication problems associated with cleft palate, they need to recognize the speech and language disorders that are evident in this population (Flinn *et al*. 2005:254). When considering the speech and language disorders manifested by children with cleft palate, it is important to focus on the vocalizations of these children, their language characteristics and the speech characteristics associated with cleft palate.

2.2.2 Pre-linguistic and linguistic development of children with cleft palate

The typical speech characteristics associated with cleft palate and the vocalizations of children with cleft palate pre- and post surgery will be addressed in the following section.

.1 Various speech characteristics of children with cleft palate

Traditional research investigated the speech of children with cleft palate and focused on the number and type of misarticulations with little emphasis on the developmental patterns of speech acquisition (Blakeley & Brockman, 1995:25). This usually reflected the norms as upper age limits rather than the average performance of the child, leading to the available data being poorly represented for the lower age limits with little emphasis on the development of cleft palate speech characteristics, as the psycholinguistic models of speech production recommended that each task during the speech assessment should be analyzed independently (Blakeley & Brockman, 1995:26; Vance *et al*. 2005:30).

The speech characteristics of children with cleft palate are already evident from the early years of their lives. Children with a cleft lip or palate are at a distinct disadvantage during early vocal development. According to the plastic surgery approach, a cleft lip is usually repaired for most children by the age of 3 months (Peterson-Falzone *et al.* 2006:5), but the palatal repair is only conducted by the middle of the child's first or second year. According to the Cleft Palate Protocol of the Facial Cleft Deformity Clinic (FCDC), University of Pretoria, following the maxillo-facial approach, the cleft lip is repaired by age 7 months with the soft palate being repaired between the ages of 4 to 6 months (Bütow, 1995:3). This timing is important as infants start to babble and play with sounds from this age onwards and the maxillo-facial approach to the timing of surgery aims to facilitate vocalization control and word productions (Bütow, 1995:53).

Differences in early vocal development can be identified in infants with unrepaired cleft palate as early as 6 months of age. Recent research has indicated that infants with cleft palate vocalize less and produce fewer total consonants and fewer multi-syllabic productions than non-cleft infants (Peterson-Falzone *et al*. 2006:5; Scherer & Kaiser, 2007:357). Compared to their non-cleft peers, infants with clefts are delayed in the onset of babbling and tend to avoid the production of alveolar and palatal consonants.

Their early consonant inventory is typically comprised of consonants that do not require high intra-oral air pressure, including nasals, glides and glottals. Palatal and alveolar consonants are mostly not produced until the cleft is repaired; and some infants avoid palatal sounds (Lohmander-Agerskov *et al.* 1994:27; Peterson-Falzone *et al*. 2006:6) These early speech sounds deficits often persist through 30 to 36 months of age, 2 years after treatment of the palate (Scherer & Kaiser, 2007:357). These children are therefore at risk for language learning disorders. Recent research has indicated that even nonsyndromic children with cleft palate are more likely to develop learning and scholastic achievement problems than non-cleft peers (Peterson-Falzone *et al*. 2006:15). Children with

cleft palate demonstrate several typical speech characteristics and speech production errors associated with the cleft palate, which need to be considered as these error patterns may occur during the early vocalization development period.

.2 Earliest vocalizations of infants with cleft palate pre-surgery

Vocalizations are produced in the pharynx and glottis by most normal developing infants. By 6 months of age, normal developing infants shift the site of articulation due to their anatomical differences in comparison with the adult anatomy. Infants with unrepaired cleft palate may start producing more anterior labial and alveolar consonants before palatal closure (Peterson-Falzone *et al*. 2006:5). Infants with cleft lip and palate may struggle with making the alveolar shift for labial and alveolar consonants as a result of insufficient velopharyngeal closure during rapid movements for running speech. Speech-language therapists need to assess each infant's ability to produce these sounds in order to determine the degree and severity of the impairment, as speech production ability is also dependent on the surgery.

Many infants with cleft lip and palate also struggle with the normal elevation of the velum and inward movement of lateral pharyngeal walls to close off the nasal cavity, resulting in insufficient velopharyngeal closure (Peterson-Falzone *et al*. 2006:2). This closure forces air through the oral cavity and is required for blowing and production of consonants produced with high intraoral pressure namely fricatives, stops and affricates (Peterson-Falzone *et al*. 2006:2). These infants then typically demonstrate hypernasality and audible nasal air flow during production of pressure consonants, fricatives and affricates (Kummer, 2001:157; McWilliams, Morris & Shelton, 1990:245).

Infants, with a cleft lip and palate, just like their non-cleft peers, engage in vocal practice throughout the pre-linguistic period, without the normal division between the oral and nasal cavities, in the absence of normal articulatory contacts in the

anterior portions of the hard palate. This may increase the risk for the child developing error patterns as they grow older which may lead to poor speech intelligibility (Peterson-Falzone *et al*. 2006:5).

The anatomical constraints due to a cleft lip and palate have the potential to influence the infant's vocalizations in several ways, including the avoidance of contact with the hard palate and production of sounds that do not require linguapalatal contacts for example producing the bilabial /m/ frequently. Furthermore, distorted nasalized productions may occur and inhibit the learning of oral airflow, leading to infants avoiding the production of early stop consonants e.g. /b/ and /d/ (Peterson-Falzone *et al.* 2006:5).

Some infants also exhibit the emergence of compensatory articulation patterns (Scherer & Kaiser, 2007:357). Compensatory articulation patterns occur when the place of articulation is shifted toward the back of the vocal tract to compensate for poor palatal function. These sounds namely /p, b, t, d, k, g/ and fricatives e.g. /f, v, th/ are substituted for sounds made by stopping the air stream in the mouth, namely stop consonants or for sounds that constrict the air stream (Scherer & Kaiser, 2007:357). Compensatory errors may lead to infants being difficult to understand at a later age and it gives their speech a distinctive atypical quality that may persist throughout childhood (Hardin-Jones & Jones, 2005:9).

The persistence of articulation errors and compensatory articulation patterns throughout infancy and into childhood necessitates early speech-language therapy. Accurate early assessment and monitoring of the child's vocalizations may guide early intervention to prevent certain patterns becoming habitual productions, which may be difficult to unlearn and affect speech intelligibility.

.3 Vocalizations of infants with cleft palate post surgery

The lack of diversity in consonant production of infants with cleft palate during the babbling stage and the speech production errors that may continue after surgery

and into adolescence is a concern. This is because these errors place the infant at a disadvantage for early word learning and normal speech development (Hardin-Jones & Jones, 2005:9) and may slow down the rate at which the child acquires an expressive vocabulary. It may also influence the manner in which the child learns first words. Recent clinical studies on early vocal development of children with cleft palate also indicated that, even after surgery has been conducted; infants with cleft palate favour certain consonants during early word acquisition, namely those starting with nasals and glides (Chapman *et al*. 2001, in Peterson-Falzone *et al*. 2006:6). These atypical patterns of articulation are frequently produced and may lead to learned sensorimotor patterns. These patterns can be carried into the first words and become routinely substituted for other consonants in the developing sound system (Peterson-Falzone *et al*. 2006:6), leading to learned errors in the child's speech.

Some infants with repaired cleft palate exhibit compensatory articulation errors and it is estimated that 77% of children with compensatory articulation errors still require speech therapy in their pre-school years and onwards (Hardin-Jones & Jones, 2005:9). Despite recent advances in management protocols, the speech production abilities of the majority of children with repaired cleft palate remain impaired throughout their pre-school and school years (Hardin-Jones & Jones, 2005:8). These speech impairments necessitate continuous speech-language therapy to ensure improvements in the speech quality of each child (Blakeley & Brockman, 1995:32).

Infants with cleft palate therefore need to be frequently monitored to eliminate the possibility of speech production errors in their pre-school years and to improve the quality of their later speech outcomes.

2.2.3 Speech distinctiveness of children with cleft palate

Children with cleft palate exhibit unique physical challenges to the acquisition of spoken language (Hodge & Gotzke, 2007:163). It is impossible to estimate the

incidence of deviant speech in the total cleft lip and palate population. In most instances speech data are reported by surgeons to evaluate their operative procedures. On average, 40% to 60% of children with cleft palate achieve normal speech following primary surgical repair while 30% to 40% exhibit normal speech after secondary management (Blakeley & Brockman, 1995:26; Scherer & Kaiser, 2007:357).

As mentioned previously, successful management and the prevention of communicative disorders encountered in this population are possible due to advances in treatment methods. However, according to Bzoch (2004:20) several authors have concluded that the achievement of normal speech for all will be limited by some environmental factors namely poor language stimulation and ineffective early intervention programs. The questionable validity of research results makes it impossible to estimate the severity of problems that are still evident in the speech of individual's with cleft palate post surgery (Blakeley & Brockman, 1995:26; Scherer & Kaiser, 2007:358). Irrespective of the timing and type of surgery, a number of factors may affect the speech production of these individuals, including the type and severity of the cleft palate, velopharyngeal incompetence, residual fistulae, hearing impairment and dental abnormalities (Hodge & Gotzke, 2007:163). Therefore, the speech outcomes of individuals with cleft palate are a result of complex interactions of a variety of factors which differ from individual to individual. McWilliams *et al.* (1990:234) indicated that articulation errors, hyper- and hyponasal resonance and nasal emission are considered to have the greatest effect on the speech intelligibility of these individuals (Peterson-Falzone *et al*. 2006:18-19).

A study conducted by Hardin-Jones and Jones (2005:9) indicated that children with cleft palate between 2 years 10 months and 5 years 6 months demonstrated significant speech production problems during their pre-school years, even after palatal repair. From the 212 preschoolers studied, 37% exhibited significant hypernasality or had received speech-language therapy for velopharyngeal

incompetence. Although few children may demonstrate the severity of problems seen in the past, the majority still continue to exhibit speech problems that require direct intervention (Hardin-Jones & Jones, 2005:12).

According to Scherer and Kaiser (2007:358) 33% to 75% of young children with repaired cleft palate receive speech-language therapy. Of this population, at least 20% to 25% receive speech-language therapy for compensatory articulation errors that usually starts at 3 years of age. These children often receive several years of intervention to eliminate the problem. It is important to consider the difficulties encountered in managing compensatory articulation during early intervention to prevent the development and maintaining thereof (Scherer & Kaiser, 2007:358).

Rapid motor speech co-articulation is learned and habitually formed during the second and third years of life and beyond. Developmental phonological skills in expressive oral language are genetically programmed to emerge during the first 2 to 3 years of life and these skills are often seriously affected in children with cleft palate. Children with cleft lip and palate often substitute consonant-like sound elements produced below the level of the velopharyngeal mechanism where air-pressure and airflow are sufficient to approximate pressure consonants (Bzoch, 2004:28). These substitutions in speech production may persist if reinforced over time, even after correction of the underlying problem of velopharyngeal insufficiency. This confirms the predisposition that children with cleft palate exhibit for the development of compensatory articulation errors which tend to remain in their phonetic repertoire, even after surgical repair of the cleft palate (Bzoch, 2004:29).

These errors become integrated in the child's lexicon and influence the sounds that the child produces, leading to impaired phonological and expressive oral language development (Peterson-Falzone *et al*. 2006:5). Several of these

compensatory articulation errors persist into childhood, leading to poor speech intelligibility.

The speech characteristics of children with cleft palate need to guide the assessment and intervention to ensure best practice in the treatment of these children (Hutters & Henningsson, 2003:545). In order to provide appropriate assessment and intervention for children with cleft palate, an in-depth discussion of the speech development of these children is necessitated, as this is the starting point for therapy. This will allow speech-language therapists to distinguish between typical and a-typical behaviour. In order to distinguish between these behaviours, it is significant to observe the speech characteristics that children with cleft palate may exhibit.

.1 Speech error patterns in children with cleft palate

The speech characteristic error patterns of children with cleft palate are part of the continuum of factors that may have a persistent effect on the speech development of each individual. Children with cleft palate are prone to demonstrate several speech errors due to the cleft palate as well as normal speech developmental errors. These errors include resonance-, obligatory articulation-, compensatory articulation- and developmental speech errors (Kummer, 2008:161). It is important to independently analyze each of these errors, as the impact of each factor may affect the speech outcomes of each child.

Resonance errors include hypernasality, hyponasality, mixed nasality and cul de sac nasality (McWilliams *et al.* 1990:234). It is important for speech-language therapists to assess resonance errors in children with cleft palate, as it is imperative to address them in treatment. Speech-language therapists are required to develop good auditory skills to identify and recognize these resonance errors, as it influences the speech of individuals who already experience difficulties due to atypical language-specific speech productions

(Hutters & Henningsson, 2003:544; Kummer, 2008:161). The identification of resonance errors are therefore an important part of the assessment protocol, as these errors may affect the voice quality, vowel- and consonant production of individuals in different ways, ultimately affecting the speech quality of each child.

Children with cleft palate frequently exhibit obligatory articulation errors namely audible or inaudible nasal air emissions, where sufficient velopharyngeal closure are not reached and air escape through the nostrils (Peterson-Falzone *et al*. 2001:164). Weak pressure consonants are produced as a result of these air pressure deviations that reduce or eliminate the plosive quality of the consonants produced as well as the weak oral ability of nasal consonant substitutions for oral stops, namely the nasal replacement of the /p, b, t, d, k, g/ sounds (Peterson-Falzone *et al*. 2006:26). These production errors may lead to learned articulation errors that exist throughout the child's life.

Children with cleft palate may also demonstrate obligatory articulation errors as a result of dental abnormalities (Kummer, 2001:221). Dental deviations are deviations in specific teeth, referring to deviations in the position or alignment of specific teeth or the absence of one or more teeth (Peterson-Falzone *et al*. 2006:35). Due to these obligatory articulation errors, interference with the normal bilabial and labiodental articulations are experienced (Peterson-Falzone *et al*. 2006:35). These affect the speech productions of children with cleft palate, as dental deviations have a pervasive effect on the place and manner of sounds that are produced. Children with obligatory articulation speech errors are sometimes unintelligible due to these articulation errors that co-exist with the cleft palate speech characteristics.

Some differences in articulation development may only be identified later in the child's life, namely compensatory articulation errors and fewer vocalizations and delayed vocabulary development (Peterson-Falzone *et al*. 2006:5, Scherer & Kaiser, 2007:357). Compensatory misarticulations are evident as learned

articulatory deviations and result in an error in place of articulation where one consonant is substituted for another. Compensatory articulation errors have the greatest impact on speech intelligibility and acceptability and include glottal stops, pharyngeal stops, pharyngeal fricatives, pharyngeal affricates, nasal fricatives and mid-dorsum palatal stops (Peterson-Falzone *et al*. 2006:27).

Velopharyngeal insufficiency is considered to be the major cause of non-target realization of pressure consonants since their production requires intra-oral pressure, and children with repaired cleft palate are not able to obtain adequate intra-oral pressure (Hutters & Henningsson, 2003:547). They therefore often have more difficulty in producing pressure consonants than other classes of consonants (Peterson Falzone *et al*. 2001:181). Results of studies on closed set tasks of phonetic elements conducted by Whitehill and Chau (2004:344) described the most frequent errors involved in the speech of 15 speakers with cleft palate between ages 5 to 44 years. These errors were found to be place of articulation errors for stops and nasals; and manner of articulation errors for stop versus fricatives and stops versus affricates (Hodge & Gotzke, 2007:164). This is important as these misarticulations may persist after palatal repair and speech-language intervention is required to improve the place and manner of articulation errors to prevent them from becoming habitual.

Children with cleft palate are not only susceptible to errors associated with cleft palate, but also to the same developmental speech sound errors that are observed in their non-cleft peers and not related to the cleft palate. These include errors in the place and manner of production as well as errors of voicing. Developmental errors include persistent phonological processes of fronting, cluster reduction, stopping and gliding of liquids (Henningsson *et al*. 2007:12). Speech-language therapists need to distinguish between developmental, obligatory and compensatory errors as the treatment strategies for each differ due to the nature and onset of these errors.

In attempting to provide accountable and effective intervention for children with cleft palate, the language characteristics of these children need to be taken into account as well, as these characteristics may have a negative influence on the speech development of children with cleft palate.

2.2.4 Language characteristics of children with cleft palate

Language development is the most important indicator for later speech production, literacy development, socialization and scholastic achievement (Peterson-Falzone *et al*. 2006:15; Priester & Goorhuis-Brouwer, 2008:802). In comparison to the speech development of children with cleft palate, limited attention has however been paid to the language development of these children (Peterson-Falzone *et al*. 2001:189). Children with cleft palate may exhibit a variety of linguistic deficits, particularly during the pre-school years (Bzoch, 2004:380; Peterson-Falzone *et al*. 2001:190). They may also exhibit shorter utterances and a reduction in the complexity and variety of words used, placing them at a disadvantage and indicating a deficit in language form (Peterson-Falzone *et al*. 2001:190). Some children with cleft palate also master conversational skills at a slower pace than their non-cleft peers, but they usually overcome these by the age of 4 years (Peterson-Falzone *et al*. 2001:191). Research has also indicated that children with cleft palate maintain a higher grammatical error rate at all age levels, despite intervention efforts to improve these skills (Bzoch, 2004:402). All of these linguistic deficits may continue to persist through the child's life, highlighting the risk for possible language learning delays and emphasizes the need for continued speech-language assessment and intervention.

Children with cleft palate often exhibit specific language and learning disabilities, affecting their academic achievement. These learning disabilities may also affect their interaction with peers and teachers in the classroom (Peterson-Falzone *et al*. 2001:342). This may be due to these children experiencing a low self-concept and verbal deficiencies in the classroom, resulting in serious academic failure.

The risks for learning problems in children with cleft palate also identified a pre-disposition for experiencing problems with phonological awareness tasks, as these tasks are based on phonemic awareness skills. This may lead to possible problems in reading and writing skills, as phonological awareness is the basis for the development of reading and writing (Priester & Goorhuis-Brouwer, 2008:802; Roth & Worthington, 2001:130)

Children with cleft palate may therefore demonstrate significant problems in the acquisition of spoken language and may present with specific cleft palate speech characteristics or error patterns due to the cleft palate. In addition they may experience problems with normal linguistic development, negatively influencing their literacy development and scholastic achievement. In order to obtain accurate information on the specific cleft palate speech characteristics of children with cleft palate, it is important to conduct comprehensive speech assessments to identify these errors and the severity thereof.

2.3 Speech assessment of children with cleft palate

2.3.1 Introduction

The ACPA developed a set of guidelines to promote best practice for children with cleft palate (ACPA, 2007:4). The ACPA parameters for speech-language pathology services state that speech-language evaluations with appropriate documentation should be conducted for each child at least twice during the first two years of life and at least annually until the age of six years. The first assessment should be conducted before or by the age of 6 months (ACPA, 2007:4). Speech evaluations should always include perceptual assessments of articulation, resonance and voice. Instrumental assessment of velopharyngeal function is required for all patients with resonance disorders and audible nasal air emissions, or both (ACPA, 2007:4). Perceptual assessments should always be conducted as the starting point of all speech assessments as there is no better instrument to assess speech than the human ear (Peterson-Falzone *et al*. 2006:69). These guidelines are recommended for use by speech-language

therapists to provide accurate diagnosis of and treatment to children with cleft palate. However, not all speech-language therapists make use of these guidelines, due to unfamiliarity with the basic information affecting the speech management of children with cleft palate as well as a lack of education and clinical experience in working with children with cleft palate (Pannbacker, 2004:196).

2.3.2 Perceptual assessment

Perceptual identification of speech production errors is the cornerstone for all speech assessment and diagnosis (Peterson-Falzone *et al*. 2006:69). The goal of perceptual assessment is to make a speech diagnosis based on the impact of any velopharygeal function problems and oral structural deviations on resonance and articulation, which influence speech intelligibility and acceptability (Henningsson *et al*. 2007:12). Perceptual speech assessment is central to the evaluation of speech outcomes associated with cleft palate and velopharyngeal dysfunction. The complexity of this process is often underestimated (Sell, 2005:103) due to the need for more standardized descriptions of speech parameters, methods and procedures used that provided reliable, detailed and repeatable information on the speech of an individual. Such information could be obtained from reliable listener judgments (Kuehn & Moller, 2000:355).

Perceptual speech assessment is the standard against which instrumental measures are validated (Sell, 2005:104). Kuehn and Moller (2000:388) concluded that no instrumental technique can replace the use of perceptual judgements, partially due to the measurement techniques that need to be practical and appropriate to use with young children (Sell, 2005:104). Perceptual speech assessment techniques are indispensable, but more standardized descriptions of speech parameters, methods and procedures are required for reliability and calculating standardization (Kuehn & Moller, 2000:388).

Perceptual assessment may include the use of low level technology such as audio or video recordings and basic materials, but it requires high level skills of speech-language therapists to analyze and rate the cleft palate speech characteristics. It is recommended that perceptual assessments include speech sampling namely stimulability, rote speech, sentence and syllable repetitions and conversational speech (www.eurocran.org). The data needs to be audio- and video recorded, as such recordings may have greater scientific credibility than live judgements, due to obtaining inter- and intra rater reliability (Henningsson *et al*. 2007:5). Analyzing and rating data according to international guidelines enables speech-language therapists to accurately determine the severity and extent of the speech disorder (Sell, 2005:108; Streicher, 2005:12).

Clinical reality, however, often precludes the accuracy of cleft palate speech assessments. For example few speech-language therapists have in-depth knowledge of the assessment of and intervention with children with cleft palate, as the services for these children are mainly conducted by the expert cleft palate teams in the major centres, leading to limited numbers of children with cleft palate in the less experienced speech-language therapists' case loads (Kuehn & Henne, 2003:103). Inexperienced speech-language therapists may also be unfamiliar with the guidelines proposed for assessment e.g. by the Eurocleft speech group (www.eurocran.org). Individuals at risk for velopharyngeal incompetence may be identified during screening on the basis of perceptual speech symptoms, for example hypernasality or audible nasal emission. This screening needs to be followed up by further diagnostic assessments. However, diagnostic and treatment decisions are often based on screening results only, which increases the risk of poor and inappropriate patient care, impacting negatively on the promotion of best practice for these children (Pannbacker, 2004:197).

According to Lohmander and Olsson (2004:64), a number of studies were conducted over the years by e.g. Dalston *et al*. (1988) and Grunwell and Sell

(2001) to illustrate the value of information gained from the perceptual assessment of children with cleft palate. A critical review of these studies, however, identified several methodological flaws in the perceptual assessment of children with cleft palate. These flaws include lack of information regarding the ages of surgery, use of different professional raters and using different approaches for the assessment of speech outcomes after treatment. Consequently comparisons of data between the different centres cannot be done objectively. It is difficult to formulate guidelines of best assessment practice for the perceptual assessment of children with cleft palate due to the different existing formats for collecting speech samples and analyzing data, the use of different stimuli to elicit responses and different criteria to score responses (Lohmander & Olsson, 2003:65).

Perceptual assessment can be further supported by conducting an oral peripheral examination. An oral peripheral examination aims at the provision of information on anatomical constraints that may influence the speech of the individual. The information derived from such an examination is invaluable to the speech-language therapist to assist with the correlation of the perceptual data and oral peripheral findings. Possible causes for the speech deviations and the best achievable ways to manage these may be identified, enabling the speech-language therapists to provide accurate and effective intervention (Peterson-Falzone *et al*. 2006:76).

During the perceptual speech assessment it is important for clinicians to collect a spontaneous speech sample within a special sampling context, taking the sound inventory of the language and the child's stimulability into account. This will allow for the identification of specific cleft palate error patterns (Peterson-Falzone *et al*. 2006:71) and for planning of effective treatment intended for children with cleft palate. Speech-language therapists have tended to collect their own samples from their clients in the past, but the recent international attempts to standardize

speech assessment materials have emphasized the need for universally acceptable speech assessment materials (Henningsson *et al*. 2007:1).

Speech-language therapists need to be trained to perform assessments of children with cleft palate according to universal assessment procedures to ensure accurate evaluations (Kuehn & Molller, 2000:388). Accurate assessments based on universal procedures would provide information to guide effective intervention and allow for inter-centre comparisons of speech data obtained from children with cleft palate.

Perceptual assessments alone, however, are not sufficient for identifying resonance disorders and nasal air emissions in clients with cleft palate, due to the possible different underlying causes of these symptoms (Peterson-Falzone *et al*. 2006:41). Perceptual assessments need to be followed up by instrumental assessments e.g. videoendoscopy, video fluoroscopy and nasometery (Peterson-Falzone *et al*. 2006:43) to provide accurate information on the speech of children with cleft palate possibly exhibiting velopharyngeal inadequacy, to determine the management required (Peterson-Falzone *et al*. 2006:42).

2.3.3 Instrumental assessment

Instrumental assessments need to be conducted after perceptual measures to confirm the clinical judgments and to specify the exact nature and extent of the causes and contributing factors to the cleft palate speech characteristics (Bzoch, 2004:379). Instrumental assessments are used to document current velopharyngeal closure status and to collect information that may guide physical management and speech therapy decisions (Peterson-Falzone *et al*. 2006:42). Results also indicate changes in the status of the velopharyngeal closure over time, confirm if speech-language therapy is warranted and informs therapy goals (Peterson-Falzone *et al*. 2006:42-43).

Videoendoscopy and video fluoroscopy provide information on the movement of the palate and velum during speech tasks, and nasometery assists the clinician to determine the percentage of acoustic energy being transmitted through the nose and mouth during oral speech production (Peterson-Falzone *et al*. 2006:47; Shprintzen & Bardach, 2005: 222). Instrumental assessment of speech characteristics of individuals with cleft palate also includes fluorographic and endoscopic examinations for determining the function and structure of the speech mechanism (Bzoch, 2004:476). Objective data on the movements in the palate and velum is obtained which provides valuable information for treatment (ACPA, 2007:4; Peterson-Falzone *et al*. 2006:42). Instrumental assessments may identify the need for secondary surgery in conjunction with a period of diagnostic speech-language therapy to correct compensatory misarticulations (Bzoch, 2004:379; Shprintzen & Bardach, 1995:245). Effective management decisions can be made regarding initiating, continuing and terminating therapy based on the results obtained from the instrumental measures.

Instrumental assessment can be done from five years of age and aims to objectively describe the physiology, aerodynamics and acoustics underlying speech production (Peterson-Falzone *et al*. 2006:41). During instrumental assessment the speech status of an individual can be examined by determining if a problem is present and the severity thereof. Furthermore, instrumental assessment determines anatomical structures causing changes in the patient's speech intelligibility and speech quality (Kummer, 2001:226).

The technological development of instrumental instruments has led to increasingly sophisticated instrumentation, placing high knowledge and skills demands on speech-language therapists (Peterson-Falzone *et al*. 2001:243) functioning in teams as they need to be skilled in these assessment techniques to obtain objective and reliable data (Peterson-Falzone *et al*. 2001:243). Familiarity with instruments will ensure that more accurate interpretations of information can be conducted, thus accurately guiding the intervention process.

These procedures require medical expertise, including team work and training in the specific techniques used; and the equipment and visualization procedures are often too expensive to be widely applied (Shprintzen & Bardach, 2005:221). According to Peterson-Falzone *et al*. (2001:219) one of the primary reasons why instrumental assessments are not routinely conducted due to equipment being expensive and technical expertise required to conduct these procedures. These methods are not readily available to teams in South Africa, as speech-language therapists on only three of the seven cleft palate teams reported that they conduct instrumental assessments (Dekker, 2007:36). There is also a lack of funding to encourage the standard use of these procedures in South Africa (Bütow, 1995:53). Furthermore, according to Peterson-Falzone *et al*. (2001:243) no instrument can surpass the trained human ear for assessing velopharyngeal insufficiency and associated speech disorders. Therefore, instrumental assessments need to be carried out in conjunction with perceptual speech measures.

When considering the assessment of children with cleft palate in relation to the intervention planning process, several important aspects regarding speech outcomes after treatment and the impact of treatment should be noted.

2.3.4 Speech outcomes after treatment and the impact of treatment

Speech characteristics are an important measure of outcome after treatment (Hutters & Henningsson, 2003:545). The aim of treatment is to obtain the best outcome for the given condition. When identifying the best outcomes from a surgical, orthodontic or speech-language perspective, comparisons between different treatment procedures are required. The comparisons between the multidisciplinary team data of the individual with cleft palate may also assist in identifying the different outcomes achieved after treatment.

Outcome measures are required for quality improvement of cleft services. As a result various registries of clinical outcomes have emerged e.g. the GOSLON

index for orthodontics to develop an international network for consensus building, planning and protocol development for international studies in cleft palate (Shaw, 2004:240). Speech quality is measured as it provides information regarding intelligibility and acceptability based on speech units having a lexical content (Hutters & Henningsson, 2003:548). However, currently there is a lack of consensus and a standardized protocol for use in determining the speech outcomes of children with cleft palate (Lohmander & Olsson, 2004:64). The outcomes resulting from the use of different assessment and treatment protocols for the treatment of children with cleft palate may vary considerably (Flinn *et al.* 2005:254). This dearth of standardized treatment protocols is problematic when comparing treatment outcomes (Whitehill, 2000:57).

Experts identified another factor that influences the comparisons of outcomes across centres as being the simplistic nature of early speech reporting systems. Perceptual speech data were also routinely reported by professionals other than speech-language therapists (Lohmander & Olsson, 2003:64). A system that is still currently used by inexperienced speech-language therapists is the traditional error framework of substitutions, distortions, omissions and gross substitutions. This system ignores the impact of phonology on speech intelligibility (Sell, 2005:108). During perceptual assessments the patients' speech was traditionally classified according to the correctness of articulation, intelligibility and the total impression of the patient's speech quality (Konst *et al.* 2003:599). These forms of testing are inadequate for the assessment of children with cleft palate, as they do not accurately identify the cleft palate speech characteristics (Sell, 2005:104).

Several systems have been proposed to measure the speech outcomes of children with cleft palate (Henningsson *et al*. 2007:2). These include systems designed by the Eurocleft Speech Group and the GOS.SP.ASS'98 (Sell, Harding & Grunwell, 1999:17). Speech outcomes measured in terms of intelligibility and acceptability are the production of single words, based on the individual sounds of the language, as single words are most frequently used in intelligibility

samples (Hutters & Henningsson, 2003:248). Although these systems provide information on the intelligibility of speech, they do not provide information on continuous speech utterances which are used in conversations (Henningsson *et al*. 2007:12). Assessments of continuous speech utterances is important as these systems measure different speech situations to determine the consistency and frequency of errors to provide a balanced, representative data sample for speech-language therapists to use during intervention planning (Henningsson *et al*. 2007:5).

With the recent emphasis on speech outcomes after treatment, the Eurocleft speech group advocates the use of several universal parameters to facilitate the cross-linguistic comparisons of speech data (Sell, 2005:105). In order to overcome the barrier of comparing speech outcomes after treatment across languages, comparisons of the sounds and words across languages are needed (Hutters & Henningsson, 2003:546). The Eurocleft Speech Project was initiated to assist in such comparisons and to propose guidelines for inter-centre comparisons between the cleft palate teams. It involves five centres and five languages where the focus of speech assessment is on consonant production (Hutters & Henningsson, 2003:459). The project utilised common target types of consonants shared by all the languages to enable comparisons across different cleft palate teams. In another project, the Scandcleft Project, five different languages were involved with the focus on pressure consonants and nasal resonance on vowels of each language, to allow cross-linguistic speech outcomes following surgical treatment (Hutters & Henningsson, 2003:459). These projects have implications for the compilation of speech assessment materials to accurately assess treatment outcomes to ensure that speech outcomes between different centres can be compared.

Some European countries have used the universal parameters to compile assessment materials in different languages namely English, Swedish, Polish, Danish, Norwegian and Finnish to allow for inter-centre comparisons after

treatment (www.eurocran.org). The universal parameters include guidelines for data collection, recording, analysis and interpretation. Even the simplest speech assessment must consider the structures and processes of the entire speech mechanism (Shprintzen & Bardach, 1995:177). Further research is required to determine treatment outcomes in a universal and standardized manner. Using standardized materials would eliminate influences from variables, including speaker demographics such as gender, age and cleft type. It is also necessary to include children with cleft palate from different language backgrounds when conducting inter-centre comparisons to allow for cross-linguistic comparisons between these language groups (Hutters & Henningsson, 2003:545). This will enable different cleft palate teams to conduct cross-centre and cross-linguistic comparisons regarding the speech outcomes of individuals to provide information on the specific cleft palate speech characteristics of the different data sets from each centre (Henningsson *et al*. 2007:13). Comparisons of outcomes will determine optimal treatment approaches and provide guidelines for best practice ensuring optimal treatment for all children with cleft palate.

Several attempts have been made to standardize speech assessment materials for the evaluation and description of cleft palate speech to enable comparisons between cleft palate teams to improve service delivery across languages and countries (Kuehn & Henne, 2003:104). Flinn *et al*. (2005:258) indicated the value of early outcome assessment and the value of inter-centre comparisons to use in conjunction with trials to provide information on the effects of the treatments used for patients with cleft palate (Henningsson *et al*. 2007:12; Hutters & Henningsson, 2003:550). Speech outcomes after treatment are generally organized and analyzed where speakers are grouped together according to the same treatment procedure. If speakers are from different language backgrounds, possible language variables must be eliminated for comparison of speech following treatment (Hutters & Henningsson, 2003:546).

Speech intelligibility is also seen as an important outcome measure. Intelligibility measures are, however, problematic because a child's ability to be understood by others is influenced by multiple factors related to the child, the listeners and the communicative context and environment (Hodge & Gotzke, 2007:164). Speech intelligibility has been used as an outcome measure in many studies of cleft palate in the past, but limitations regarding the use of traditional rating scales occurred, due to problems in agreed reporting parameters (Henningsson *et al*. 2007:12). The term speech understandability has been proposed instead, where an additional measure of speech acceptability is included, as it represents a different perceptual aspect of speech adequacy (Henningsson *et al*. 2007:12).

Speech understandability is the degree to which the listener can understand the speaker's message and according to Henningsson *et al*. (2007) this should be based on conversational speech only. In addition, speech acceptability is the degree to which speech calls attention to itself apart from the content of the spoken message. This parameter should be rated based on all connected speech that is elicited during the assessment (Henningsson *et al*. 2007:12-13).

The universal parameters are of value to guide speech-language therapists in assessments, to ensure accuracy and eventually to make comparisons between cleft palate centres possible, which will enable researchers to make recommendations regarding best team practice. When seeking the optimal treatment for all children with cleft palate, international consensus regarding assessment will assist to objectively determine the best outcomes and inform best practice.

2.4 International guidelines for the speech assessment of children with cleft palate

Although several procedures for assessing speech with rating scales exist, it is currently unclear which of the many rating scales, procedures and statistics are best suited to measure the characteristics of cleft palate speech. This has led to

research and the development of new approaches to ensure that the need for an adequate and reliable perceptual evaluation tool is met (Konst *et al*. 2003:598). More recent approaches to perceptual speech assessment have included rating scales, sentence repetition tasks and spontaneous speech tasks to assess an individual's speech understandability and speech acceptability. These differ from the earlier error framework as they include the evaluation of speech and conversational speech aspects, mapping of speech characteristics and the reporting of these findings in different contexts, providing an accurate representation of the child's phonetic repertoire and speech abilities (Henningsson *et al*. 2007:3,8; Lohmander & Olsson, 2004:64; Sell, 2005:108).

Various systems for the collection and analysis of perceptual speech assessment data, as discussed earlier, have been proposed as outcomes measures for speech of individuals with cleft palate, but none have been adopted universally or widely enough to permit large-scale cross centre studies (Henningsson *et al*. 2007:2).

In order to facilitate the standardization of a universal system for the reporting of speech outcomes, guidelines were established by a team of professionals to develop a system for universal assessment and inter-centre comparisons of outcomes of individuals with cleft palate (Henningsson *et al*. 2007:2). These guidelines are recommended as they allow for inter-centre comparisons between cleft palate teams and may lead to the best outcomes for the given condition (Henningsson *et al*. 2007:2). These international guidelines include those proposed by the Eurocleft speech group and the Eurocran guidelines (www.eurocran.org).

The Eurocleft Group study was a pioneering effort for cross-linguistic comparisons of speech assessment data, and the Scandcleft Project refined the data collection guidelines (Lohmander & Olsson, 2004:70). The Eurocleft guidelines also included information from the parents regarding therapy, health,

hearing, progress at school and family concerns to determine the effect of the cleft palate on the child's social well-being (Peterson-Falzone *et al*. 2006:9-16). Additional information can be identified and noted, including the child's voice, features examined through oral peripheral examination, language abilities and possible associated or co-occurring syndromes (Sell *et al*. 1997:24-25). A universal system for reporting speech outcomes would be highly beneficial in facilitating and enabling comparisons to be made across centres. One important use of such a system would be its utilisation as a tool in clinical trials involving collaborative groups from different geographic regions including countries or regions that not only differ in their way of rating and reporting perceptual speech data but also in the languages spoken (Shaw, 2004:239). However, to date experts in the field have not yet reached consensus and this goal for international use of the universal parameters has not yet been achieved.

In a review of the perceptual speech analysis in cleft palate conducted by Sell (2005), these Eurocleft guidelines were used to determine concerns regarding the perceptual assessment of children with cleft palate. Sell (2005:117) concluded that the measurement of impairment levels involve the highly skilled and complex process of data sampling, data collection and recording, archiving, together with a standardized approach to data analysis and interpretation. Sell (2005:118), however, indicated the Eurocleft guidelines to be useful, when used in conjunction with a more functional approach which affect quality of life. This indicated that further research is needed to determine the functionality and applicability of these guidelines.

The Eurocran speech group started developing their guidelines in 1994 to assess children with cleft palate and to determine the impact of treatment. The recommended speech sample of the Eurocran speech group includes a word list and short sentences, and children are asked to name words, count and produce a spontaneous speech sample (www.eurocran.org). Age-related adaptations are made, where the older children are required to read a passage. Analysis of the

perceptual speech sample is done according to the cleft palate speech characteristics (www.eurocran.org). The Eurocran guidelines are recommended by experts in the field of cleft palate as current best practice as they include conversational speech and not just words alone. These results assist with the planning of intervention and provide information to compare the different teams' perceptual speech outcomes with each other in an effort to improve the quality of service delivery.

In an attempt to further improve standardization in cleft care, expert speech-language therapists initiated a different perceptual data recording system in 2005 (Henningsson *et al*. 2007:2). This initiative aimed at documenting speech outcomes in individuals with cleft palate using a set of five universal and two global parameters, as these parameters characterize the speech outcomes of individuals born with cleft palate regardless of the language or languages spoken by the patient (Henningsson *et al*. 2007:17).

A detailed speech sample is included in this system, to provide information on the consistency and frequency of errors (Henningsson *et al*. 2007:6). This includes the assessment of various parameters for example language specific high pressure consonants and vowels, in controlled speech contexts such as sentence repetition and in natural contexts such as conversational speech. The system includes several cleft palate speech characteristics, for example hyponasality and audible nasal turbulence to elicit cleft palate speech characteristics from individuals (Henningsson *et al*. 2007:7).

Nonetheless, a number of international publications (Henningsson *et al*. 2007:2; Hodge *et al*. 2007:164; Hutters & Henningsson, 2003: 545; Lohmander & Olsson, 2004:64; Sell, 2005:104) and the information posted on a website (www.eurocran.org) the Eurocran guidelines are not well known by many speech-language therapists involved in providing services to children with cleft palate. Speech-language therapists traditionally utilised a particular system of

documenting and reporting speech characteristics of children with cleft palate in their own clinical setting and may be reluctant to change the system they have successfully used for many years (Henningsson *et al*. 2007:2). There is also a lack of common understanding or usage of terms utilized by speech-language therapists during the perceptual assessment of children with cleft palate (Henningsson *et al*. 2007:3).

It is therefore recommended that the assessment of cleft palate speech be done using standardized speech materials (Hathorn *et al*. 2005:406), which will allow for a universal tool to be used across different countries, languages and cleft teams, creating a system to compare and refine different treatment outcomes (Hutters & Henningsson, 2003:551). Standardization of a perceptual speech assessment protocol is still a high ideal and a complex issue as a result of the multilingual challenges to this population in most cleft palate centres, worldwide.

The use of a universal system for the perceptual speech assessment of children with cleft palate may improve access to services, possibly leading to improved outcomes after treatment. This will also contribute towards lessening the burden of cost on health care, as services will be readily available and accounted for. Such a universal system may also be used in different contexts to optimally assess children with cleft palate in their own native language.

2.5 A contextual approach to the speech assessment of children with cleft palate

2.5.1 The South African context

Literature emphasized the importance of the universal guidelines for the perceptual speech assessment of children with cleft palate in different contexts. This has identified the lack of appropriate materials present in South Africa regarding the perceptual assessment of children with cleft palate in different languages. There is an increasing demand for speech and language materials in clinical and research situations in countries where there are few assessment

resources available (Carter *et al*. 2005:386). An important aspect in the provision of equitable speech-language therapy services is the recognition of cultural variation and the potential for cultural bias (Carter *et al*. 2005:386).

As identified in chapter one, there is a lack of appropriate assessment tools for the assessment of the multicultural population in South Africa (Pakendorf, 1998:1). Culturally sensitive assessment tools are of great importance as the parental and extra familial contexts may differ across cultures and ethnicities (Louw *et al*. 2006:48). Professionals need to respect family beliefs and perceptions of disability to ensure a true understanding of this concept and potential positive outcomes by utilizing a family-centred approach to assessment and intervention (Louw *et al*. 2006:47). It is important for speech-language therapists to have insight into the ethnographic and cultural factors of the family and children with cleft palate, as these factors may play a significant role in obtaining medical care for these children in addition to determining the manner in which the family will follow treatment recommendations (Louw *et al*. 2006:48).

South Africa poses several challenges to speech-language therapists when attempting to provide appropriate assessment and intervention services to children with cleft palate. The current South African language policy mandates that every person has the right to achieve education in his or her own language (www.pansalb.org.za), and currently linguistic appropriate services for the African speaking children are not provided.

The South African Speech Language and Hearing Association (SASLHA) developed a set of guidelines for assessment and intervention to be followed with multilingual clients in an attempt to limit bias during service delivery (SASLHA, 2003). These guidelines need to be adhered to in order to provide competent professional services (Pakendorf, 1998:1; SASLHA, 2003). Speech-language therapists are also expected to ensure that there are appropriate services available to bilingual and multilingual clients, in order to ensure equitable service

delivery (Menen & Stansfield, 2006:635). However, this is not always possible due to the lack of resources namely assessment and treatment materials for the African population and the limited number of interpreters available to assist speech-language therapists with service provision in the South African context (Pakendorf, 1998:1).

As mentioned earlier, Streicher (2005) responded to the above issue by developing a preliminary perceptual speech assessment protocol for pre-school Sepedi-speaking children with cleft palate. The results indicated that speech-language therapists expressed a general need for appropriate assessment materials in the African languages, namely Zulu, Tswana, Ndebele, Xhosa, Swazi, Tsonga, Venda, Sotho, as well as in Afrikaans. A specific need was expressed for assessment materials to be made available in Zulu (Streicher, 2005:41).

In South Africa the majority of speech-language therapists is mainly Afrikaans and English speaking, and may be unfamiliar with the cultural and language backgrounds of multilingual children with cleft palate. This poses a challenge to the development of assessment materials in these languages, as well as providing optimal services in the child's native language (Pakendorf, 1998:2).

2.5.2 A culturally sensitive assessment approach

Children with disabilities comprise approximately 9,4% of the total population with disabilities in South Africa (Children in 2001, in Swanepoel, 2004:14) and children with cleft palate are included in these estimates (Department of Health, 2001:6). Several attempts have been undertaken by Government to promote, in the spirit of international co-operation, the exchange of appropriate information in the field of preventative health care and of medical, psychological and functional treatment of disabled children (Department of Heath, 2001:1). This includes the dissemination of and access to information concerning rehabilitation, education and vocational services with the aim of enabling state parties to improve their

capabilities and skills (Department of Health, 2001:1), to improve the access to and quality of services rendered.

The South African Department of Health developed and implemented several policy guidelines in 2001 for the management and prevention of genetic disorders, birth defects and disabilities. These birth defects include inherited genetic disorders and non-genetic abnormalities (Department of Health, 2001:2). Cleft lip and palate is viewed as a priority condition and the Department of Health aims to manage these conditions by providing counselling as well as the best medical treatment for families and individuals (Department of Health, 2001:6).

Children with cleft palate in South Africa require culturally appropriate and sensitive services. The use of culturally appropriate tools will not only improve service delivery, but will also contribute to the Department of Health's goal to correct genetic disorders in order to restore normal function (Department of Health, 2001:6).

When considering the need identified and current policy framework of the Department of Health, the time has come for the development of an assessment tool for Zulu-speaking children with cleft palate.

2.6 Conclusion

The speech assessment of children with cleft palate in South Africa is a complex process, as it needs to take into account the different language and cultural influences and speech situations that may affect the speech characteristics of these children. It is also imperative to determine the speech outcomes after treatment to ensure the most appropriate management for each condition. The guidelines provided by the Eurocran group (www.eurocran.org) on how to conduct instrumental and perceptual speech assessments are currently recommended as best practice.

The best practice guidelines need to be followed to improve, standardize and compare cleft palate data across different cleft palate centres. Inter-centre comparisons will determine which treatments work best for each individual and will enable speech-language therapists to provide best care for children with cleft palate, even after surgical repair of the cleft. This will globally and nationally contribute towards improved service delivery to children with cleft palate.

The literature review provides the basis for the development of a perceptual speech assessment protocol for Zulu-speaking children with cleft palate.

2.7 Summary

This chapter addressed the speech assessment of children with cleft palate in a multilingual and multicultural South Africa. A review of the speech development of children with cleft palate was conducted and the speech assessment of these children was discussed. The international guidelines for the assessment of these children highlighted the need for a contextually applicable assessment tool. This literature review served as the theoretical underpinning for the research and attempted to reduce the gap between the guidelines for the assessment of children with cleft palate published in the literature and assessments that are conducted in practice.

CHAPTER 3
MULTILINGUAL AND MULTICULTURAL SERVICE DELIVERY TO CHILDREN WITH CLEFT PALATE IN SOUTH AFRICA

The aim of this chapter is to provide a critical overview of the current practices, guidelines and resources available in cleft care for the rainbow nation in South Africa.

3.1 Cultural and linguistic diversity in South Africa

Treating children from a multilingual perspective can be a daunting task for speech-language therapists around the globe (ASHA, 2004:1, Naudé, Louw & Weideman, 2007:520; SASLHA, 2003:1). Speech-language therapists' strive to overcome challenges in service delivery to multilingual populations by providing ethical acceptable services in an unbiased, non-discriminatory manner, irrespective of race, gender, age, religion, national origin, sexual orientation or disability (ASHA, 2004:1) but are still challenged in their efforts.

Multilingualism is a universal phenomenon and speech-language therapists are part of the support personnel who manage multilingual and multicultural children in South Africa (Naudé *et al*. 2007:519-520). Multilingualism is researched by linguists, educators and speech-language therapists in other countries and the focus on multilingualism has become a global issue (Naudé *et al*. 2007:519).

ASHA has developed policies regarding non-discrimination based on gender, race, linguistic background and other factors to promote competent, effective and appropriate service delivery to multilingual populations in the USA by speech-language therapists and audiologists (ASHA, 2004:7; Hegde & Davis, 2005:191). These guidelines were developed since the recent research reports over the past decade emphasised the need for unbiased, objective treatment materials (Hegde & Davis, 2005:192).

Multilingualism in urban areas in South Africa has substantially increased over the past decade (Naudé, 2005:2). Multilingualism in schools and pre-schools has created challenges for the speech-language therapists working with these children, as cultural background and exposure to different languages should be considered during intervention (Naudé, 2005:3). In response to these developments, the South African Speech-Language-Hearing Association (SASLHA) developed several guidelines in working with children from diverse cultural backgrounds. These guidelines indicate that normative data derived from formal commercially available tests not standardised in the child's native language may not be applied to multilingual children (SASLHA, 2003). SASLHA emphasised that the guidelines adhere to the consideration of language of instruction in all educational contexts, language in which therapy is conducted and the nature of therapeutic intervention in each language (SASHLA, 2003:1). These guidelines need to be followed when working with multilingual clients to ensure best practice and non-biased assessment and treatment.

In an attempt to consider all the different languages of instruction and exposure in South Africa, a Government Organisation the Pan South African Language Board (PANSALB) was established with the vision to respect all languages in South Africa, to treat all languages equal and to promote non-discrimination on the basis of language (www.pansalb.org). This organisation promotes the equal status and use of all the official languages in South Africa, the development and use of each language and the promotion of multilingualism within the constitution (www.pansalb.org). The South African language policy states that each person has the right to receive education in his or her language of choice (www.pansalb.org). It is therefore important for speech-language therapists to respect these rights during cross-cultural service delivery to children with speech and language disorders in South Africa (SASLHA, 2003:1).

3.2 Cross-cultural service delivery to children with speech and language disorders in South Africa

The necessary adaptations in speech-language service delivery in South Africa to multilingual clients and culturally appropriate service delivery for this population will be discussed to explain cross-cultural service delivery in South Africa.

3.2.1 Adaptations in speech-language service delivery in South Africa

The change in political dispensation in 1994 necessitated speech-language therapists in South Africa to strive towards equitable service delivery to the diverse South African population. This change in the political dispensation highlighted that the culture and language of individuals are intertwined, and requires that the nature of the communication disorder be viewed from a cultural perspective (Pillay, Kathard & Samuel, 1997:109).

The South African Constitution was amended and published in 1996 with the aim to improve the quality of life of all citizens and to free the potential of each person (Constitution, 1996:1). The Constitution recognises the eleven official languages in South Africa and promotes the rights of the population of South Africa to promote equity, practicability and no language discrimination (The Constitution, 1996:14). The continuing increase of African language speakers in the South African population make it difficult to provide speech-language therapy services in all the official languages, leading to less equitable services being delivered to them (Pakendorf, 1998:1).

An estimated 5% of the South African population suffers from some type of disability and they are distributed over the rural, non-urban and urban areas according to race (Swanepoel, 2004:12; www.signgenius.com). These multiracial, multicultural and multilingual characteristics of South Africa and the geographical distribution of children with special needs pose various challenges to speech-language therapists to effectively implement service delivery. A decade ago, speech-language therapists were encouraged to adapt their

services to fit the needs of the populations served, but they have not fully succeeded in meeting these needs due to the dearth of culturally appropriate assessment and intervention materials along with their lack of knowledge of the different African, Asian and other languages and cultural backgrounds (Fair & Louw, 1999:13). The Public Health Care system approach and the introduction of compulsory community service made community-based speech-language therapy services available to many previously under-serviced regions. This has led to changes in speech-language service delivery to accommodate clients from both urban and rural areas, and to overcome the cultural and linguistic mismatch between speech-language therapists and clients.

3.2.2 Culturally appropriate service delivery in South Africa

Developing cultural competence is a prerequisite to provide cross-linguistic and cross-cultural services. Speech-language therapists need to offer services that value diversity, have the capacity for self-assessment, and need to be aware of the inherent dynamics when cultures interact, institutionalize the cultural knowledge and develop adaptations to diversity (Roberts, Rule & Inocenti, 1998:41). Cultural competence refers to the ability of service providers to respond optimally to all children, understanding both the richness and limitations of the socio-cultural contexts in which children and families and their service providers may be operating (Lynch, 1998:49). It includes respecting the beliefs, interpersonal styles, attitudes and behaviors of both the families who are the clients and the professionals providing the services (Roberts *et al*. 1998:41). Services need to be offered in a realistic manner, considering resources including transport, and creating a sense of competence within the family (Bennet, Zhang & Hojnar, 1998:239).

Cultural diversity has a profound effect on the ways in which families and professionals interrelate cross-culturally during service delivery (Louw *et al*. 2006:48). In an attempt to provide culturally sensitive intervention, it is important that speech-language therapists consider the potential effects that internal and

external cultural factors may have on intervention services for culturally and linguistically diverse children (Rivers, 2000:67).

It is recommended that culturally sensitive and appropriate intervention should be approached from an ethnographic perspective where the cultural factors influencing intervention are resembled. Observations are made of individual's behaviours in the context in which they occur and conclusions are developed that arise from the culture's point of view (Hammer, 1998:8). Speech-language therapists therefore set aside their own conceptions and view the experiences of their clients in their different contexts by following a family-centred approach to meet the goals of intervention, to understand the family's values, priorities, interpretation of events and decision-making processes (Hammer, 1998:9).

In order to achieve cultural competence, speech-language therapists need to reflect on their own culture and conduct self-awareness, collect ethnographic information related to the community in which the family resides, determine the degree of transcultural operation of the family and examine the families orientation to specific child-rearing issues (Lynch, 1998:50). This self-awareness will assist speech-language therapists to develop the necessary skills for successful engagement with clients and feeling comfortable during interaction with families whose cultures and life expectations differ from their own.

Cross-cultural differences are not only present regarding communication interaction patterns, but societies also differ with respect to what they consider to be normal or pathological (Louw & Avenant, 2002:145). Currently there are a limited number of African speech-language therapists in South Africa and services are mostly provided across cultures. Families may often have different ideas and beliefs regarding disabling conditions and intervention which may make collaboration in intervention difficult (Louw & Avenant, 2002:145). Services need to be provided in such a manner that the families of children with disabilities are empowered, ensuring that the assets of the family are utilized (Kretzman &

McKnight, 1993:5). An asset-based approach capitalizes the strengths and resources of the family. Their cultural identity, beliefs and customs should therefore be used to the child's advantage (Louw *et al*. 2006:54). Professionals providing the services should recognize and reasonably accommodate the cultural expectations of families who are in need of the services, as this may lead to competent family-centered care (Roberts *et al*. 1998:42).

Each family is unique and their values, beliefs, needs and child rearing practices should be recognised and respected in the provision of speech-language therapy services. It is important to consider these aspects and acknowledge the family beliefs and views, as this is the only way of ensuring culturally congruent service delivery from an ethnographic perspective (Hammer, 1998:9; Shipley & McAffee, 2004:23).

The ethnographic approach emphasises that caregivers need to be valued as important members of the intervention team and need to be encouraged to express their needs, concerns and priorities. This provides them with the opportunity to share their thoughts and fears and empowers caregivers to become part of the decision-making team. Speech-language therapists are encouraged to collect cultural- and linguistic-specific information about the caregivers and families and recognise that caregivers may assign different meanings to children with special needs. It is important to respect caregivers' rights to privacy and confidentiality, provide clear explanations of the roles of each team member working with them and to provide regular opportunities for caregivers to ask questions, make comments and request clarification on any aspect of the intervention process (Rivers, 2000:67).

Children acquire language within a context of the family and language development is integrally related to the culture of the family (Owens, 2005:171). The increasing awareness of differences across and within cultural linguistic groups needs to be considered, as the values, beliefs and behaviors of the

clients and professionals impact on the outcomes of service delivery (Louw & Avenant, 2002:145). The family structure in many African families is extended and may be multigenerational, affecting the styles of communication interaction of the client (Louw & Avenant, 2002:146). Interaction patterns are the basis for language development and will define the ways a child learns his/her native language. The cultural influence of these factors needs to be considered, as many cultures regard interaction with children as less important (Naudé *et al*. 2007:529), impacting negatively on assessment and intervention, as children may often be unfamiliar with appropriate interaction styles leading to an inaccurate sample of the child's speech and language abilities (Owens, 2005:216). Perceptions of disabilities and the attitude of the family regarding the acceptance of disabilities also impact on intervention (Owens, 2005:217). These factors will determine how effectively timeous treatment can be initiated and the compliance of families during treatment (Louw *et al*. 2006:54).

The cultural factors influencing intervention in South Africa need to be addressed in an innovative manner to provide culturally congruent and sensitive intervention within the family context of South Africa (Louw & Avenant, 2002:147). In the provision of culturally congruent services, speech-language therapists still require knowledge of the different cultural backgrounds and resources for the assessment of children in the African languages.

3.3 Dearth of speech and language assessment tools in African languages

Limited research has been conducted on the speech and language development of African language speaking children in the disciplines of linguistics, education, psychology and speech-language therapy in South Africa (Naudé, 2005:5), leading to a scarcity of normative data or tests that have been standardized.The development of culturally appropriate materials is further challenged by the lack of norms for the speech and language development of African language speakers, making it difficult for the speech-language therapists to distinguish between normal development and delayed or disordered communication

development (Klein & Moses, 1999:10). The majority of children in South Africa are multilingual which complicates accurate diagnosis of speech and language disorders, as the influence of the child's mother tongue needs to be determined as well. Naudé *et al*. (2007:520) recommended that speech-language therapists collaborate with clinical linguistics in conducting research to establish developmental norms for African languages in South Africa to provide valuable information for the compilation of assessment materials. This will allow for more accurate speech assessments, which in turn will enhance the quality of intervention.

Speech-language therapists across South Africa have attempted to solve the problem of the dearth of appropriate assessment materials by various methods, one being the translation of existing tests into African languages (Pakendorf, 1998:4). The problem with such translations are that few have been formally researched or standardised to date, therefore their reliability and validity are questionable. The issue is hereby complicated even further for Zulu-speaking children with cleft palate, as the available tests were not designed to specifically identify cleft palate speech characteristics.

Current clinical practice is often to apply commercially available tests that were standardized in the United States of America or United Kingdom or to translate these tests for use with the South African population (Pakendorf, 1998:3-4). While these attempts are laudable, several shortcomings can be identified in the translation process namely: a lack of developmental norms for the speech and language development in African languages that questions the validity of these tests and the majority of these tests that was not standardized yet. This led to debates regarding the applicability of these tests for the African population. The majority of speech-language therapists translating the tests are not fluent speakers of these African languages and they need the assistance of first language speakers in the translation process, to ensure that all the important language aspects is considered (Pakendorf, 1998:4, Pillay *et al*. 1996:114).

Several attempts have been made in adapting and translating these tests, e.g. on the auditory comprehension of Xhosa speakers (Willenberg, 1987), but sufficient research has not been conducted to resolve reliability and validity issues of the translated and adapted versions of the tests yet (Pillay *et al*.1997:116).

During the translation of existing materials, the different communication styles of the specific group, non-verbal behaviour shared by the cultural group, cultural diversity within the group and the verbal and literate language translations are often disregarded due to speech-language therapists not having the appropriate knowledge and skills of the specific language (Pakendorf, 1998:3-4; Carter *et al*. 2005:387). This created problems regarding the validity of assessments, as the materials may be inappropriate for the specific situation and the structure of the assessment is influenced by the content of the assessment task (Carter *et al*. 2005:388). Many children from diverse cultural and linguistic backgrounds may also be unfamiliar with a formal assessment structure and adaptations need to be made regarding the setting of assessment to lead to effective assessments (Owens, 2005:410).

Currently the only formal speech and language test available for Zulu-speaking children is the Zulu Expressive Receptive Language Assessment for pre-school children (Bortz, 1997). The ZERLA was developed based on the theoretical model of language form, content and use within a pragmatic framework (Bortz, 1995:105). It was compiled according to the specific noun classes in Zulu, with the appropriate prefixes, adjectives and elicitation techniques to elicit a spontaneous speech sample in order to assess the verbal structure of each participant's responses (Bortz, 1995:111).

The ZERLA was effectively tested on pre-school Zulu-speaking children to assess their language abilities and possible language impairments (Bortz, 1995:261). This test does not include assessment of phonology of the Zulu language or pragmatic skills. The ZERLA does not appear to be used frequently

in clinical practice in South Africa. According to Moodley (2006) and Pahl (2006) adapted English evaluation protocols still tend to be used widely to assess Zulu-speaking children. This may be due to speech-language therapists being unfamiliar with the ZERLA as it was not made commercially available and its content only allowed for receptive and expressive language assessments. The need identified by training institutions to have developmental norms to compare speech (Pahl, 2006) together with the need for a standard protocol to guide teaching and practice for children with cleft palate (Streicher, 2005:41) indicates that further assessment materials in Zulu are required.

The lack of developmental norms in Zulu led to Naidoo's (2003) investigation of the speech sound and syllable development in Zulu-speaking children between the ages of 3 and 6.2 years. Naidoo (2003) found that Zulu-speaking children develop a significant inventory of speech sounds by the age of 3 and further development, refinement and stabilisation of the sound systems occurs at the age of 6.2 years, congruent with those of children speaking other languages (Naidoo, 2003:59, Owens, 2001:271). Although Zulu speech sounds differ from English, their speech sound development is similar to that of English speaking children (Owens, 2001:271). This information may be used for the compilation of articulation tests and therapy programmes for Zulu-speaking children (Naidoo, 2003:59). Further research is, however, still required to develop a comprehensive Zulu speech database and normative data, as there is currently, as far known, no such data available to assist in the compilation of standardized assessment materials.

Furthermore, there are a limited number of speech-language therapists qualified and currently practicing to provide services to children with speech and language disorders in Zulu (www.hpcsa.co.za). South-African speech-language therapists are faced with high case loads and work demands (Pillay *et al*. 1997:111), leading to limited time available for the development of culturally appropriate assessment tools for children in the African languages. Limited collaboration

between researchers and clinicians also make such research time consuming and costly. As a result, limited research has been conducted in the African languages to date (Mphahlele, 2006).

Mattes and Omark (1994, in Hall 1995:157) identified another concern in the assessment of multilingual and multicultural clients, namely that an English Additional Language (EAL) learner may perform poorly in school due to limited familiarity with the English language and/or other cultural differences that may be present. EAL learners need to be distinguished from those with communicative disorders and/or abnormalities that require special educational needs (Naudé *et al*. 2007:521) as this will determine the type and goals of service delivery. Only after the child has been assessed in his/her home language and language of teaching and learning, can a statement regarding his or her linguistic and speech abilities be made (Reddy, 1997:3).

As an alternative to limited assessment tools and developmental norms in African languages, speech-language therapists currently often tend to rely on non-standardised assessment procedures for obtaining baseline data to use in intervention planning. This is not viewed to be best practice; as such tests do not provide normative data on the speech and language development of the child. The combination of standardised and non-standardised approaches to treatment permits speech-language therapists to identify the developmental status of behavioural systems that may be maintaining the speech-language disorder (Klein & Moses, 1999:73). A combination of these approaches to assessment provides accurate and reliable information on the child's communication ability, guiding the intervention process.

Another alternative solution to overcome the dearth of assessment tools in the South African context is to use trained interpreters during the speech and language assessment of children (Hegde & Davis, 2005:191). This will increase the reliability and accuracy of the assessment data, enabling speech-language

therapists to determine the needs of the children during the assessment (Pillay *et al*. 1997:110). Currently, however, there is a lack of trained interpreters and speech-language therapists in South Africa should devote time to train interpreters to make more accurate diagnoses and to ensure equitable services (Pillay *et al*. 1997:109). The focus on best practice emphasises the need for culturally and linguistically appropriate assessment materials for the African languages. Such materials would improve clinical services and intervention. One of the African languages identified was Zulu, as it is a language frequently spoken in South Africa.

3.4 Characteristics of the Zulu language and implications for children with cleft palate

The Zulu language has developed in its own right with 21,6 % of the South African population being Zulu speaking (Roberts, 2000:4). Zulu is a major Bantu language of South Africa and is classified as part of the Nguni group of languages. This group of languages are spoken by 22 million people residing in South Africa. Some salient phonetic and grammatical differences occur between the different Nguni languages and members of the Nguni group have little difficulty in understanding one another (Wilkes & Nkosi, 1998:i). The Zulu language is divided into eight noun classes according to the different forms of their prefixes (Wilkes & Nkosi, 1998:ii). The Zulu language has many regional variants with differences in dialect between the urban and rural settings (Wilkes & Nkosi, 1998:iv).

Zulu is typified as being a partially synthetic language where words typically consist of more than one morpheme. Various morphemes are combined to form complex words with its elements maintaining a fixed meaning. Zulu is characterised by a noun class system, with a suffixal system and verbal derivatives. This indicates that prefixes are used to express numbers and noun classes to which a noun belongs and this prefixes determine the semantic content of each noun class (Bortz, 1995:58).

The two most common characteristics of the Zulu sound system are the lengthening of the penultimate syllables of most words, the elision of final vowels in words followed by a similar consonant and the elision of the /i/ in nouns with bi- or tri-syllabic stems (Wilkes & Nkosi, 1998:x). Zulu is also characterised by click sounds, e.g. [ǂg], [ǁg], [!] and [ǀ], pronounced according to the different tongue placements for each individual sound (Wilkes & Nkosi, 1998:xii). A click sound can be considered as any sound that is released by an obstruction of the air stream followed by a quick release of air flowing inwards, accompanied by a sharp sound (Le Roux & Groenewald, 2007:38). The complexity of the Zulu language makes speech and language assessments extremely complex and difficult for non-Zulu speaking speech-language therapists, especially in the absence of trained interpreters.

Children with cleft palate often demonstrate compensatory misarticulations such as glottal stops, pharyngeal stops, pharyngeal fricatives, pharyngeal affricates, posterior nasal fricatives, nasal fricatives, mid-dorsum palatal stops and substitutions of sounds due to their anatomical structure's inability and possible velopharyngeal incompetency leading to these errors in place of articulation (Peterson-Falzone *et al*. 2006:31). Children with cleft palate tend to experience difficulty with the production of sounds that require high intra-oral pressure (Peterson-Falzone *et al*. 2006:6). Therefore the production of Zulu click sounds may be problematic for children with cleft palate. It is clear that the development of cleft palate speech assessment materials in Zulu is a complex process as both linguistic and disorder specific aspects need to be considered. All of these aspects need to be addressed in the compilation of linguistically and culturally appropriate tests.

3.5 Conclusion

Due to the prevalence of Zulu in South Africa the dearth of culturally and linguistically appropriate speech assessment tools for this population is problematic. The need identified for an appropriate perceptual speech

assessment protocol for Zulu-speaking pre-school children with cleft palate (Streicher, 2005) necessitates urgent attention. To address this clinical need, inferences can be drawn from the literature on multilingual and multicultural service delivery, from local research conducted on the speech development and language assessment of Zulu-speaking children and lastly from the international guidelines formulated for the perceptual speech assessment of children with cleft palate.

The development of culturally and linguistically appropriate assessment materials will enable speech-language therapists to provide accountable services to the children with cleft palate in South Africa by ensuring that these services are available in the child's mother tongue and improving services to allow each individual to reach his/her full potential and increase their quality of life.

3.6 Summary

Chapter 3 focused on cross-cultural service delivery to children with speech and language disorders and the cultural mismatch that may exist between clients and professionals during service delivery. The limited resources available in South Africa for Zulu speaking children with cleft palate and the need for standardised materials were emphasized. This highlighted the urgent need for culturally and linguistically appropriate assessment materials for these children, especially when considering the complexity of the Zulu language and cleft palate disorders. In conjunction with the guidelines developed in the literature for the assessment of children with cleft palate and the applicability of these guidelines in the South African context, such assessment materials can be developed.

CHAPTER 4
METHOD

The aim of this chapter is to describe the methodology that was followed in planning and executing research to develop a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate.

4.1 Introduction

Since the time of its rudimentary beginnings, from a substrate of related disciplines including education, medicine and psychology, the profession of communication disorders has made remarkable strides in developing a source of knowledge firmly grounded in scientific research. The substance and relevance of our current critical endeavours owe much to a pre-existing scientific ethos that values critical thinking and objectivity in assessing the reliability and validity of evidence and a willingness to change theories and approaches as new facts emerge (Maxwell & Satake, 2006:2). Several researchers have concluded that speech-language therapists' knowledge lies outside the range of their own theoretical bases and problem solving skills, encouraging them to follow an approach to research with the emphasis on studying problems as they are encountered and then justifying the approach to these problems according to the perceived theoretical relevance and recent research findings (Leedy & Ormrod, 2005:2).

Research and clinical practice are inextricably linked and therefore inform one another. It is important to conduct research to obtain firm validations regarding specific problems and their solutions to provide applications for clinical practice and to ensure best treatment outcomes (Kamhi, 2006:255). Therefore, when a clinical need for specific assessment or intervention material arises, researchers respond to such a need and their research efforts may result in new and valuable materials (Maxwell & Satake, 2006:40). In the current study a need was identified

for a Zulu perceptual speech assessment protocol for pre-school children with cleft palate.

The current research is based on an identified clinical need for a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate. The development of such a protocol may inform clinical practice, emphasising the reciprocal relationship between theory and practice. Once a protocol is available, practice can inform research, e.g. how to change the protocol for the development of a similar protocol in other languages.

The chapter will present the aim of the study, research design, ethical implications, materials and apparatus used, procedures followed, the data recording and analysis as well as the data processing.

4.2 Research aims

The aim of this research was to develop a reliable perceptual speech assessment protocol in Zulu for the identification and description of the cleft palate speech characteristics of Zulu-speaking pre-school children.

The following objectives were formulated to achieve the aim:

- To describe the compilation of the Zulu perceptual speech assessment protocol.
- To determine the age-appropriateness of the picture stimuli of the protocol by applying it to normal Zulu-speaking pre-school children.
- To determine the perceptions of speech-language therapists regarding the clinical applicability of the protocol.
- To describe the applicability of international guidelines in the development of a perceptual speech assessment protocol in the Zulu language.

4.3 Research design

The researcher selected a *mixed methods research approach* that was cross-sectional and explorative in nature, due to the complexity of cleft palate, the Zulu language and its implications for cleft palate speech and the guidelines for the perceptual assessment of children with cleft palate in the South African context (Leedy & Ormrod, 2005:134; www.eurocran.org).

The *mixed methods approach* involved collecting, analyzing, and integrating both quantitative and qualitative methods and data in this single study (Creswell, 2007:20). A qualitative approach was necessitated as the researcher developed a perceptual speech assessment protocol for Zulu-speaking children with cleft palate and reflected on the applicability of international guidelines to an African language. A quantitative approach was required as the protocol was applied by speech-language therapists on Zulu-speaking children with cleft palate. Based on their evaluations, their perceptions regarding the clinical applicability of the protocol were obtained. Therefore, triangulation of the qualitative and quantitative research approaches was deemed suitable, resulting in a *mixed methods approach* for this study (De Vos, Strydom, Fouché & Delport, 2005:361).

The *mixed methods approach* provided a better understanding of the research question, namely whether a reliable perceptual speech assessment protocol could be developed for Zulu-speaking children with cleft palate. The quantitative approach is more formalized and was applied in phases two and three of the study where data recording sheets, questionnaires and elicited responses from children were used to analyze data collected from the participants in this study. The qualitative approach provided a more philosophical approach to the study and was evident in phases one and four where the Zulu perceptual speech assessment protocol was compiled and the application of the international guidelines for perceptual speech assessments in a Zulu language was reflected on (De Vos *et al*. 2005:357).

A *cross sectional* method was selected within the mixed methods approach (Maxwell & Satake, 2005:221). This design was suitable as the researcher collected data once off from each participant and described the patterns of distribution in the speech of children with and without cleft palate (De Vos *et al.* 2005:135).

An e*xplorative research* method was chosen for the study as the clinical applicability of the perceptual speech assessment protocol on pre-school Zulu-speaking children with cleft palate was examined (De Vos *et al*. 2005:106). The researcher developed a perceptual speech assessment protocol and determined the age-appropriateness thereof, as well as the clinical applicability of the protocol for the Public Health Sector in the Gauteng region by using observations, elicited speech responses, questionnaires and data recording sheets for data collection. The exploratory framework was appropriate as new grounds were investigated. As far as is known, this was a first attempt to compile a Zulu perceptual speech assessment protocol for children with cleft palate.

The *mixed methods approach* to research was selected as the study developed and tested the clinical applicability of the perceptual speech assessment protocol on Zulu-speaking pre-school children with cleft palate. The results obtained from the assessments and observations may guide future service delivery towards children with cleft palate (De Vos *et al*. 2005:107). By using the mixed method approach the research was conducted in four different phases. The planning of four phases was appropriate as each phase correlated with an objective of the study and the aims of each phase could be achieved accordingly (De Vos *et al.* 2007:417). Furthermore, the researcher was able to identify specific problems and order them within an appropriate phase. Figure 4.1 illustrates the phases in which the study was completed. The method will be presented according to each phase of the study.

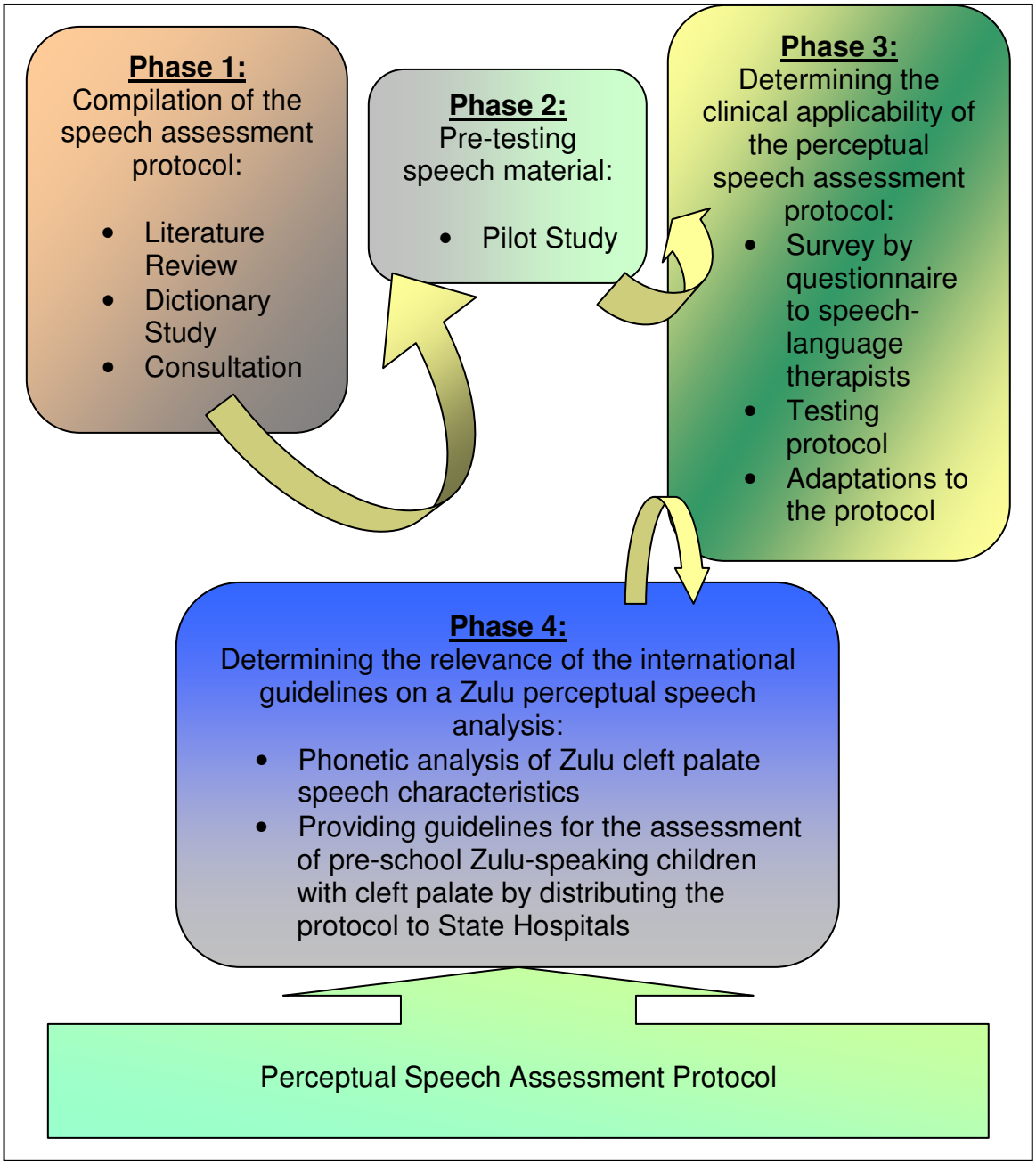


Figure 4.1 Phases of the research project (based on Streicher, 2005)

4.4 Ethical implications

When using human subjects as participants in research, it is important to protect the rights and welfare of these participants, as any study implies a certain level of risks and benefits (Maxwell & Satake, 2006:62). Ethical research principles require that risks and potential benefits regarding the study be considered and

possible discomfort or harm be identified in an attempt to reduce the degree of potential harm or discomfort as far as possible while remaining focused on the intended goals (Leedy & Ormrod, 2005:101).

Research involving children requires special attention to possible risks and harm involved, as they are a vulnerable group. Participating in research may upset children, lead to embarrassment and may even damage their lives (Alderson, 2005:99). It is imperative to respect children during research, protect their rights and strive for the best ethical outcomes. Children need to be treated sensitively, as dignified human beings, fairly and by effective use of resources (Alderson, 2005:98). In the current study all the children, with and without cleft palate, were viewed as vulnerable due to their age and congenital anomaly (Louw & Delport, 2006:2). Therefore care was taken to obtain the child's assent after informed consent was gained from the parents, and to design the study in such a manner that it was enjoyable for the children and as non-invasive as possible.

The ethical principles of research, namely *Autonomy, Beneficence* and *Non-malfeasance* and *Justice* (Louw, 2006; Leedy & Ormrod, 2005:101), were applied as follows in the research:

- **Autonomy or respect for persons:**

The participants consisted of speech-language therapists, parents and children. The speech-language therapists and parents were informed of the nature, goals, specific procedures and significance of the study via letters and provided written informed consent (Maxwell & Satake, 2006:63). The children received verbal information at an appropriate level of understanding and their verbal assent was requested. All the participants were offered the opportunity to withdraw from the study at any time without negative consequences, as participation was voluntary (Leedy & Ormrod, 2005:101). Speech-language therapists and parents were also informed via letters and verbally of the plan for dissemination and authorship of the findings and the intended duration of the study, to ensure that respect for the

participants was upheld (Maxwell & Satake, 2006:63) (see Appendices F - G for letters of informed consent).

The children's assent was obtained by using pictures to offer them a choice of participation (see Appendix G for verbal assent). Children were offered rewards, namely stickers, at the end of the assessment. The researcher also explained that they could refuse to participate without any negative consequences. Pictures were used to explain participation and refusal to participate (see Appendix G for pictures of verbal assent).

- **Beneficence and non-malfeasance:**

The children and speech-language therapist participants were not subjected to any risks or harm during the assessment and application of the perceptual speech assessment protocol (Leedy & Ormrod, 2005:101). Participation did, however, require additional time of the speech-language therapists as they conducted the protocol in addition to their daily duties. Although children were subjected to a test situation, it was not considered to be harmful as the protocol was designed in such a way that it was enjoyable for them and as non-invasive as possible (Alderson, 2005:98). Professional colleagues were respected by reporting research findings honestly, without misleading or misrepresenting others (Leedy & Ormrod, 2005:102).

- **Justice:**

A fair process of selection was followed as there was no bias or discrimination during the selection of participants, as stipulated by the inclusion and exclusion criteria (see 4.6.3). The selection process required that participants be Zulu first language speakers between the ages of 3 and 6, either normal Zulu-speaking children or children with a cleft palate, according to the different phases of the study, irrespective of gender.

Data collection commenced after ethical clearance was obtained from the University of Pretoria, Faculty of Humanities, Research Proposal and Ethics Committee (see Appendix A).

4.5 Phase one: compilation of the perceptual speech assessment protocol

4.5.1 Aim:

The aim of phase one of the study was to compile a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate.

4.5.2 Participants:

During phase one of the study the researcher and an expert Zulu linguist compiled the word list of the protocol. Table 4.1 describes the characteristics of the expert Zulu linguist.

Table 4.1: Characteristics of Zulu linguist

Characteristics of Zulu linguist	
Gender	Female
Work environment	Tertiary Institution
Qualification	MA *cum laude*. Dissertation entitled: An Acoustic Phonetic Study of the Vowels of Setswana
Years of experience	20 years
Area of experience	Phonetics of African Languages
Knowledge base	Phonetics and Phonology
Special interest	Linguistics

4.5.3 Material and apparatus:

The material was used in phase one:

- Zulu/English English/Zulu Dictionary (Doke, Malcolm, Sikakana & Vilikazi, 1990)
- An Introduction to Zulu Phonetics (Taljaard & Snyman, 1993)

- Current Zulu articulation and language assessment materials, e.g. *Zulu Expressive and Receptive Language Assessment (ZERLA)* (Bortz, 1995)*, A Developmental profile of speech sound and syllable acquisition in Zulu-speaking children* (Naidoo, 2003)
- Sources on cleft palate speech characteristics (see Appendix L; Brodsky *et al*. 1992; Bütow, 1995; Golding-Kushner, 2001; Harding, Harland & Razzell, 1997; Henningsson *et al*. 2007; Hardin-Jones & Jones, 2005; Hutters & Henningsson, 2004; Kritzinger, Louw & Hugo, 1996; Kuehn & Henne, 2003; Kuehn & Moller, 2000; Kummer, 2001; Kummer, 2008; McWilliams *et al.* 1990; Peterson-Falzone *et al.* 2001; Peterson-Falzone *et al.* 2006; Sell, Harding & Grunwell, 1999; Sell, Harding & Grunwell, 1994; Sphrintzen & Bardach, 1995 & Van Lierde *et al.* 2004)
- Eurocran guidelines (www.eurocran.org)

4.5.4 Procedure:

The following procedural steps were followed in developing the Zulu speech materials:

- Several sources on general speech-language evaluation were consulted (Shipley & McAfee, 2004; Shipley & McAfee, 1998) to determine which general aspects to include in the biographical data sheet.
- A literature review of the speech characteristics that children with cleft palate exhibit was conducted to determine which aspects needed to be included in the protocol (Henningsson *et al*. 2007).
- Clinical assessment tools on cleft palate were reviewed for cleft palate characteristics to include in the Zulu perceptual speech assessment protocol. These include the *Facial Cleft Deformities Clinic Communication Evaluation Protocol, 0 to 3 years* (Louw & Kritzinger, 2001), *Universal Parameters for Reporting Speech Outcomes in Individuals with Cleft Palate* (Henningsson *et al*. 2007); the *Universal Parameters Form for Reporting Speech Outcomes in Cleft Palate* (Henningsson *et al*. 2007); the *Scandcleft Protocol* (Sell, 2005),

Cleft Lip and Palate Clinic of Northridge: Speech and Orofacial Consultation (Trost-Cardamone, 2004) and the *ACPA Parameters* (2004).

- A literature review of the vocabulary development of normal developing Zulu-speaking children was conducted to ensure that the protocol was linguistically and age appropriate (Bortz, 1995).
- A literature review of the normal speech sound and syllable acquisition in Zulu-speaking children was conducted in order to determine which sounds and syllables develop at the different ages to improve the linguistic applicability of the protocol (Naidoo, 2003).
- The *ZERL*A (Bortz, 1995) was reviewed to determine whether it could be used in the compilation of the protocol. One section of the ZERLA is designed to elicit speech sound production. However, the words included contained a limited number of sounds in specific noun classes, only certain word positions and limited pictures to elicit words. The ZERLA was not utilized further.
- Sources on culturally sensitivity and multicultural considerations in the assessment of children from diverse cultural backgrounds were consulted to ensure that the protocol was appropriate for Zulu-speaking children (Hegde & Davis, 2005; Klein & Moses, 1999; Naudé *et al.* 2007; Shipley & McAfee, 2004).
- The Eurocran guidelines (www.eurocran.org) and the universal parameters developed by experts in the field of cleft palate (Henningsson *et al.* 2007) were studied and used as a framework in compiling the Zulu speech materials.
- Each of the Eurocran guidelines (www.eurocran.org) was applied in the compilation of the Zulu perceptual speech assessment protocol, as follows:

1. *Guideline 1: Single word lists and short sentences:*

The different sounds and sound systems, phonemes and phonetic applications of the Zulu language were thoroughly studied. Several sources were consulted (Doke *et al.* 1990; le Roux & Groenewald, 2007; Naidoo, 2003; Taljaard & Snyman, 1993) to develop an understanding of the Zulu sound system. In

addition, an expert Zulu linguist was consulted to select appropriate test words and short sentences (www.eurocran.org).

2. *Guideline 2: Single word lists – Single consonant inventory should include all pressure consonants, all or some non-pressure oral consonants and one or more nasal consonants.*

   A Zulu word list was compiled following the guideline and the expert Zulu linguist was consulted to ensure that all the Zulu pressure consonants and some non-pressure oral consonants were selected. Click sounds are characteristic of the Zulu sound structure (Wilkes & Nkosi, 1998:xii) and were therefore included.

3. *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.*
4. *Guideline 4: Single word lists – The number of contextual sounds should be limited.*
5. *Guideline 5: Single word lists – Clusters with non-pressure consonants, clusters with nasal consonants and other types of clusters should be included.*
6. *Guideline 6: Single word lists – The position of consonants should be in "strong" and other positions in words.*

   The sources on the Zulu sound system were consulted for the selection of words to include in the word lists (Doke *et al.* 1990; Naidoo, 2003; Taljaard & Snyman, 1993; le Roux & Groenewald, 2007). The word list was scrutinized by the expert Zulu linguist to ensure that the words selected matched these requirements.

7. *Guideline 7: Single word lists – The number of representations of each test consonant should occur three times in strong positions, twice in other positions and twice in clusters.*
8. *Guideline 8: Single word lists – Test consonants should be randomly ordered and high vowels should occur in approximately 10 of the words which also have a test consonant in a "strong" position.*

Guidelines seven and eight were adhered to by analyzing the compiled word list and determining the representations of each test consonant, specifically in the initial, medial or final position within words.

9. *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.*

   Sentences were developed in conjunction with the expert linguist to adhere to the guideline.

10. *Guideline 10: Restricted speech material for cross-linguistic comparisons should include similar phonetic content and occur in similar phonetic context.*

    By following the earlier guidelines for word and sentence composition, the current protocol reflects similar phonetic content and contexts.

11. *Guideline 11: Elicitation of single word lists by using naming or semantic prompting.*

    Microsoft Office XP (2001) and *Clip Art* programmes were used to source pictures to match the selected words to facilitate the elicitation of child productions. These pictures were selected with care, to avoid possible bias pictures of children of different races and genders were included.

12. *Guideline 12: The speech material should include rote speech and counting.*

    Words representing rote speech, namely the numbers from one to 10 and the days of the week, were included in the first section of the protocol (Doke *et al.* 1990; www.eurocran.org).

13. *Guideline 13: Collecting a spontaneous speech sample.*

    Questions and phrases were compiled to elicit spontaneous speech on the following topics: family, friends, sport, hobbies, animals, jobs and explanations of sport games.

- Principles regarding suitable elicitation techniques for pre-school children were followed. These included phrasing the questions and instructions simply in short sentences, using unambiguous language for easy comprehension, using pictures with a high interest value, using pictures to elicit more than one word to ensure the least time-consuming strategy is used and using pictures that

are appropriate in size for pre-school children to recognize and relate to (Bernthal & Bankson, 2004:244; Roth & Worthington, 2001:23).

- A form for the analysis of the speech sample was compiled. This was based on the guidelines set by experts in the field of cleft palate (Henningsson *et al.* 2007) to assist speech-language therapists in rating each child's speech according to specific categories. It included nasality, nasal air flow, consonant production errors, voice disorders, speech intelligibility and speech acceptability. A four-point rating scale, namely within normal limits, mild, moderate and severe, was included (Henningsson *et al*. 2007:10; Hutters & Henningsson, 2004:545).
- The researcher constantly revised the Zulu speech materials during the development of the protocol to ensure consistent interpretation and application of the guidelines.

4.5.5 Description of the perceptual speech assessment protocol

The protocol is contained in Appendix K and consisted of the following sections:

- Aim of the protocol
- Biographical data sheet
- Cleft palate speech characteristics
- Instructions
- Speech assessment:
  Sound inventory and pictures
  Counting and rote speech
  Sentence repetition
  Word lists with non-nasal and nasal consonants
  Conversational speech
- Analysis form

4.5.6 Content validity of the perceptual speech assessment protocol

The content validity of the speech sample was addressed by following the Eurocran guidelines (www.eurocran.org) as described above. These guidelines

were compiled by experts in the field of cleft palate (Henningsson *et al.* 2007) based on consensus meetings. Therefore the compilation of the Zulu speech sample was designed to elicit a speech sample which will allow for the identification of cleft palate speech characteristics (Maxwell & Satake, 2006:128).

4. 6 Phase two: pilot study

4.6.1 Aim

The aim of phase two of the research was to pre-test the perceptual speech assessment protocol on normal Zulu-speaking pre-schoolers to determine the linguistic and age-appropriateness of the protocol as well as to ensure that the content of the protocol was reliable and valid.

4.6.2 Participants:

Twelve normal Zulu-speaking pre-school children between the ages of 3 and 6 participated in this phase of the study. The population was sourced from a selected nursery school. Non-probability sampling was used to ensure a representative sample (Maxwell & Satake, 2006:220).

4.6.3 Selection criteria:

The following selection criteria were applied.

- ***First language:***

The participants' first home language had to be Zulu, allowing for the possibility of additional languages spoken at home. Multilingualism is a characteristic of many South African families and it would be difficult to recruit participants from urban settings who speak only Zulu as a home language (Dawber & Jordaan, 2002:34).

- ***Age:***

The participants had to be between the ages of 3 to 6, since the aim of the research was the development a perceptual speech assessment protocol for pre-schoolers with cleft palate (Hardin-Jones & Jones, 2005:9).

- ***Normal Zulu-speakers:***

The participants were required to be normal, first language Zulu-speakers without congenital or acquired anomalies to preclude the possibility of any anomaly or disorder influencing their performance on the protocol (Owens, 2005:86).

- ***Race:***

The selected participants had to be black Zulu-speaking children as the aim of this study was to develop a culturally and linguistically appropriate perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate, and Zulu is predominantly spoken by the black population in South Africa (www.pansalb.org.za).

- ***Gender***

Gender was not controlled in this study as it was not considered to have an influence on the speech material or compilation of the protocol. Participants could therefore be either male or female.

- ***Variables not controlled:***

The main aim of the pilot study was to test the appropriateness of the protocol and not to assess the speech production of the participants. Therefore the following factors were not considered during the selection of participants: possible hearing loss, recurrent otitis media, articulation errors and developmental phonological disorders, possible language delays, low birth weight and prematurity. The teachers had indicated that the children have normal hearing and normal speech and language development. Furthermore, according to Rossetti (2001:106-107), children with low birth weight and prematurity, achieve normal development and catch-up growth by the age of 3 and therefore these factors would not affect the outcomes of the study.

4.6.4. Sampling method

Non-probability sampling, specifically classified as purposive sampling, was used as these children exhibited specific features of interest for the research (De Vos *et al*. 2007:328; Leedy & Ormrod, 2005:206). The researcher thought critically about the parameters of the Zulu-speaking pre-school children and clearly

identified the selection criteria (De Vos *et al.* 2007:328; Leedy & Ormrod, 2005:199). This allowed for maximizing the specific linguistically and age-appropriate information obtained from the participants.

4.6.5 Selection procedure:

- Accessible nursery schools in Gauteng were identified and the heads of the schools were requested for permission to approach the children's parents for consent to participate in the study (see Appendix I for letter of informed consent).
- The parents were contacted via letters to request participation in the research by their children (see Appendix F for letter of informed consent).
- Once consent was obtained from the parents, children's assent was obtained verbally (see Appendix G).

4.6.6 Description of participants:

The 12 participants in phase two of the study are described in Table 4.2.

Table 4.2: Biographic detail of normal Zulu-speaking children as participants
(n = 12)

Characteristics	Range	Number of subjects or value	Average or percentage
Age	3 years, 1 month – 6 years, 6 months	12	Mean age of 4 years and 3 months
Gender	Male Female	7 5	58,3% 41,7%
Home language	Zulu	12	100%

According to Table 4.2, the 12 participants represent both genders and had a mean age of 4 years and 3 months. Although the language of instruction at the nursery school was English, all the participants had Zulu as first home language

according to their parents and school records. They were categorized into 3, 4 and 6 year old groups, with six children in the 3 year old group, four children in the 4 year old group and two children in the 6 year old group to assist in the data analysis process to determine which characteristics are age-specific. The identified nursery school did not have any children who met the set criteria of the study for the 5 year age group. This was not viewed to be problematic as two of the children in the 4 year old group were almost 5 years old and the information derived from their responses was useful to determine the age and linguistic appropriateness of this protocol. Furthermore, according to Vance *et al.* (2004:43), children aged between 4 years, 7 months and 5 years, 11 months in their study showed accurate word repetitions and these skills mature with age to become more accurate. Therefore, responses of the 4 year old group could be viewed also as indicative of 5 year old children's responses.

4.6.7 Material and apparatus:

The speech material compiled in phase one was used in phase two (see Appendix K) in conjunction with the data recording sheet that was developed (see Appendix M).

.1 Description of *data r*ecording sheet (see appendix M)

A data recording sheet was compiled to assist with the data collection for phase two and contained the following:

- *Biographical information* of the participant: to assign the participation number that was allocated for each child to ensure confidentiality.
- *Reponses to the protocol:* to record the elicited responses during the counting, rote speech and sentence repetition tasks.
- *Difficulties encountered with the sentence repetition task:* to note any sentences which appeared to be too complex or not age-appropriate for participants.

- *Conversational speech:* to note the ease of elicitation of conversational speech and to provide information on the elicited speech of each participant regarding their speech production abilities.
- *Familiar and unfamiliar words on the protocol:* to note the age and linguistic appropriateness of the speech material.
- *The length of administration:* to determine the length of time taken to perform the protocol on pre-school children.
- *Difficulties with the completion of the protocol:* to note any difficulties encountered by participants, e.g. lack of concentration and complexity of the tasks presented to them.
- *Possible reasons for non-compliance:* to note for any possible contributing factors to/ reasons for non-compliance, e.g. pictures being too abstract or not clear enough to be named appropriately.
- *Familiarity with pictures:* to note age and linguistically appropriateness of the pictures.
- *Possible articulation errors or developmental phonological disorders:* to identify any possible articulation errors or concerns regarding language development.

The following apparatus (Table 4.3) was used for the data collection and analysis during phase two.

Table 4.3: Apparatus used in phase 2

Apparatus	Justification	Use	References
Digital Audio recordings - OLYMPUS VN-240PC DIGITAL VOICE RECORDER *Digital Video Recordings* - SONY HANDYCAM DCR-DVD605	To record the perceptual speech characteristics of the participants to obtain accurate information on their cleft palate speech characteristics. Digital recordings may assist speech-language therapists in analyzing the responses and lead to improved inter- and intra-rater reliability (Henningsson *et al.* 2007:5). These findings would have greater scientific credibility if recorded and rated, leading to improved quality of care (Henningsson *et al.* 2007:5; Pannbacker 2004:195).	Recording of rote speech, picture naming, sentence repetition and spontaneous speech sample	• De Vos *et al.* 2005 • Lohmander & Olsson, 2004:57 • Henningsson *et al.* 2007 • Pannbacker, 2004:195
Pictures	Accepted elicitation technique and appropriate elicitation technique for verbal responses from children (Roth & Worthington, 2001:23). Appropriate material for children's age, developmental status, language level and gender (Roth & Worthington, 2001:23).	To elicit a speech sample for analysis and comparison to conclude whether it allows for perceptual detection of cleft palate speech characteristics.	• Shipley & McAfee, 2004 • Sphrintzen & Bardach, 1995 • Henningsson *et al.* 2007

4.6.8 Procedures for data collection and analysis

- Data collection

- The participants' assent was obtained verbally by using pictures to provide them with a choice to participate or not to participate before they were asked to complete the tasks of the protocol (see Appendix G).
- The children were seen individually in a quiet office where the aim of the study was explained to them in English by the researcher. The researcher checked with the teachers regarding each child's ability to comprehend English, as no interpreter was available. The teachers identified the children with poor English comprehension and instructions to these children were explained by the teacher's assistant.
- Each child was presented with the speech elicitation material and pictures and requested to respond to what was presented to them. Their participation was encouraged by verbal and token reinforcements.
- Digital audio and video recordings were made of each participant's responses to the word and sentence elicitation tasks (Henningsson *et al*. 2007).
- Each participant's speech productions were phonetically transcribed according to manner, place and voicing of target consonants on the designed data recording sheet (see Appendix M).

- Data analysis

- The data was analyzed by reviewing and transcribing the digitally audio- and video-recorded productions of each participant to identify and determine possible articulation disorders, language delays and developmental phonological delays.
- Productions were compared to the normal Zulu grammatical sound and syllable development (Naidoo, 2003) by identifying which sounds develop at the different ages and comparing the elicited responses accordingly.
- Data relating to the length of administration, difficulties encountered during the completion of the protocol, unfamiliar words or pictures, reasons for

non-compliance and articulation or developmental phonological delays was listed for each participant to determine whether any aspects of the protocol needed to be adapted to ensure linguistic and clinical applicability of the protocol.

- Results:

- The results indicated that the pictures and words contained in the protocol were linguistically and age appropriate for all the participants and that the time taken to complete the protocol was within the normal limits for pre-school children (Roth & Worthington, 2001:23). The data recording sheet developed by the researcher (see Appendix M) proved to be adequate for the recording of all the elicited responses from the participants. Therefore a reliable and valid assessment protocol could be developed. The results of each participant's performance on the protocol during the pilot study will be presented in chapter 5.

4.6.9 Reliability and validity

Intra-observer reliability of the results was ensured as the researcher reviewed and evaluated the responses of the children on the perceptual speech assessment protocol by conducting phonetic transcriptions of their responses (Maxwell & Satake, 2006:121). Inter-observer reliability was determined by comparing the transcriptions of the elicited responses of the researcher and expert Zulu linguist. Comparisons indicated a more than 80% inter-observer agreement, as determined by descriptive statistics (De Vos *et al*. 2005:73). This indicated that the use of the instrument and elicited responses of the participants were consistent (De Vos *et al*. 2005:403).

Internal reliability was ensured by using the same procedure and items of the protocol with each individual to elicit the speech sample (Maxwell & Satake, 2006:119).

Content validity (De Vos *et al*. 2005:161; Maxwell & Satake, 2006:128) of the protocol was achieved by following the specific international guidelines

(Henningsson *et al.* 2007; www.eurocran.org) in the development of the protocol, covering the full range of the Zulu phonetic contexts and eliciting an adequate sample of the Zulu phonetic system for the compilation of the protocol. Face validity (Leedy & Ormrod, 2005:92) was also achieved as the pilot study determined that the Zulu perceptual speech assessment protocol was age and linguistically appropriate in the pilot study.

4.6.10 Trustworthiness

The trustworthiness of phase two of the study was ensured by providing the elicited responses of the participants as a true reflection of their speech abilities and by applying these findings to Zulu-speaking pre-school children with cleft palate (De Vos *et al*. 2005:345).

4.7 Phase three: determining the clinical applicability of the perceptual speech assessment protocol

4.7.1 Aim:

The aim of phase three of the research was to establish the clinical applicability of the perceptual speech assessment protocol.

4.7.2 Participants:

- Speech-language therapists: three working in Provincial Hospitals in Gauteng, the researcher and independent rater participated in phase three.
- Children: four children in the current case loads of speech-language therapists and eight children from the FCDC served as participants.

4.7.3 Selection criteria:

The following criteria were formulated for the selection of the participants.

- Speech-language therapists as participants:

- **Qualifications:**

The three participants, the researcher and independent rater were required to be qualified speech-language therapists and/or audiologists and registered with the HPCSA to ensure their professional status as this study aimed to determine the clinical applicability of the Zulu perceptual speech assessment protocol according to speech-language therapists currently practising in the Gauteng area.

- **Work context:**

The speech-language therapists were required to be employed in Gauteng by the Department of Health in Provincial Hospitals, practising in private practice or employed by an academic institution. Gauteng has a high-density population and was manageable within the time frame of the study. This would ensure that they had access to children with cleft palate.

- **Clinical experience with children with cleft palate:**

The speech-language therapists were required to have theoretical and clinical training in cleft palate and some clinical experience of service delivery to children with cleft palate, in order to be able to evaluate the clinical applicability of the perceptual speech assessment protocol. According to Vallino *et al.* (2008:371), clinical experience in working with cleft palate is imperative, as it is a complex disorder with a pervasive effect on the child and the family, which requires specialized intervention.

- Zulu-speaking children with cleft palate as participants:

- **Cleft lip and palate:**

The children had to have an unrepaired or repaired cleft lip or palate as the aim of this study was to develop a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate.

- **Home language:**

The children's first language had to be Zulu as the aim was to evaluate the clinical applicability of the perceptual speech assessment protocol based on the children's responses and performance on the Zulu protocol.

- **Age:**

The children had to be pre-schoolers between the ages of 3 and 6, as the aim of the research was to determine the clinical applicability and age-appropriateness of the Zulu perceptual speech assessment protocol on pre-school children with cleft palate.

- **Speech-language therapy:**

The children had to be in the current case loads of speech-language therapists working in Provincial Hospitals in Gauteng or speech-language therapists consulting at the FCDC to facilitate access to children with cleft palate in order to administer the Zulu perceptual speech assessment protocol.

4.7.4 Sampling method

Non-probability sampling classified as purposive sampling was used in the selection of speech-language therapists as subjects (De Vos *et al.* 2005:328; Maxwell & Satake, 2006:97). Consecutive sampling was suited to phase three of the study as the available subject group was restricted (Maxwell & Satake, 2006:96). Therefore, all speech-language therapists in the Provincial Hospitals selected and at the FCDC who consented to participate and met the selection criteria, were included as participants (Maxwell & Satake, 2006:96).

Consecutive sampling was also used for the children with cleft palate as participants in phase three, as all these children provided verbal assent and they met the set selection criteria (Maxwell & Satake, 2006:96). Purposive sampling was also used in the selection of children as participants, as they represented the Zulu-speaking pre-school children with cleft palate in Gauteng (Maxwell & Satake, 2006:97).

4.7.5 Selection procedure:

- The Chief of Operations at the Gauteng Department of Health was approached to provide consent for the execution of the research project in

Provincial Hospitals in Gauteng (see Appendix B for letter of informed consent).

- Upon obtaining the above permission, the Chief Executive Officers of identified Provincial Hospitals in Gauteng were contacted telephonically and by mail to obtain permission to perform the research project at their hospitals.
- Supervisors at speech-language therapy departments in Provincial Hospitals in Gauteng were identified and approached regarding participation in the research project. The following requests were made (see Appendixes D-F for letters of informed consent):
    - Permission for speech-language therapists to participate in the study.
    - Permission for children in their case loads to participate in this study.
    - Permission to access the children's records to complete biographical information on the protocol.
- The supervisors who granted permission received personally delivered letters of informed consent to distribute. Seven hospitals in Gauteng Province indicated that they were willing to participate in the study.
- Speech-language therapists working under the supervisors were requested to participate and to provide informed consent.
- Parents of identified children were contacted by the speech-language therapists to request informed consent for the study.
- Children's verbal assent was obtained by the speech-language therapists before conducting the protocol (see Appendix G for verbal assent pictures).
- The Head of the Facial Cleft Deformities Clinic was approached for permission to perform assessments on selected pre-school Zulu-speaking patients and to access their case records.
- The community nurse at the FCDC was requested to identify Zulu-speaking pre-school children with cleft palate.

- Parents were approached for permission to assess their children at the clinic during their routine visits.
- Verbal assent was obtained from the children (see Appendix G for verbal assent pictures) prior to performing the protocol on them.
- An independent speech-language therapist was requested to participate as an independent rater of the speech samples obtained.

4.7.6 Description of participants:

.1 Speech-language therapists

The characteristics of the speech-language therapists as participants in phase three of the study are summarized in Tables 4.4 and 4.5.

Table 4.4: Characteristics of speech-language therapists as participants (n=4).

Number of speech-language therapists conducting the protocol	Qualifications	Work setting	Training in cleft palate	Working in collaboration with cleft palate teams in Gauteng	Years of experience with cleft palate	Community service experience
1	Bachelor's degree	Provincial Hospital	- Undergraduate theoretical module - Clinical training	Yes	3 years	Yes
2	Bachelor's degree	Provincial Hospital (community service)	- Undergraduate theoretical module - Clinical training	Yes	4 months	Current
3	Bachelor's degree	Provincial Hospital (community service)	- Undergraduate theoretical module - Clinical training	No	5 months	Current
4*	Bachelor's degree	Private Practice	- Undergraduate theoretical module -Clinical training	No	3 years	Yes

* Researcher

According to Table 4.4, all four participants have a Bachelor's degree. Two of the three participants currently employed at Provincial Hospitals were serving their community service year at the time of data collection, while the remaining two participants had already completed their community service year. Two participants worked in close collaboration with cleft palate teams. Experience with cleft palate ranged from a limited four months to three years.

The location response rate was 100%, as all 23 of the Provincial Hospitals in Gauteng were contacted to participate in the study and the researcher could locate them all. The contact rate was 30%, as only seven of these Hospitals agreed to participate in the study. This may also be due to the fact that some of the Hospitals currently only conduct speech-language therapy on adult patients, some served as clinics and others referred patients with cleft palate to nearby cleft palate teams. The total response rate was a low 43%, as only three of the speech-language therapists responded on the questionnaire and returned it to the researcher (Maxwell & Satake, 2006:230).

The poor co-operation from speech-language therapists in the Provincial Hospitals in Gauteng was disappointing, especially after the supervisors of seven hospitals had given permission for them to participate in the study. After several follow-up phone calls, only three of the seven hospitals returned their completed protocols to the researcher. This low response rate could be attributed to the high workload at Provincial Hospitals in Gauteng, limited staff available and few staff adequately trained or experienced in cleft palate service delivery (Dekker, 2007:45).

The poor response from targeted speech-language therapists led to limited and insufficient data. Therefore, the researcher decided to administer the protocol on additional Zulu-speaking pre-school children with cleft palate herself, as the aim of the study was to determine the clinical applicability of the protocol on such children. An independent speech-language therapist was recruited to act as a

second rater of the responses of children to counteract possible bias regarding the researcher as data collector and to improve reliability.

The characteristics of the independent rater are described in Table 4.5.

Table 4.5: Characteristics of independent rater (n=1)

Characteristics of speech-language therapist as independent rater						
Gender	**Qualification**	**Years of experience**	**Work environment**	**Children with cleft palate in current case load**	**Area of interest**	**Cleft palate team collaboration**
Female	B. Communication Pathology degree	3 years	- Private practice - Tertiary institution	1 – 2% of total case load	Cleft lip and palate	Private practice and an academic institution

According to Table 4.5 the characteristics of the speech-language therapist made her suitable to act as an independent rater.

.2 Children with cleft palate as participants

The characteristics of the children with cleft palate who participated in the study are summarized in Table 4.6.

Table 4.6: Characteristics of children with cleft palate as participants (n=12)

Participant	Age	Gender	Type of cleft lip or palate	Age at primary surgery	Associated communication disorders	Speech-language therapy
1	4 years, 1 month	Female	Hard and soft palate only	11 months	None	Provincial Hospital
2	4 years, 3 months	Male	Unilateral cleft lip and palate	8 months	Language delay	Provincial Hospital
3	3 years	Female	Hard and soft palate only	1 year, 4 months	Chronic otitis media	Provincial Hospital
4	7 years	Female	Unilateral cleft lip	11 months	Head injury	Provincial Hospital
5	4 years, 4 months	Female	Unilateral cleft lip and palate	10 months	None	FCDC
6	6 years, 9 months	Female	Unilateral cleft lip and palate	8 months	None	FCDC
7	4 years, 1 month	Male	Bilateral cleft lip and palate	2 years, 5 months	Language delay	FCDC
8	6 years	Male	Hard and soft palate only	Using plate	None	FCDC
9	5 years, 6 months	Female	Bilateral cleft lip and palate	10 months	None	FCDC

10	6 years	Female	Unilateral cleft lip and palate	3 years, 11 months	Language delay	FCDC
11	5 years, 6 months	Female	Unilateral cleft lip and palate	No surgery yet	Language delay Mio-functional swallowing disorder	FCDC
12	3 years	Female	Hard and soft palate	No surgery yet	Otitis media	FCDC

According to Table 4.6, nine of the participants were female and three were male. This is contrary to the literature indicating that the majority of children with communication disorders are usually boys (Owens 2005:171). Recent cleft palate research also indicates the incidence of cleft palate being higher in boys than in girls (Vallino, Zuker & Napoli, 2008:486). Their ages ranged from 3 to 7 years, with an average age of 4 years 10 months. All participants, even participant number 4 in spite of her being 7 years of age, attended pre-school. Participant 4 had a learning delay attributed to a head injury.

The children exhibited a range of cleft palate types, with the highest occurrence of bilateral cleft lip and palate. Table 4.6 indicates that not all children's clefts had been repaired early. This confirms the findings of Dekker (2007:5) that several patients in the South African public health system do not seek timeous treatment and that there is a waiting list for cleft repair surgeries. Associated communication disorders include language delay, learning delay and chronic otitis media, which are commonly associated with cleft palate, and these associated disorders may influence the communication skills of children with cleft palate negatively (Peterson-Falzone *et al*. 2006:13).

4.7.7 Material and apparatus:

The perceptual speech assessment protocol developed in phase one (see Appendix K), a self-administered questionnaire (see Appendix J) and a digital voice recorder were used in phase three of the study.

4.7.7.1 Zulu perceptual speech assessment protocol:

The Zulu perceptual speech assessment protocol for pre-school children with cleft palate was used (see Appendix K).

4.7.7.2 Questionnaire:

A self-administered questionnaire was compiled for phase three of the study and is contained in Appendix J.

.1 Aim of the questionnaire:

The aim of the questionnaire was to determine the perceptions of the speech-language therapists as participants regarding the clinical applicability and age-appropriateness of the perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate.

.2 Justification for the use of a questionnaire as data-collection tool:

A questionnaire was selected as it is a useful tool for gathering a wide range of information in various contexts (De Vos *et al*. 2005:169). Responses were considered to be reliable since the questionnaire was completed by the participants after they had examined and then administered the Zulu perceptual speech assessment protocol (De Vos *et al.* 2005:170) to children in their case loads.

.3 Guidelines followed in the design of the questionnaire:

The guidelines provided by Bailey (1994), De Vos *et al*. (2005) and Pannbacker & Middleton (1994) were followed in the development of the questionnaire. According to Pannbacker and Middleton (1994:93), an authoritative questionnaire forms an integrated whole due to questions being interwoven and ensuring an easy progression.

Two principles of an authoritative questionnaire were considered, namely to eliminate uncertainty regarding the completion of the questionnaire and to determine the perceptions of the participants on the clinical applicability of the Zulu perceptual speech assessment protocol (Pannbacker & Middleton,

1994:93). The researcher pre-determined appropriate questions, restricted the length, used clear unambiguous language in formulating the questions, determined that no unwarranted assumptions could be made, ensured consistency in the questions, kept the task simple, provided clear instructions and edited the questionnaire to have a professional and attractive appearance to improve the response rate (De Vos *et al.* 2005:171; Leedy & Ormrod, 2005:191).

.4 Content of the questionnaire:

The questionnaire consisted of four sections and is described in Table 4.7.

Table 4.7: Content of the questionnaire

Content	Justification	Description	References
Participant information sheet	• To guide participants what was required of them (De Vos *et al*. 2005:170). • To ensure that participants communicated as much information as possible to ensure the objectives of the study (Leedy & Ormrod, 2005:185)	• The aim of the protocol • The role of each participant • Instructions for the completion of the questionnaire.	• De Vos *et al*. 2005 • Leedy & Ormrod, 2005
Biographical information section	• To determine the current knowledge base and clinical skills of speech-language therapists working with these children (Vallino *et al.* 2008:371) • To gain information on the current services provided to the multilingual cleft palate children	• Work context of speech-language therapists. • Levels of service delivery • Language of therapist. • Qualifications • Years of experience with cleft palate • Percentage of children with cleft palate in the current	• Louw *et al*. 2006 • Kuehn & Henne, 2003

	in South Africa.	case load.	
Section A: Evaluation of the applicability of the protocol	• To obtain the perceptions of speech-language therapists working with children with cleft palate regarding the clinical applicability of the protocol (Streicher, 2005). • To provide local evaluations of this protocol (Henningsson *et al*. 2007:4) for possible improved service delivery to children with cleft palate.	• Instructions of the perceptual speech assessment protocol • Descriptions of the cleft palate speech characteristics • Perceptual assessment of the speech characteristics of children with cleft palate • Clinical usage of the protocol • Administration of the protocol • Need for an interpreter • Rating system • Length of the protocol • Usage of video and/or audio recordings • Suitability of the protocol for the different age groups • Reasons for non-	• Streicher, 2005 • Henningsson *et al*. 2007

		compliance • Usefulness of such a protocol in the current work context • Need for a similar protocol in other languages	
Section B: Administration of the protocol	• To provide valuable information on the administration of the perceptual speech assessment protocol on pre-school children with cleft palate. • To provide information regarding the clinical applicability of this protocol • To guide the service delivery to pre-school Zulu-speaking children with cleft palate (Henningsson *et al*. 2007:4)	• Possible reasons for not piloting the protocol If the protocol were piloted: • Number of children and their ages • Ease of administration • Length of the protocol • Detailed perceptual speech analysis • Descriptions of cleft palate characteristics • Use and need for audio and/or visual recordings • Reasons for non-compliance • Language of instructions	• Streicher, 2005 • Henningsson *et al*. 2007

	• Need for an interpreter • Future use of the protocol • Comments and recommendations

.5 Types of questions:

Open and closed set questions were included in the questionnaire. Open set questions (Section A questions 4, 7, 8, 9, 12, 13; Section B questions 1, 7, 8, 10, 11) gave the participants the opportunity to formulate responses without being restricted to a certain answer (Roth & Worthington, 2001). Closed set questions (Section A questions 1, 2, 3, 4, 5, 6, 10, 11; Section B question 2, 3, 4, 5, 6, 9) provided an opportunity to reduce uncertainty and increase the possibility of completing the whole questionnaire, without omitting questions (De Vos *et al.* 2005:174). Closed set questions were also used to ensure relevant responses to each question and to limit the number of responses obtained from each participant (De Vos *et al*. 2005:174). The questionnaire is contained in Appendix J.

4.7.7.3 Digital voice recorder

The apparatus used in phase three of the study is described in Table 4.8.

Table 4.8: Material and apparatus used in phase 3 of the study

Apparatus	Justification	Use	Reference
Digital audio recordings - OLYMPUS VN-240PC DIGITAL VOICE RECORDER	• To record the perceptual speech characteristics of the participants • To obtain accurate information on their cleft palate speech characteristics • To provide greater scientific credibility by recording and rating responses, leading to improved quality of care (Henningsson *et al*. 2007:5; Pannbacker 2004:195).	• Recordings of rote speech, picture naming, sentence repetition and spontaneous speech sample	• De Vos *et al*. 2005 • Lohmander & Olsson, 2004:57 • Henningsson *et al*. 2007 • Pannbacker, 2004:195

4.7.8 Data collection and analysis

.1 Data collection

- Copies of the protocol and questionnaire were provided to speech-language therapists assigned to working with children with cleft palate at the seven identified Provincial Hospitals in the Gauteng area who had provided informed consent.
- The speech-language therapist participants from the hospitals who provided consent for the study were requested to read the participant information sheet carefully and to adhere to the instructions.
- They were required to examine the protocol and to complete section A of the protocol before administering it on a child (see Appendix J for questionnaire).
- The speech-language therapists were requested to select a child from their current case load who met the criteria specified by the researcher and to apply the protocol on a minimum of one of these Zulu-speaking pre-school children with cleft palate.
- They were required to use the necessary digital equipment if possible to make audio and/or video recordings of participants' responses.
- Upon administration of the protocol they were required to complete the protocol's data sheet by rating the child's responses on the protocol and by using the input obtained from their colleagues to assist them in the rating process.
- After completion of the data sheet, they were required to complete the questionnaire provided to determine their perceptions of the protocol.
- After numerous follow-up enquiries, urgent telephonic conversations and requests, it became evident that only three participants from the seven hospitals had complied with the request to administer the protocol on a child with cleft palate in their case loads and to complete the questionnaire.
- Three participants were an insufficient number to meet the aims of the research and it was deemed necessary to increase the number of children to be assessed. Therefore children registered as patients with

the Facial Cleft Deformities Clinic (FCDC), University of Pretoria, were assessed by the researcher and digital audio recordings were made.

- The data collection triangulation occurred as data was obtained from the speech-language therapists' evaluations and administrations and from the researcher administering the protocol herself.

4.7.8.2 Data analysis

.1 Questionnaire:

Responses to the closed-ended questions of the questionnaire were analyzed by using MS Excel to classify, organize and summarize observations and perceptions of the speech-language therapists (Maxwell & Satake, 2006:280). Open-ended questions were analyzed according to their qualitative description by inductive reasoning, sorting and categorizing the data into small sets of abstract, underlying themes, e.g. the content and clinical applicability of the protocol, administration time, comments and recommendations regarding the protocol and the future use of the protocol (Leedy & Ormrod, 2005:150). The information was presented in figures and tables and was described quantitatively (Leedy & Ormrod, 2005:150).

***.2 Zulu* perceptual speech assessment protocol:**

Speech-language therapists in Provincial Hospitals used their colleagues to assist with the rating of children's responses. The recorded responses of children were independently evaluated and rated by the second rater. This was conducted by completing the data sheet on the protocol regarding each of the elicited responses on the picture naming task, sentences, word repetitions and spontaneous speech sample of each child assessed at the FCDC. These data sheets were then discussed with the researcher. The information was presented in tables and figures and described accordingly (Leedy & Ormrod, 2005:105).

4.7.9 Reliability and validity

- ***The Zulu perceptual speech assessment protocol:***

A detailed description of the validity and reliability of the protocol is provided under section 4.6.9.

- ***Questionnaire:***

The content validity of the questionnaire was achieved by carefully following literature guidelines in the compilation of the questionnaire (Maxwell & Satake, 2006:90). Construct validity was obtained as the same questionnaire was used for all the speech-language therapist participants and the questionnaire identified the perceptions of speech-language therapists regarding the clinical applicability of the protocol (Maxwell & Satake, 2006:129).

The internal consistency reliability of the questionnaire was achieved by ensuring that the same instructions were given to all participants and by carefully phrasing the questions (Maxwell & Satake, 2006:120).

4.7.10 Trustworthiness

Trustworthiness of phase three of the study was ensured as the results from phase three indicated that the protocol could be used with Zulu-speaking pre-school children with cleft palate as it succeeded in identifying the specific cleft palate speech characteristics in an African language. The credibility of the study was ensured as the findings can be reduplicated and the inclusion of an external rater reflected the true findings of the study (De Vos *et al*. 2005:345).

4.8 Phase four: determining the applicability of international guidelines on a Zulu perceptual speech analysis

4.8.1 Aim:

The aim of phase four of the research was to determine the relevance of the international guidelines (www.eurocran.org) in compiling a perceptual speech assessment protocol in the Zulu language.

4.8.2 Participants:

The speech-language therapist as researcher participated in reflecting on the usefulness of the international guidelines for the perceptual speech assessment of children with cleft palate.

4.8.3 Material:

The perceptual speech assessment protocol for Zulu-speaking children with cleft palate (see Appendix K) and the Eurocran guidelines (www.eurocran.org) were used in phase four of the study.

4.8.4 Procedure for data collection and analysis:

- The data sheets of the participants and recordings of their speech productions completed by the second rater obtained in phase three were reviewed, analyzed and compared to the protocol and the international guidelines to determine the applicability of each of the guidelines on the Zulu perceptual speech assessment protocol.
- Each guideline was critically examined to determine the applicability thereof on the Zulu perceptual speech assessment protocol for pre-school children with cleft palate.
- The researcher used the protocol according to the information obtained in the questionnaires, from the assessments of the children at the FCDC and by consulting with the independent rater regarding her perceptions of the data collected. The questionnaires, responses and digital recordings were played and compared to the guidelines set by experts in the field of cleft palate (Henningsson *et al.* 2007; www.eurocran.org). These ensured that inter-observer reliability was obtained and that the applicability of the protocol was evaluated thoroughly (Maxwell & Satake, 2006:114).

4.9 Conclusion

By following a formal mixed method approach in this study all the detailed information needed for research was included to ensure valid and reliable results (Leedy & Ormrod, 2005:134). The conclusion can therefore be drawn that the

method was comprehensive, leading to research being conducted systematically. The method of this study included all the important principles in the literature for the perceptual assessment of children with cleft palate and procedures followed to ensure replicability by other researchers. This method confirmed a greater understanding of the development of a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate.

4.10 Summary

This chapter described the research design and methodology that were used to develop a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate. The objectives to be achieved were detailed, as was the separate discussion of the four different phases of the study. The selection of participants with reference to the inclusion and exclusion criteria was described and the data collection and analysis procedures were discussed. The ethical implications of the study and the reliability and validity of the research received the appropriate attention.

CHAPTER 5
RESULTS AND DISCUSSION

The aim of this chapter is to present the results according to the specified objectives of the study. The results are discussed and compared to the current body of knowledge to obtain meaning and to provide insight into the service delivery to children with cleft palate.

5.1 Introduction

Research on cleft palate has become an integral part of the management process and may be conducted by longitudinal assessments of the outcomes of treatment, periodic team reviews of data outcomes and the necessary adaptations to treatment procedures as recent research is accessed (ACPA, 2007:24). Speech-language therapists working with children with cleft palate need to act on and inform parents and caregivers of new developments in the diagnosis and treatment of cleft palate as they become available (ACPA, 2004:9). Speech-language therapists can systematically improve their efforts to be better clinicians, colleagues, advocates and investigators by considering clinical experience and patient preference against the background of the highest quality scientific evidence that can be found (Dollaghan, 2004:4).

An important role of speech-language therapists as members of cleft palate teams is also to conduct research to contribute to the scientific development of the field and to improve service delivery. The limited assessment resources available in African languages necessitated the current research. According to Leedy and Ormrod (2005:5), research requires the collection and interpretation of data in an attempt to resolve the problem that initiated the research.

The descriptive results are presented according to the objectives delineated to achieve the main aim of the research, namely to develop a reliable perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate. Figure 5.1 provides a schematic illustration of the results.

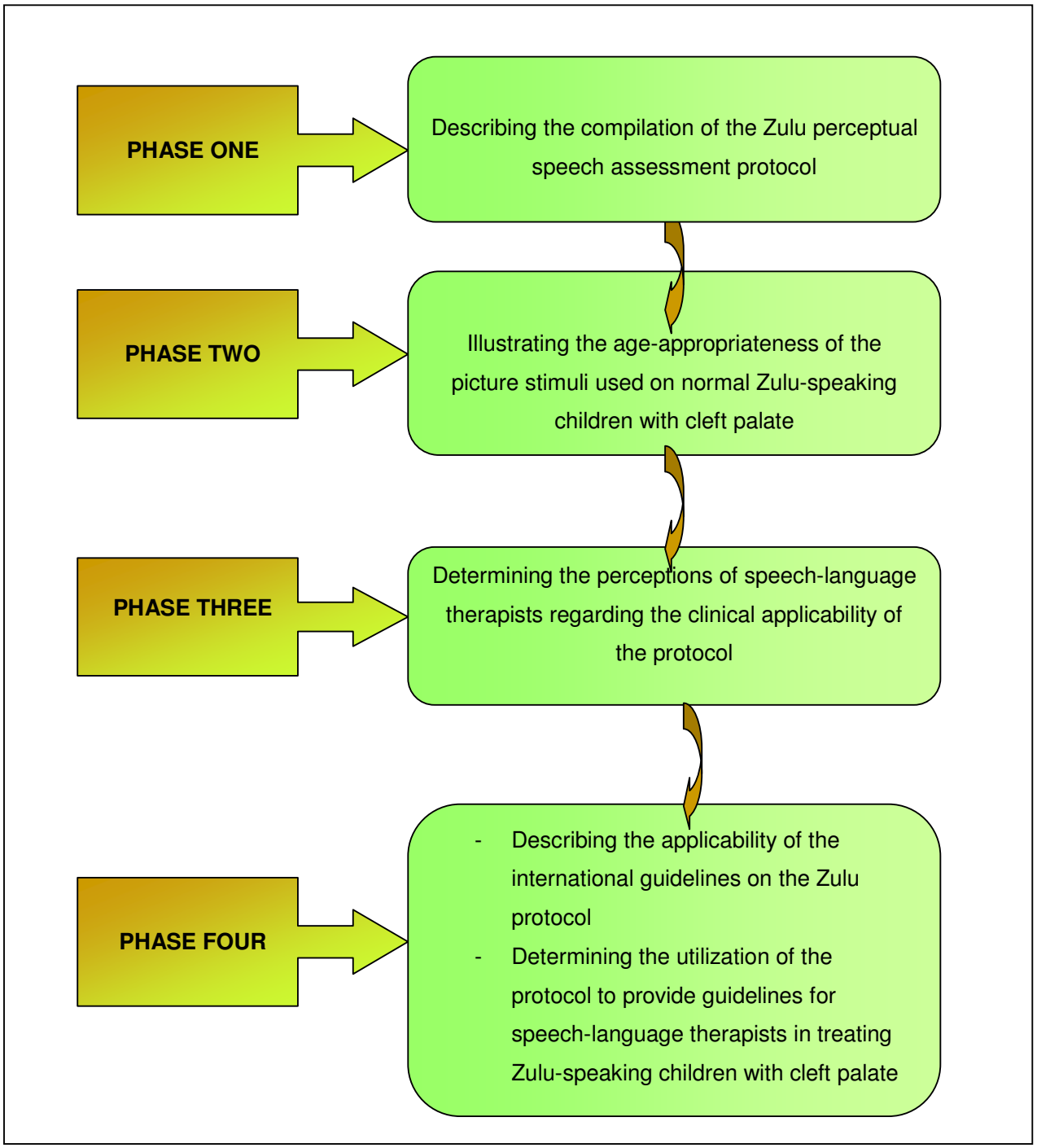


Figure 5.1. Schematic illustration of the results

5.2. Phase one: the compilation of the Zulu perceptual speech assessment protocol

Objective one: To describe the compilation of the Zulu perceptual speech assessment protocol.

In the development of diagnostic materials, it is important to reflect on the processes followed to obtain insight into the processes of the development of diagnostic tools and to comprehensively portray the collected data. Researchers in South Africa, such as Streicher (2005), Visser (2005) and Weinmann (2004), developed speech-language assessment materials for use in the South African context. Each created a framework for describing the process. These frameworks guide the following reflection:

5.2.1. Process of the compilation of the Zulu perceptual speech assessment protocol

The reflection process contributed in determining the applicability of the protocol on the Zulu-speaking pre-school population and confirmed the theoretical framework of the study (De Vos *et al*. 2005:246; Visser, 2005:128; Weinmann, 2004:41).

Several sources on cleft palate speech characteristics, the perceptual speech assessment of children with cleft palate and guidelines for the development of assessment tools were consulted. This informed the compilation process as follows (based on Visser, 2005; Weinmann, 2004):

- Insight was gained into the cleft palate speech characteristics that needed to be considered when assessing these children, as this information is important when obtaining a detailed speech sample of the children's consistency and frequency of errors. This provided information on a representative sample of the various speech characteristics demonstrated in controlled speech contexts that may be influenced by cleft palate (Henningsson *et al*. 2007:5).
- The nature of the speech sample to be compiled was determined by applying the Eurocran guidelines (www.eurocran.org) in the compilation of the Zulu perceptual speech assessment protocol for pre-school children with cleft palate. These guidelines provided an extremely useful framework for the inclusion of age- and linguistically appropriate data in the protocol.

- The aspects of normal Zulu vocabulary and speech development in the protocol and the normative data on the Zulu speech sound and syllable structure development (Naidoo, 2003) were studied. Sources on the normal Zulu speech sound acquisition and syllable structure development are limited. The study of Naidoo (2003) on the Zulu speech sound and syllable structure development proved to be a valuable resource. It was used as a guideline for the selection of the different words for the protocol.
- Age-appropriate pictures for culturally and linguistically sensitive assessment tools and important information to be considered with these materials proved to be valuable in designing the protocol and choosing suitable pictures (Hegde & Davis, 2005; Klein & Moses, 1999; SASLHA, 2003).
- Sources on cleft palate speech and multicultural assessment materials were consulted to identify important considerations for conducting multi- and cross-cultural speech assessments on children (Klein & Moses, 1999; Roth & Worthington, 2001).

The development of the perceptual speech assessment protocol was a time-consuming, complex process. This was, however, a crucial starting point in the study, as it set the background for the compilation of the protocol.

The compilation of the Zulu perceptual speech assessment protocol proved to be challenging and the challenges were met in the following manner:

- The current dearth of culturally and linguistically appropriate assessment materials for Zulu-speaking children (Mphahlele, 2006), especially for children with cleft palate, limited the use of any existing tests in the Zulu language. This is attributed to the fact that none of these tests were appropriate for assessing Zulu-speaking children with cleft palate as the current Zulu assessment materials do not allow for the identification of specific cleft palate speech characteristics. Information on the speech production, phonological development and influence of cleft palate on speech production needed to be considered to obtain accurate speech assessment data. This challenge was met by consulting with the specialist Zulu linguist

and by following the Eurocran guidelines (www.eurocran.org) and guidelines developed by experts in the field of cleft palate (Henningsson *et al*. 2007) for the framework of the compilation of the Zulu perceptual speech assessment protocol for pre-school children with cleft palate.

- The majority of speech-language therapists working with children with cleft palate in South Africa are Afrikaans and English speaking (Pakendorf, 1998:2) whilst 75% of the population have an African language as native language (www.pansalb.org). Therefore the perceptual speech assessment protocol needed to be uncomplicated, easy to administer with or without the use of an interpreter, user-friendly and with accurate guidelines and instructions regarding the Zulu language, cleft palate speech characteristics and cultural sensitivity to allow speech-language therapists to use it clinically. This challenge was addressed by ensuring that the content was clear, uncomplicated and unambiguous, with specific instructions and guidelines for speech-language therapists to follow during administration of the protocol to identify specific cleft palate speech characteristics.
- The lack of norms and limited normative data for Zulu challenged the compilation of an age-appropriate perceptual speech assessment protocol for Zulu-speaking children with cleft palate (Naudé *et al.* 2007:521). This challenge was met by including the Zulu phoneme structure, developmental levels of pre-school children's expressive and receptive language abilities and the normal Zulu sound and syllable acquisition in the protocol to develop an age and linguistically appropriate protocol (Naidoo et al. 2005; Taljaard & Snyman, 1989).
- The researcher's knowledge of the Zulu language and sound structure was based mainly on theoretical knowledge and very limited conversational ability in Zulu. This challenge was addressed by the researcher wanting to provide accountable services and to realize an opportunity to fulfil a clinical need (Streicher, 2005). Therefore, an expert Zulu linguist was consulted for the compilation of the protocol. In order to improve the validity and reliability of the protocol, the expert linguist controlled the words and sentences in the

protocol by monitoring the phonetic structure of words, phonetic environments of each phoneme and the sentences included in the protocol.

Consultations with the expert Zulu linguist proved to be invaluable due her knowledge of the Zulu language structure and phonetic system. This was a meaningful experience for the researcher as she was exposed to collaboration with an expert linguist in developing the Zulu protocol to obtain data for this specific geographical area and language group, and in doing so responded to the plea made by Naudé *et al.* (2007:535) for collaboration between speech-language therapists and linguists in the development of speech-language assessment tools for African language-speaking children (Naudé *et al*. 2007:535).

It was concluded that the compilation of the speech materials of the Zulu perceptual speech assessment protocol for pre-school children with cleft palate was completed successfully by applying literature guidelines and by consulting and collaborating with an expert Zulu linguist (www.euorocran.org; Henningsson *et al*. 2007; Visser, 2005:130).

5.3 Phase two: pilot study

- Objective two: To determine the age-appropriateness of the picture stimuli used in the protocol by applying it on normal Zulu-speaking pre-school children.

The data obtained in phase two of the study were used to illustrate the age-appropriateness of the picture stimuli in the protocol and were discussed in chapter 4 (see 4.6.8). The results of the 12 children's performance on the Zulu perceptual speech assessment protocol are illustrated in Figure 5.2 and discussed accordingly.

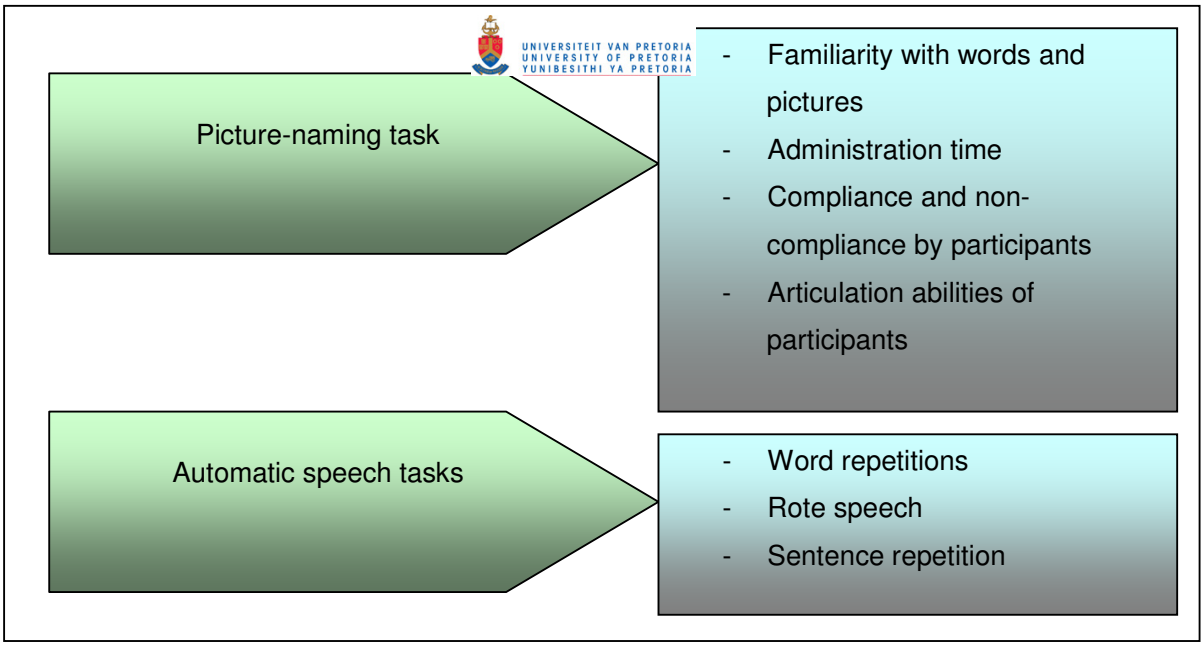


Figure 5.2 Illustration of discussion of results: Phase two

5.3.1 Speech sample: Picture-naming task

The results pertaining the speech sample are presented in Figures 5.3 and 5.4 as well as in Tables 5.1 and 5.2.

.1 Familiarity of pictures and words on the perceptual speech assessment protocol

The results are illustrated in Figure 5.3

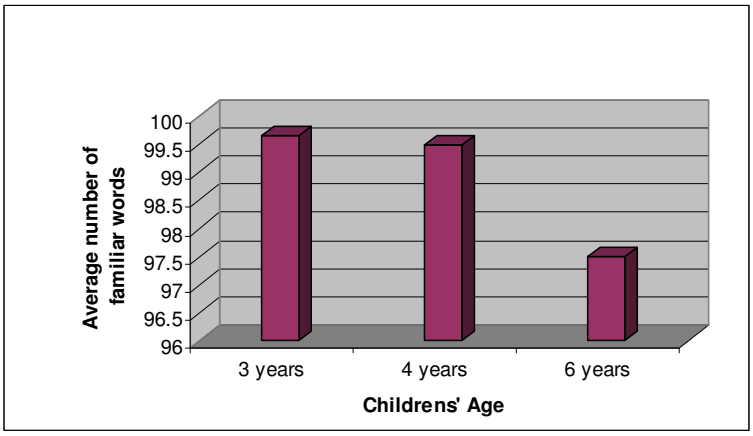


Figure 5.3 Average number of pictures familiar to the pre-school participants (n=12)

According to Figure 5.3, the majority of the three to six year old children were familiar with the pictures presented to them. The average number of familiar words and pictures were 98 of the 110 pictures and words presented. Pictures that were unfamiliar to the children included numbers 5, 7, 28, 29, 31, 35, 39, 48, 49, 54, 60, 63, 67 (see Appendix O for complete list of unfamiliar pictures and words). These included agent and action semantic words, e.g. *qakatha – to plait hair, and mbatha – to dress* (Owens, 2001:263). These were difficult to illustrate with pictures, which may have contributed to the unfamiliarity to the participants. The correct responses were elicited by semantic prompting (www.eurocran.org).

According to Figure 5.3, two children in the six year old group were less familiar with the pictures and words presented to them than the participants in the 3 and 4 year old groups. It is important to note that the six year old group consisted of only two participants and therefore the average number of words familiar to them was less than those of the three and four year old groups. Each participant's level of functioning, language ability, phonological and linguistic differences needs to be considered, as these aspects could also affect the familiarity of participants with the words and pictures (Hegde & Davis, 2005:199).

It is concluded that the pictures were appropriate for all the age groups of participants in phase two. Adaptations can be made to the elicitation process according to the child's level of functioning. Semantic prompting can be considered for the elicitation of the words on the protocol to ensure clinical applicability.

.2 Administration time of the perceptual speech assessment protocol

The results of the time taken to administer the protocol are illustrated in Figure 5.4.

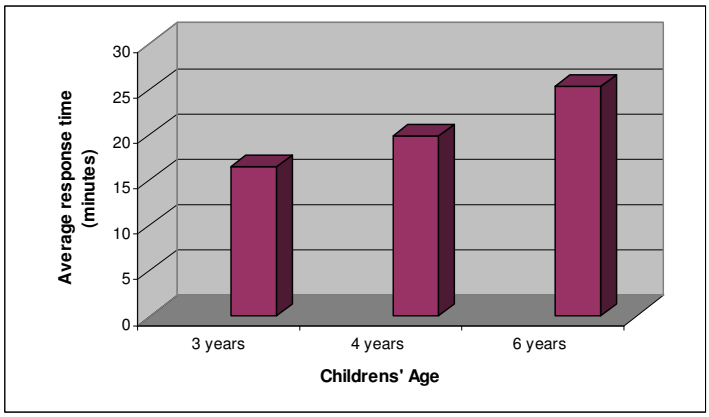


Figure 5.4 Administration time of the protocol (n=12)

The protocol took between 11 minutes, 22 seconds and 23 minutes, 51 seconds to conduct with each of the 12 participants, with an average time of 20 minutes, 53 seconds. Figure 5.4 illustrates that the administration times for each of the three participation groups differed according to their level of expressive language abilities and semantic-syntactic development. The four and six year old children with the higher levels of expressive language and semantic-syntactic development performed better on the tasks presented to them, as they could complete more items on the protocol, which led to a longer administration time. The administration times were, however, still within the normal time frame for pre-school children when compared to commercially available speech assessment tests (Fisher-Logeman, 1971; Fudula, 1963; Goldman-Fristoe, 1969).

When comparing the administration time of the perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate to the commercially available materials for the speech assessment of pre-school children, namely the *Goldman-Fristoe Test of Articulation (1969), Fisher-Logeman Test of Articulation Competence (1971)* and the *Arizona Articulation Proficiency Scale: Revised (1963)*, the administration times of each of the 12 participants were appropriate for pre-school children, as all of these commercially used tests take between 20 and 30 minutes to administer.

The protocol consisted of several sections and words (see Appendix K) according to the different Zulu phonemes to be elicited, which could have impacted on the administration time of the protocol. In a hospital-based setting, an average administration time of 20 minutes, 53 seconds is acceptable, as a normal speech-language therapy session ranges from 30 to 60 minutes and the rest of the session could be applied to conduct, for example, an oral-peripheral or language evaluation on the child (Roth & Worthington, 2001:23). The administration time of the protocol makes it usable as an evaluation tool in a hospital context.

.3 Compliance and non-compliance

According to Table 5.1, seven of the 12 participants did not fully cooperate during the testing procedure. This behaviour may be attributed to various factors as listed in Table 5.1.

Table 5.1 Possible reasons for non-compliance by participants of phase two (n=7)

Participation number	Instructions provided in English	Levels of concepts included
2	√	√
3	√	√
4		√
5	√	√
6		√
10		√
11		√

Three of the participants with Zulu as their main home language struggled with the English instructions. According to Dawber and Jordaan (2002:5), learning a second language is more difficult than first language learning as it may take up to five years for a second language learner to become proficient in his/her second language. For pre-school children to understand and follow instructions they need to be familiar with the vocabulary used (Dawber & Jordaan, 2002:6). The

majority of South African children are multilingual and close attention needs to be paid to test instructions to prevent technical and situational biases (Goldstein, 2000:65).

Several other factors may contribute to non-compliance by children in testing conditions, such as performance demands, language disorders, pragmatic disorders, conceptual complexity of test items, English as Additional Language (EAL) and the clarity of pictures included (Klein & Moses, 1999:186). Non-compliance by the seven participants was also attributed to the level of concepts included in the protocol. These levels included the semantic-syntactic combinations of pictures to elicit words that were difficult for pre-school participants to produce, namely concepts such as *breathing (phefumula), jumping down (ngqabitha), saw thick (xhonkxa*) and *smash to pieces (maklaka)*. These concepts were, however, important to include in the protocol, as some were the only words where the specific phonetic context or sound syllable occurs in the Zulu language. To ensure an understanding of the concepts, semantic prompting and queuing were used to elicit the specific responses required from the participants (www.eurocran.org) to which they responded well.

.4 Articulation and developmental phonological abilities

The speech production abilities of the participants are summarized in Table 5.2 and the comprehensive phonetic transcriptions of the productions are contained in Appendix N.

Table 5.2 Speech production abilities of participants in phase two (n=12)

Participant	Age	Articulation errors	Phonological processes
1	6 years, 4 months	• Additions • Substitutions	• Deletion of unstressed syllable • Backing • Idiosyncratic processes
2	3 years, 5	• None	• None

	months		
3	3 years, 1 month	• None	• None
4	3 years, 9 months	• None	• None
5	3 years, 6 months	• None	• None
6	3 years, 10 months	• None	• None
7	4 years, 7 months	• Additions • Omissions	• Deletion of unstressed syllable • Backing • Epenthesis
8	6 years, 6 months	• Substitutions • Additions • Omissions	• Deletion of unstressed syllable • Cluster reduction • Gliding
9	4 years, 5 months	• Additions • Omissions	• Deletion of unstressed syllable • Gliding • Cluster reduction • Epenthesis
10	3 years, 9 months	• None	• None
11	4 years, 1 month	• None	• None
12	4 years, 4 months	• Additions • Substitutions • Omissions	• Deletion of unstressed syllable • Cluster reduction • Epenthesis

According to Table 5.2, articulation errors and developmental phonological processes were present in a six year old child and in three of the children in the

four year old group. Articulation and phonological processes were judged to be within the normal limits for the three year old participants and the participants between four years one month and four years five months, even though they had speech production errors (Bernthal & Bankson, 2004:118; Naidoo *et al*. 2005:68). Articulation errors were still present in the participants until the age of 6 years and 6 months. The stabilization period for the acquisition of speech sounds and the later lexical acquisition that ensures the mastering of phonological difficulties and word productions occurs between the ages of four and eight years (Bauman-Waengler, 2000:72; Bernthal & Bankson, 2004:118). Substitutions, deletions and omissions may still exist in children older than three years, as most of the Zulu consonants are acquired by the age of four (Naidoo *et al.* 2005:74). Phonological processes may still occur until the age of five and this may clarify the presence of phonological processes in the four year old children (Bauman-Waengler, 2000:107). If these processes occur after the age of five, it is classified as delayed development. Therefore, seven of the participants were judged to exhibit normal speech production abilities (Naidoo *et al*. 2005:71).

Several phonological processes were identified in five of the participants, as illustrated in Table 5.2. These occurred in three of the four year old children and one of the six year old children. These included deletion of unstressed syllables, backing, epenthesis, cluster reduction and gliding.

Idiosyncratic phonological processes were used by only one participant, which reflects the literature findings indicating that such processes are infrequent in the speech of normally developing children and may occur in children with developmental phonological disorders (Bauman-Waengler, 2000:72). The participant using idiosyncratic processes also exhibited deletion of unstressed syllables and backing, indicative of a developmental phonological disorder (Bauman-Waengler, 2000:73).

The incidence of phonological processes in the older age groups of participants confirms literature findings. Priester and Goorhuis-Brouwer (2008:805) found that

phonological processes were still evident in children with cleft palate as old as seven years. According to Vermaak (2006:30), there is a complex relationship between multilingualism and phonological development, which in part explains the developmental phonological disorders of participant one and eight.

In conclusion the findings indicated that the picture-naming task could be used to elicit a speech sample in which articulation errors and developmental phonological processes, should they occur, could be identified. The protocol was found to be useful as a clinical tool to determine the speech production abilities of the pre-school Zulu-speaking children as participants. It is important to note that the pilot study assessed normal Zulu-speaking children and identified articulation errors and developmental phonological processes. Children with cleft palate may also exhibit articulation errors and developmental phonological processes, as well as typical cleft palate speech characteristics (Priester & Goorhuis-Brouwer, 2008:805). The protocol may therefore also be useful to describe the speech development of children with cleft palate.

5.3.2 Automatic speech tasks

The automatic speech tasks included counting rote speech, repetition of words with nasal and non-nasal consonants, sentence repetitions and a spontaneous speech sample. Results are illustrated in Table 5.3.

Table 5.3 Participants' responses on automatic speech tasks (n=12)

Participant	Counting in Zulu	Days of week in Zulu	Words with nasal consonants	Words with non-nasal consonants	Sentence repetitions	Speech sample
1	No	No	√	√	√	√
2	No	No	√	√	√	√
3	No	No	√	√	Struggled with task	Struggled with task
4	No	No	√	√	√	√
5	No	No	√	√	√	√
6	No	No	√	√	√	√

7	No	No	√	√	√	√
8	No	No	√	√	√	√
9	No	No	√	√	√	√
10	No	No	√	√	√	√
11	No	No	√	√	√	√
12	No	No	√	√	√	√

- **Rote speech:**

The rote speech was elicited by requesting participants to count from one to 10 and to name the days of the week in Zulu. The aim of this task was to determine whether the children could perform the task and to elicit a sample of the Zulu phonemes. All the participants struggled to complete this task in Zulu. Their responses may reflect the influence of ELoLT and of multilingual exposure to a mix of languages at home as Zulu was not the only language that they are exposed to (Dawber & Jordaan, 2002:23). It is also customary for African language speakers to use English words when counting or talking about the days of the week (www.pansalb.org). The task may also have been difficult for the three and four year old children, due to difficulty experienced in understanding the instructions (Dawber & Jordaan, 2002:5). It is suggested that in such situations the children be requested to repeat the rote speech items rather than to perform the task spontaneously. Repetitions would allow for the range of Zulu phonemes to be elicited.

- **Words with nasal and non-nasal consonants**

All the participants could repeat words with nasal and non-nasal consonants successfully and showed comprehension of the task. This task was therefore considered to be age, culturally and linguistically appropriate.

- **Sentence repetition task**

According to Table 5.3, only participant three struggled with this aspect of the automatic speech task. He tended to shorten sentences and omit phrases in an attempt to simplify the task. All other 11 participants could repeat sentences

without any difficulty. The sentences were therefore considered to be well suited to the pre-school age level.

- **Spontaneous speech sample**

During this section of the assessment, participants were requested to provide information on, for example, their family, sports and hobbies (see Appendix K). This elicitation technique was successful in engaging 11 of the 12 participants to converse in continuous speech. The one participant who did produce a limited spontaneous speech sample was found to have an expressive language delay as she used simple sentence constructions, consisting of only one word representations of subject or verb structures when prompted.

The automatic speech tasks were found to provide valuable information on the normal Zulu-speaking pre-school children's abilities to provide responses on rote speech, words with nasal and non-nasal consonants, sentence repetitions and producing spontaneous speech. This section could prove to be useful in the assessment of children with cleft palate, as their productions of the automatic speech tasks could be used to identify specific cleft palate speech characteristics.

In conclusion, the results of phase two on non-cleft palate Zulu-speaking children's performances on the protocol indicated that the test instructions, level of concepts included, their pictorial representation, the nature of the speech sample and the administration time were age and linguistically appropriate for Zulu-speaking pre-school children.

5.4 Phase three: perceptions of speech-language therapists regarding the clinical applicability of the protocol

- Objective three: To determine the perceptions of speech-language therapists regarding the clinical applicability of the protocol.

Speech-language therapist participants' perceptions of the clinical applicability of the Zulu perceptual speech assessment protocol were determined by their responses to a self-administered questionnaire (see Appendix J) and the researcher's administration of the protocol on eight children. The results are illustrated in Figure 5.5.

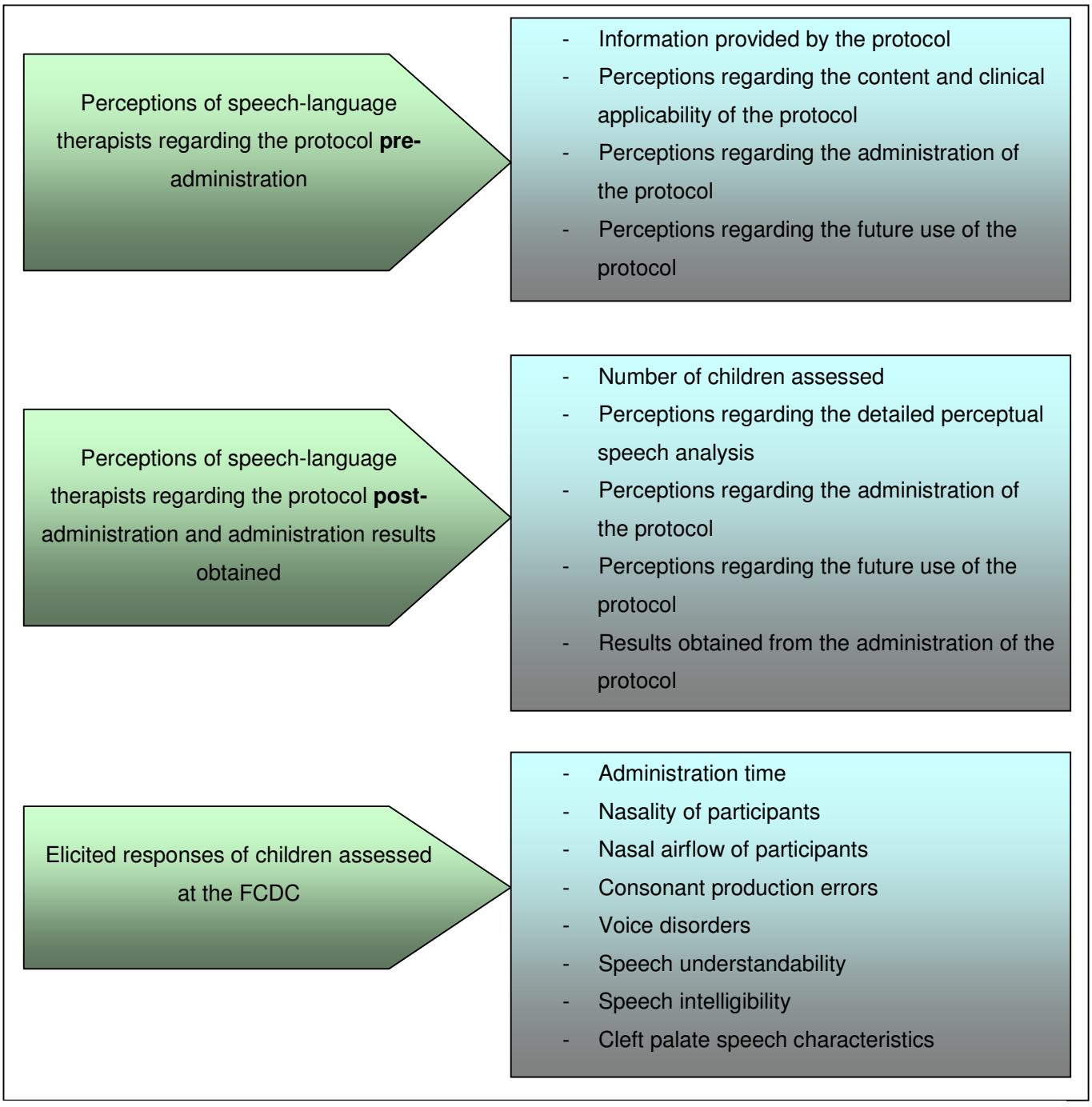


Figure 5.5 Illustration of discussion of results: Phase three

5.4. Perceptions regarding the clinical applicability of the perceptual speech assessment protocol pre-administration

Speech-language therapists' perceptions were analyzed in terms of the different sections of the questionnaire.

5.4.1 Information provided by the protocol

The speech-language therapists' opinions regarding the information component of the protocol were obtained from section A of the questionnaire (Questions 1 and 2) and are illustrated in Table 5.4.

Table 5.4 Perceptions regarding the information provided in the protocol (n=3)

Perceptions regarding	Response categories	Number of participants
Instructions of the protocol	Comprehensive	3
Descriptions of cleft palate speech characteristics	Necessary, clear and accurate	3

According to Table 5.4, all three participants indicated that the instructions of the protocol were comprehensive and that the descriptions of the cleft palate speech characteristics were necessary, clear and accurate. It is imperative that the instructions are easy to follow and clear to enable speech-language therapists to administer the protocol according to its intended use. It is clear that the instructions were comprehensive enough to render the protocol user friendly for clinical use.

The inclusion of the cleft palate speech characteristics was found to be useful by the speech-language therapists. Descriptions of the speech characteristics that children with cleft palate may exhibit enable speech-language therapists to rate elicited responses to identify cleft palate speech characteristics and to interpret results more accurately. This is especially important as many speech-language therapists have limited experience in working with children with cleft palate (Vallino *et al.* 2008:371).

5.4.2 The content and clinical applicability of the protocol

The results were obtained from section A (Questions 3, 4 and 10) and are illustrated in Table 5.5.

Table 5.5 Perceptions regarding the content and clinical applicability of the protocol (n=3)

Aspect assessed	Response categories			
	Yes	**No**	**Unsure**	**Total**
Content of the protocol sufficient for an accurate perceptual speech assessment	2		1	3
Speech-language therapists' willingness to use the protocol	3			3
Suitable for use with different age groups				
3 year olds		3		3
4 year olds	2	1		3
5 year olds	3			3
6 year olds	3			3

Table 5.5 indicated that only one participant was unsure whether the content of the Zulu perceptual speech assessment protocol would provide accurate information. She indicated that she had limited experience in working with Zulu-speaking children with cleft palate. Vallino *et al.* (2008:374) identified an urgent need for in-service clinical training for speech-language therapists working with children with cleft palate, which would be appropriate for this speech-language therapist.

The participants indicated that they were willing and eager to use this protocol to administer a perceptual speech assessment on Zulu-speaking pre-school children with cleft palate. This was viewed to be positive, as the current high workloads of speech-language therapists in Provincial Hospitals do not foster enthusiasm for trying out new procedures.

Two of the participants felt that the content of the protocol was not suitable for the three and four year old children, as the concepts included were too abstract and the pictures were judged to be too complex for them to recognize. These opinions were contrary to the findings from the pilot study (see 5.3.1.1) where the majority of the three and four year old children had a high level of familiarity with the pictures and words of the protocol. When considering the automatic speech tasks (see 5.3.2.) only one of the six three year old participants struggled with the sentence repetition task and the spontaneous speech sample, indicating that the protocol was suitable for this age group, in spite of the speech-language therapists' opinions.

5.4.3 Administration of the protocol

Perceptions regarding the administration of the perceptual speech assessment protocol were derived from section A, Questions 5, 6, 7, 8, 9 and 11, and are illustrated in Table 5.6.

Table 5.6 Perceptions regarding the administration of the Zulu perceptual speech assessment protocol (n=3)

Aspect assessed	Response categories			
	Yes	No	Unsure	Total
Ease of administration	2		1	3
Need for an interpreter for: - Administration of the protocol - Interpretation of responses	 3 3			 3 3
Rating system	3			3
Length of the protocol	3			3
Audio and/or video recordings	2	1		3
Possible reasons for non-compliance: -Language delay -EAL -Clarity of pictures -Level of concepts	 3 2 2 1			 3 3 3 3

According to Table 5.6, two of the participants felt that the administration of the Zulu perceptual speech assessment protocol and the interpretation of results may be easy to conduct, particularly with the assistance of a trained interpreter. The services of trained interpreters who are competent in the home language of the child who is assessed are necessitated by the diverse languages and multicultural facets of the South African population (Naidoo *et al*. 2005:64).

All the participants indicated that the rating system of the protocol was appropriate to determine the degree and severity of the elicited responses from the children assessed. One participant indicated that the rating system covers enough options. Another participant indicated that there may be a difference between speech-language therapists regarding their definition of "within normal limits". This was a valid comment, as the experience level of the speech-language therapists working with children with cleft palate may determine individual judgements regarding normal versus abnormal. This again points to the importance of in-service training in the clinical management of children with cleft palate to ensure consistency and accuracy in using the rating system suggested by experts in the field and adopted in the protocol (Henningsson *et al*. 2007; 12; Vallino *et al.* 2008:374).

The participants all felt that the length of the protocol was appropriate, especially when considering the valuable information that is provided by the protocol. Only one of the three participants indicated that it was not practical in her current work setting to make audio and/or video recordings due to time and equipment constraints. Recordings can be influenced by several aspects, such as noisy environments, speech-language therapists sharing treatment rooms, time constraints, lack of equipment, the possible invasive nature of recordings for children and obtaining informed parental consent and verbal child assent prior to recordings. International experts in the field of cleft palate, however, view digital audio and/or video recordings as essential to listener reliability and scientific credibility (Henningsson *et al*. 2007:4).

The participants also provided possible reasons for non-compliance by children when assessed. Two participants indicated that they felt EAL could result in non-compliance by children with cleft palate. Two participants also indicated that the clarity of pictures could influence children's performance negatively. Results obtained from the pilot study, however, indicated that the non-cleft palate Zulu-speaking children responded positively to the pictures. Finally, the level of concepts included in the protocol was viewed by one participant as having contributed to non-compliance. As discussed earlier, semantic prompting could be used to elicit such target production (www.eurocran.org). The administration of the protocol can therefore be concluded as being uncomplicated and achievable by speech-language therapists.

5.4.4 Future use of the Zulu perceptual speech assessment protocol

Information was provided through Questions 12 and 13 from section A of the questionnaire and the results are provided in Table 5.7.

Table 5.7 Perceptions regarding the future use of the Zulu perceptual speech assessment protocol (n=3)

Aspects assessed	Response categories		Number of participants
	Yes	No	
Usefulness of the protocol for future use	3		3
Languages in which a perceptual speech assessment protocol would be useful -Tswana -Ndebele -Xhosa -Venda -Other	 2 1	 	 3 3

The Zulu perceptual speech assessment protocol for pre-school children with cleft palate would be useful as a clinical tool according to participants. Other African languages were also identified where a need for a similar protocol existed. Development of a protocol in other African languages would allow for

cross-linguistic comparisons of words that were similar in phonetic content and occurred in similar phonetic contexts (Hutters & Henningsson, 2003:545; www.eurocran.org). Such cross-linguistic comparisons would contribute towards the standardization of perceptual speech assessment materials and inter-centre comparisons of treatment outcomes, to improve the quality of cleft palate care for all individuals (Lohmander & Olsson, 2003:65).

5.5. The clinical applicability of the perceptual speech assessment protocol post administration

The perceptions of speech-language therapists regarding the protocol were ascertained in section B of the questionnaire after they had administered the protocol on Zulu-speaking pre-school children with cleft palate. The results are illustrated and discussed accordingly.

5.5.1 Number of children assessed and perceptions regarding the detailed perceptual speech analysis

The number of children assessed by the speech-language therapists is described in Table 5.8.

Table 5.8 Number of children assessed and perceptions regarding the detailed perceptual speech analysis (n=3)

	Speech-language therapists' participation numbers	Number of children assessed	Ages of children	Protocol's ability to provide a detailed perceptual analysis
	1	2	4 years, 3 months 7 years	Yes
	2	1	4 years, 1 month	Yes
	3	1	4 years, 3 months	Yes
Total	3	4		

The protocol was administered on four children with a mean age of 4 years and 8 months. This was a limitation as such a small number yielded little information regarding clinical applicability. All the participants indicated that the Zulu perceptual speech assessment protocol provided a detailed description of the children's responses. This confirmed the participants' responses prior to the administration of the protocol, where they revealed that the inclusion of the cleft palate speech characteristics in the Zulu perceptual speech assessment protocol was necessary, clear and accurate (see 5.4.1). It was interesting to note, however, that not all the participants completed the analysis form of the elicited speech sample (see Appendix K) comprehensively, as only some of the salient cleft palate speech characteristics were mentioned, e.g. nasality, speech understandability and speech acceptability (see 5.5.5). This may have been due to time constraints and heavy case loads or to their uncertainty and unfamiliarity regarding the descriptions of the cleft palate speech characteristics. Although only four children were assessed, the speech-language therapists judged the perceptual speech assessment protocol to be of clinical value. This limited number of children necessitated the researcher to assess additional children to obtain more information on the speech responses of children with cleft palate on the protocol.

5.5.2 Perceptions regarding the administration of the protocol

The perceptions of the speech-language therapists regarding the administration of the protocol after children were assessed were obtained from Questions 2, 3, 5, 6, 7, 8, and 9 from section B of the questionnaire. Results are illustrated in Table 5.9.

Table 5.9 Perceptions regarding the administration of the perceptual speech assessment protocol (n=3)

Aspects assessed	Response categories			Number of participants
	Yes	No	Unsure	
-Ease of administration -Rating system	3 3			3 3
Length of the protocol -Age-appropriate -Suitable within hospital context	 3 3			 3 3
Cleft palate speech characteristics useful for analysis and interpretation of results	3			3
Audio and/or video recordings: -Beneficial	 2	 1		 3
Possible reasons for non-compliance -Language delay	 3			 3
Instructions provided in Zulu	3			3
Need for an interpreter for the administration of the protocol	3			3

All three participants indicated that the protocol was easy to administer when using interpreters to help with the administration. Participants indicated that the protocol was functional and necessary for use in the hospital setting and also applicable in the community setting. The use of trained interpreters for the administration and interpretation of the findings will improve the clinical applicability of the protocol and ensure that accurate and effective responses can be elicited from children, as the speech-language therapists could rely on first-language Zulu speakers to observe responses (Hegde & Davis, 2005:213). In some of the cases the parents of children assisted with the administration of the protocol and with providing the instructions. It is important to collaborate with families during the intervention process and asking the parents to be involved ensured that they felt part of the team, as it focused on the family and considered cultural sensitivity (Louw *et al.* 2006:48).

The participants indicated that the length of the protocol in terms of age-appropriateness for pre-school children and suitability within a hospital context was acceptable. Compared to their perceptions before administering the protocol (see 5.4.2 and 5.4.3) they all indicated that the protocol was not suitable for three year old children, but after administration they indicated that the length was appropriate to elicit a perceptual speech sample from children with cleft palate.

All participants indicated a need for the description of cleft palate speech characteristics for analyzing and interpreting results. Such a framework guides assessment, provides valuable information for intervention planning and enables speech-language therapists to provide the best care to children with cleft palate (Henningsson *et al*. 2007:2).

Two of the three participants felt that audio and/or video recordings would be beneficial while assessing children with cleft palate. It is disappointing, however, that none of them made such recordings during the assessment of the children with cleft palate (see 5.6.2.). This may have been due to lack of equipment available to conduct the recordings and possible time constraints during the assessment of children.

After the administration of the protocol, all three participants indicated that the only reason for possible non-compliance with the Zulu perceptual speech assessment protocol was the possibility of a language delay. This contrasted with their perceptions prior to the administration of the protocol (see 5.4.3) as none of the other possible reasons for non-compliance were noted in the responses of the participants. Participants indicated that pictures included were clear and the fact that they were colourful contributed towards the ease of elicitation of the speech samples.

5.5.3 Perceptions regarding the future use of the protocol

Information was provided by Question 10 from section B of the questionnaire and the results are illustrated in Table 5.10.

Table 5.10 Perceptions regarding the future use of the protocol (n=3)

Aspects assessed	Response categories		Number of participants
	Yes	**No**	
Future use of the protocol	3		3
Comments regarding future use	*The testing of children in their home language will greatly improve the reliability of assessments*		

Table 5.10 shows that all the participants were positive about the Zulu perceptual speech assessment protocol and would use it in future to assess children with cleft palate. One of the participants commented that the assessment of children in their home language would improve the reliability of assessments. This will ensure that the diagnosis of the cleft palate speech characteristics is more accurate and that a better understanding of the degree and severity of each child's problems will lead to improved intervention. The participants indicated that the protocol is culturally sensitive and appropriate, rendering the documented speech results suitable for use for comparisons across patient groups and different languages (Henningsson *et al*. 2007:15).

5.5.4 Results obtained from the administration of the protocol

The results yielded by administering the protocol on 12 Zulu-speaking pre-school children with cleft palate are illustrated in Figures 5.5 and 5.6 and Table 5.12.

.1 Administration time

The administration time of the protocol for each participant was obtained by observing and analyzing the response times on the tasks presented to the children. The results are illustrated in Figure 5.6.

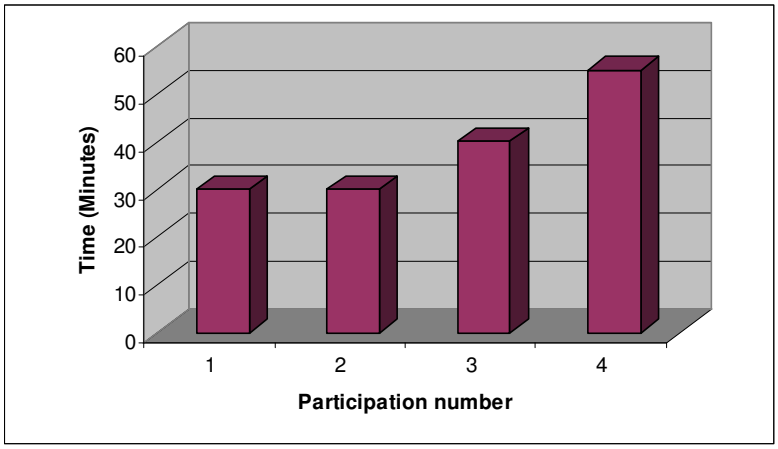


Figure 5.6 Administration time on children assessed by the speech-language therapists (n=4)

From Figure 5.6 it was evident that it took between 30 minutes and 55 minutes, with an average administration time of 39 minutes, to administer the Zulu perceptual speech assessment protocol on the pre-school children with cleft palate in Provincial Hospitals in Gauteng. The exception was participant 4 (aged 7) who concentrated poorly throughout the completion of the comprehensive protocol. This may have been due to a head injury, which influenced her performance in terms of her concentration span and response rate to pictures, questions, words and sentences, leading to a longer administration time on the protocol (Klein & Moses, 1999:251). Overall, the speech-language therapist participants experienced the administration time as practically viable (see 5.5.2). The speech-language therapists felt that the time taken to administer the protocol was justified as they were able to obtain reliable information for the identification of the cleft palate speech characteristics from these assessments.

The results of the administration time on children assessed by the researcher are illustrated in Figure 5.7.

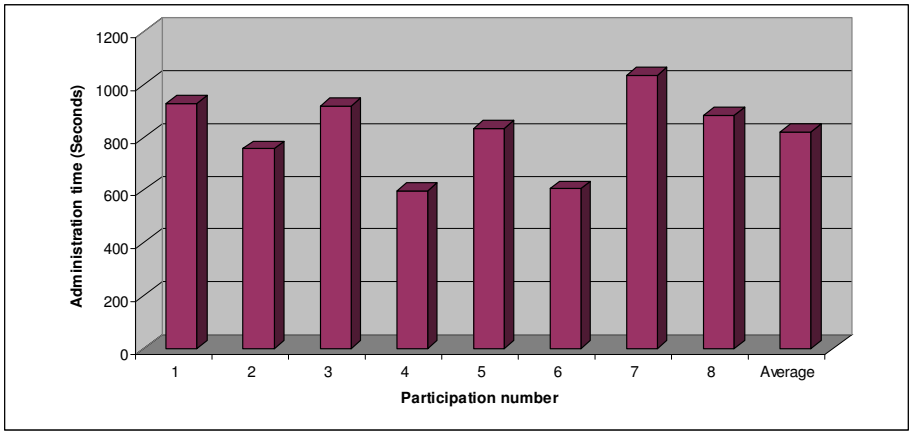


Figure 5.7 Administration time on children assessed by the researcher (n=8)

Figure 5.7 illustrates that the average administration time of the Zulu perceptual speech assessment protocol conducted by the researcher was 14 minutes and 6 seconds. The administration times on children with cleft palate compared well with the findings from the pilot study where the average administration time on the protocol by the researcher was 20 minutes, 53 seconds, and also with the recommended administration times on current commercially available speech assessment materials for pre-school children (Fisher-Logeman, 1971; Fudula, 1963; Goldman-Fristoe, 1969).

The administration times obtained from children assessed at the FCDC were often shorter than those of the speech-language therapists at the Provincial Hospitals in Gauteng. This may be attributed to the researcher being more familiar with the Zulu perceptual speech assessment protocol. Furthermore, the fact that the researcher administered the protocol on 12 normal Zulu-speaking pre-school children could also contribute to her being more familiar with it than the speech-language therapists in the Provincial Hospitals (see 5.3.1). Even in light of this possible tendency, the average administration times for pre-school children with cleft palate are still seen as appropriate, and the possibility of familiarizing oneself with the Zulu perceptual speech assessment protocol might lead to quicker administration times and speech-language therapists becoming more competent in the perceptual assessment of pre-school children with cleft palate (Vallino *et al.* 2008:371).

When observing children assessed by the researcher, it became evident that longer administration times were needed for the children from the older age groups (participant 1) and for children with possible associated communication disorders (participants 3 and 7) and languages delays, which affected their comprehension (Vallino, Zuker & Napoli, 2008:487). The older child (participant 1) was able to provide more accurate responses on the protocol, as she displayed more highly developed language skills during the assessment than her younger peers (Owens, 2005:88). It is therefore concluded that the administration time for the pre-school children was appropriate.

It should also be noted that both the researcher and speech-language therapists in the Provincial Hospitals asked parents to assist with the interpretation and translation processes. Trained interpreters are not always available in Provincial Hospitals (Dekker, 2007:44). The inclusion of parents in the assessment process can empower them in the intervention process, ensuring equal partnership and leading to culturally competent services (Hegde & Davis, 2005:213; Louw *et al.* 2006:54; Madding, 2000:14). Using parents could assist the speech-language therapists to conduct assessments and interpret findings. It can therefore be recommended that speech-language therapists consider using parents to assist when the protocol is administered.

.2 Speech production results obtained from the assessment of children with cleft palate on the Zulu perceptual speech assessment protocol

Information was obtained from the completed speech sample analysis form on the Zulu perceptual speech assessment protocol (see Appendix K) and is presented in Tables 5.11 and 5.12.

Table 5.11 Speech production results obtained from speech-language therapists post administration of the Zulu perceptual speech assessment protocol (n=4)

Participant	Duration of speech-language therapy	Co-operation of client	Nasality	Nasal airflow	Consonant production errors	Voice disorder	Speech understandability	Speech acceptability	Speech characteristics
1	3 years	Good	Mild, mixed nasality	Not rated	Not rated	Absent	Mild	Mild	Not provided
2	3 years, 4 months	Poor - fluctuation in attention	Mild hypernasality	Not rated	Not rated	Absent	Mild	Mild	Not provided
3	2 years	Good	Moderate hypernasality	Not rated	Not rated	Absent	Moderate	Moderate	Not provided
4	5 years, 6 months	Poor - attention difficulties	Moderate hypernasality	Not rated	Not rated	Absent	Moderate	Moderate	Apraxic and dysartric speech

Table 5.12 Speech production results of pre-school children with cleft palate assessed at the FCDC (n=8)

Participant number	Duration of speech-language therapy	Co-operation of client	Nasality	Nasal airflow	Consonant production errors	Voice disorder	Speech understandability	Speech acceptability	Speech characteristics
1	None	Good	Mild hyponasality	Audible Intermittent	-Abnormal pharyngeal backing -Compensatory articulation errors	Absent	Within normal limits	Within normal limits	-Assimilation -Pharyngeal articulation
2	3 months	Good	Normal hypernasality	Audible within normal limits	-Abnormal pharyngeal backing -Compensatory articulation errors	Absent	Within normal limits	Within normal limits	-Backing to velar -Backing to uvular -Glottal articulation

3	None	Good	Mild mixed resonance	Audible intermittent	-Abnormal pharyngeal backing -Weak oral pressure -Omissions -Substitutions -Additions	Absent	Moderate	Moderate	-Assimilation -Backing to velar -Backing to uvular -Pharyngeal articulation -Glottal articulation
4	None	Good	Moderate hypernasality	Audible intermittent	-Nasal fricatives	Absent	Mild	Mild	-Active nasal fricatives
5	4 years	Good	Mild hypernasality	Audible intermittent	-Abnormal pharyngeal backing -Omissions -Simplifications	Absent	Mild	Moderate	-Dentalisation -Backing to velar -Backing to uvular -Pharyngeal articulation
6	5 years	Good	Mild hypernasality	Audible intermittent	-Omissions -Substitutions	Absent	Moderate	Moderate	-Assimilation

7	Unknown	Poor	Moderate hypernasality	Audible intermittent	-Abnormal pharyngeal backing -Nasal consonant for oral production -Weak oral pressure -Omissions -Substitutions -Simplifications -Idiosyncratic word use	Absent	Severe	Severe	-Dentalisation -Assimilation -Backing to velar -Backing to uvular -Active nasal fricatives -Gliding of fricatives

8	None	Good	Mild hyponasality	Inaudible intermittent	-Abnormal pharyngeal backing -Abnormal backing of oral-targets -Nasal consonant for oral production -Nasalized voiced pressure consonant	Absent	Mild	Mild	-Palatalisation -Assimilation -Backing to velar -Backing to uvular -Pharyngeal articulation -Nasal realization of plosives -Gliding of fricatives

According to Table 5.11, all four of the children had received speech-language therapy between the ages of 2 years and 5 years 6 months, which confirmed that these children with cleft palate in the Public Health system were receiving the services required. The Department of Health encourages appropriate services to the vulnerable populations with specific congenital conditions such as cleft palate, which is prioritized (Department of Health, 2001:13).

The speech-language therapists indicated that two of the four pre-school children co-operated well, while two (participant 2, aged 3 years, 4 months and participant 4, aged 7 years) struggled to concentrate throughout the completion of the comprehensive protocol. This was attributed to the one child exhibiting a head injury and the other one presenting with a language delay. In spite of these challenges, the speech-language therapists were able to administer the Zulu perceptual speech assessment protocol and elicit an adequate speech sample for analysis.

Participant 1 was also reported to have recurrent otitis media. The presence of middle ear disease is always a concern in children with cleft palate, especially when considering the number of infections that the child had, and if ventilation tubes were inserted (Vallino *et al.* 2008:486). The speech-language therapist indicated that the child's middle ear and hearing status were normal and not considered to have influenced her co-operation in completing the protocol.

It was interesting to note that none of the speech-language therapists provided information on the nasal airflow of the children, their consonant production errors or the detailed cleft palate speech characteristics, especially since they had all agreed that it was important to include these aspects in the Zulu perceptual speech assessment protocol (see 5.4.1 and 5.4.2). Even after administration they all indicated that these aspects were useful in the analysis and interpretation of results (see 5.5.2). This may be due to a number of factors, e.g. speech-language therapists experiencing time constraints, heavy workloads and possible lack of clinical experience and training in working with cleft palate children (Vallino *et al*. 2008:371). The omitted judgements could have provided important information on the specific

cleft palate speech characteristics of the children, for example assimilation, pharyngeal articulation and the absence of pressure consonants (see Appendix K). Identification of these aspects is important as they may persist throughout the pre-school years and it is imperative to address these speech patterns in intervention (Hardin-Jones & Jones, 2005:13).

Elicited responses from participants assessed by the researcher are described in Table 5.12. According to Table 5.12, only three participants (participants 2, 5 and 6) were receiving speech-language therapy at their local Provincial Hospitals and at the FCDC at the time of testing. This may have been due to the fact that the majority of children assessed by the researcher travelled from far, as cleft palate service delivery were not readily available in their home town or, with possible centralization of services; they did not have easy access to services and timeous treatment (Dekker, 2007:6; Louw *et al.* 2006:52). Regular follow-up appointments at the FCDC are important but regular ongoing speech-language intervention needs to be available to all children with cleft palate to prevent the negative impact of a cleft palate on communication.

Several consonant production errors were identified in the speech of participants who were assessed at the FCDC. These errors included omissions, substitutions, additions and simplifications. These errors often occur in children with cleft palate, especially in those with bilateral clefts (Vallino *et al*. 2008:487). It should be noted that participant 7 had low muscle tone and a myo-functional swallowing disorder, which could explain the presence and persistence of her articulation errors (Peterson-Falzone *et al.* 2001:304). This participant exhibited such poor speech understandability and acceptability on word and sentence level that the independent rater found it challenging to follow her. She was only intelligible to people familiar with her and accustomed to her manner of speaking (Henningsson *et al*. 2007:10).

Participants 3, 6 and 7 had accompanying language delays, which affected their performance on the Zulu perceptual speech assessment protocol negatively. A language delay could contribute to speech production errors and, if language

intervention is not provided, these children may have an additional risk of developing age-related speech problems as well as language learning problems at a later stage (Peterson-Falzone *et al*. 2001:192).

.3 Speech production results regarding the click sounds of children assessed at the FCDC

These assessments were conducted by the researcher and were rated by the independent rater to improve the validity and reliability of sounds. Such information was not provided by the speech-language therapist participants, in spite of the instructions. This may again be attributed to high workloads and limited clinical knowledge on cleft palate (Vallino *et al.* 2008:371). The results are demonstrated in Table 5.13.

Table 5.13 Speech production results on the click sounds of children assessed at the FCDC

Words in the protocol with click sounds	Participation number	Elicited responses	Speech characteristics
qakatha (to plait hair), iqogo (a collection), cula (to sing), isicabucabu (spider), qhinqa (to wait), iqhude (a rooster), chitha (to throw out), gqagqaza (to scatter), gcwigcwiza (to bubble), ngqabitha (to jump down), fengqa (to use nickname), ngcolile (is dirty), bhangcuzela (to walk unarmed), nqaka (to catch), inqama (ram), ncenga (to deplore), bhinca (to put on/ wear), qonkqela (to amass), chonkco (perched), xoxa (to chat), ixixo (frog), xhaka (to grip/catch), isixhobo (heaps of rock and stones), gxabalaza (to sit at ease), gxiba (to slander), ngxi! (tight), ngxangxasha (to hop), nxese (regret), bhonxula (to pull out), xhonkxa (to sow thick)	1	[!akatha vs. !aťaǩa],[iqoqɔ vs. ʕqoqo],[ǀulavs. ǀula],[isiǀabuǀabu vs. isiǀabuǀabu], [!hiŋǁa vs. !hiŋǁa], [ǃhudɛvs.ǃhudɛ],[ǂhitha vs. ǂhitha],[ǂgaǂgaʐa vs. ǂgaǂgaʐa],[ǂgviǂgviʐa vs. ǂgviǂgviʐa],[ǂgabitha vs. ǂg̃abitha],[vɛǃga vs. vɛǃga], [ǂgɔlilɛvs. ǂgɔlilɛ],[baǂguʐɛla vs. baǂguʐɛla],[ŋǁaka vs. ŋǁaka],[iŋǁamavs. iŋǁama],[ŋǁɛŋa vs. ŋǁɛŋa], [biŋǁa vs. biŋǁa],[!ɔŋɛla vs. ɔŋɛla], [ǀhoːŋǀɔ vs. ǀhoːŋǀɔ], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ],[ǁhakavs. ǁhaka],[isiǁhɔbɔvs.isiǁhɔbɔ], [ǁgabalaʐa vs.ǁgabalaʐa],[ǁgiɓa vs. ǁgiɓa],[ǁgi vs. ^gi],[ǁg̃aǁg̃aʃa vs. ǁg̃aǁg̃aʃa],[ŋǁɛsɛ vs. ŋǁɛsɛ],[bɔŋǁula vs. bɔŋǁula],[ǁhɔŋǁa vs. ǁhɔŋǁa]	-Lateralization of [t] and [ǁ] sounds -Pharyngeal articulation of [iq] sound -Deletion of unstressed syllable e.g. [i], [!], [ǁ] -Substitution of sounds e.g. [ǩ] for [th]

	2	[!akatha vs. !atˈatha],[iqoqɔ vs. iʕqoqo],[ǀulavs. ǀula],[isiǀabuǀabu vs. isiǀabuǀabu], [!hiŋǁa vs. !hiŋǁa], [ǃhudɛvs.ǃhudɛ],[ǀhitha vs. ǀhitha],[ǀgaǀgaʐa vs. ǀgaǀgaʐa],[ǀgviǀgviʐa vs. ǀgviǀgviʐa],[ǀgabitha vs. ǀgabitha],[vɛ!ga vs. vɛ!ga], [ǀgɔlilɛvs. ǀgɔlilɛ],[baǀguʐɛla vs. baǀguʐɛla],[ŋǁaka vs. ŋǁaka],[iŋǁamavs. iŋǁama],[ŋǁɛŋa vs.˜ɛŋa], [biŋǁa vs. biŋǁa],[!ɔŋɛla vs. !ɔŋɛla], [ǀhoːŋǀɔ vs. ǀhoːŋǀɔ], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. ǁiǁɔ],[ǁǁhakavs. ǁǁhaka],[isiǁǁhɔbɔvs.isiǁǁhɔbɔ], [ǁǁgabalaʐa vs.ǁǁgabalaʐa],[ǁǁgiɓa vs. ǁǁgiɓa],[ǁǁgi vs. ǁǁgi],[ǁǁgaǁǁgaʃa vs. ǁǁgaǁǁgʔaʃa],[ŋǁɛsɛ vs. ŋǁɛsɛ],[bɔŋǁula vs. bɔŋǁula],[ǁǁhɔŋǁǁa vs. ǁǁhɔŋǁǁa]	- Pharyngeal articulation of [iq] sound -Glottal articulation of [ǁǁg] sound -Deletion of unstressed syllable e.g. [i], [ŋǁ]
	3	[!akatha vs. !atˈatha],[iqoqɔ vs. ʕqoqo],[ǀulavs. ǀula],[isiǀabuǀabu vs. isiǀabuǀabu], [!hiŋǁa vs. !hiŋǁa], [ǃhudɛvs.ǃhudɛ],[ǀhitha vs. ǀhitha],[ǀgaǀgaʐa vs. ǀgaǀgaʐa],[ǀgviǀgviʐa vs. ǀgviǀgviʐa],[ǀgabitha vs. ~ǀgabitha],[vɛ!ga vs. vɛga], [ǀgɔlilɛvs. ~ǀgɔlilɛ],[baǀguʐɛla vs. baǀguʐɛla],[ŋǁaka vs. ŋǁaka],[iŋǁamavs. iŋǁama],[ŋǁɛŋa vs. ŋǁɛŋa], [biŋǁa vs. biŋǁa],[!ɔŋɛla vs. ʔɔŋɛla], [ǀhoːŋǀɔ vs. ǀhoːŋǀɔ], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ],[ǁǁhakavs. ǁǁhaka],[isiǁǁhɔbɔvs.isiǁǁhɔbɔ], [ǁǁgabalaʐa vs.ǁǁgabalaʐa],[ǁǁgiɓa vs. giɓa],[ǁǁgi vs. ʔgi],[ǁǁgaǁǁgaʃa vs. >ǁǁgaǁǁgaʃa],[ŋǁɛsɛ vs. ŋǁɛsɛ],[bɔŋǁula vs. bɔŋǁula],[ǁǁhɔŋǁǁa vs. ǁǁhɔŋǁǁa]	- Pharyngeal articulation of [iq] sound - Glottal articulation of [!]ǀ and [ǁ]sound -Deletion of unstressed syllable [!], [ǁ] -Backing to velar of [ǁǁg] sound

	4	[!akatha vs. !aťatha],[iqoqɔ vs. iǥoqo],[ǀulavs. ǀula],[isiǀabuǀabu vs. isiǀabuǀabu], [!hiŋǀa vs.iŋǀa], [ǃhudɛvs.ǃhudɛ],[ǀhitha vs. ǀhitha],[ǂgaǂgaǯa vs. ǂgaǂgaǯa],[ǀgviǀgviǯa vs. ǀgviǀgviǯa],[ǂgabitha vs. ǂgabitha],[vɛ!ga vs. vɛ!ga], [ǀgɔliǀɛvs. ǀgɔliǀɛ],[baǀguǯɛla vs. baǀguǯɛla],[ŋǀaka vs. ŋǀaka],[iŋǀamavs. iŋǀamã],[ŋǀɛŋa vs. ŋǀɛŋa], [biŋǀa vs. biŋǀa],[!ɔŋɛla vs. !ɔŋɛla], [ǀho:ŋǀɔ vs. ǀho:ŋǀɔ], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ],[ǁǀhakavs. ǁǀhaka],[isiǁǀhɔbɔvs.isiǁǀhɔbɔ], [ǁǀgabalaǯa vs.ǁǀgabalaǯa],[ǁǀgiɓa vs. ǁǀgiɓa],[ǁǀgi vs. ʔǀgi],[ǁǀgaǁǀgaʃa vs. ǁǀgaǁǀgaʃa],[ŋǀǁɛsɛ vs. ǃǁɛsɛ],[bɔŋǀǁula vs. bɔŋǀǁula],[ǁǀhɔŋǁǀa vs. ǁǀhɔñǁǀa]	- Glottal articulation of [ǁǀg] sound - Deletion of unstressed syllable e.g. [!h], [ǁǀ] -Active nasal fricatives of [ŋ] sound
	5	[!akatha vs. !aťatha],[iqoqɔ vs. iʕqoqo],[ǀulavs. ǀula],[isiǀabuǀabu vs. isiǀabuǀabu], [!hiŋǀa vs. !hiŋǀa], [ǃhudɛvs.ǃhudɛ],[ǀhitha vs. ǀhitha],[ǂgaǂgaǯa vs. ǂgaǂgaǯa],[ǀgviǀgviǯa vs. ǀgviǀgviǯa],[ǂgabitha vs. ǂgabitha],[vɛ!ga vs. vɛ!ga], [ǀgɔliǀɛvs. ǀgɔliǀɛ],[baǀguǯɛla vs. baǀguǯɛla],[ŋǀaka vs. ŋǀaka],[iŋǀamavs. iŋǀama],[ŋǀɛŋa vs. ŋǀɛŋa], [biŋǀa vs. biŋǀa],[!ɔŋɛla vs. !ɔŋɛla], [ǀho:ŋǀɔ vs. ǀho:ŋǀɔ], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ],[ǁǀhakavs. ǁǀhaka],[isiǁǀhɔbɔvs.isiǁǀhɔbɔ], [ǁǀgabalaǯa vs.ǁǀgabalaǯa],[ǁǀgiɓa vs. ǁǀgiɓa],[ǁǀgi vs. ǁǀgi],[ǁǀgaǁǀgaʃa vs. >ǀgaǁǀgaʃa],[ŋǀǁɛsɛ vs. ŋǀǁɛsɛ],[bɔŋǀǁula vs. bɔŋǀǁula],[ǁǀhɔŋǁǀa vs. ǁǀhɔñǁǀa]	-Backing to velar of [ǁǀg] sound -Pharyngeal articulation of [q] sound

	6	[!akatha vs. !atˈatha],[iqoqɔ vs. iqoqo],[ǀulavs. ǀula],[isiǀabuǀabu vs. isiǀabuǀabu], [!hiŋǀa vs. !hiŋǀa], [ǃhudɛvs.ǃhudɛ],[ǂhitha vs. ǂhit͡ha],[ǁgaǁgaz̤a vs. ǁgaǁgaz̤a],[ǁgviǁgviz̤a vs. ǁgviǁgviz̤a],[ǁgabit͡ha vs. ǁgabitha],[vɛǃga vs. vɛˈǃga], [ǁgɔlilɛvs. ǁgɔlilɛ],[baǁguz̤ɛlavs. baǁ͡guz̤ɛla],[ŋǀaka vs. ŋǀaka],[iŋǀamavs. iŋǀama],[ŋǀɛŋa vs. ŋǀɛŋa], [biŋǀa vs. biŋǀa],[!ɔŋɛla vs. !ɔŋɛla], [ǂhoːŋǀɔ vs. ǂhoːŋǀɔ], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ],[ǁǂhakavs. ǁǂhaka],[isiǁǂhɔbɔvs.isiǁǂhɔbɔ], [ǁǁgabalaz̤a vs.ǁǁgabalaz̤a],[ǁǁgiɓa vs. ǁǁgiɓa],[ǁǁgi vs. ǁǁgi],[ǁǁgaǁǁgaʃa vs. ǁǁgaǁ͡ǁgaʃa],[ŋǁɛsɛ vs. ŋǁɛsɛ],[bɔŋǁula vs. bɔŋǁula],[ǁǂhɔŋǁa vs. ǁǂhɔŋǁa]	-Assimilation of [th], [ǁg] and [ǁ] sound
	7	[!akatha vs. !atˈatha],[iqoqɔ vs. i>qoqo],[ǀulavs. ǀula],[isiǀabuǀabu vs. isiǀabuǀabu], [!hiŋǀa vs. !hiŋǀa], [ǃhudɛvs.ǃhudɛ],[ǂhitha vs. ǂhitha],[ǁgaǁgaz̤a vs. ǁga͡ǁgaz̤a],[ǁgviǁgviz̤a vs. ǁgviǁgviz̤a],[ǁgabitha vs. ǁgabitha],[vɛǃga vs. ɻɛǃga], [ǁgɔlilɛvs. ǁgɔlilɛ],[baǁguz̤ɛla vs. baǁg̃uz̤ɛla],[ŋǀaka vs. ŋǀaka],[iŋǀamavs. iŋǀama],[ŋǀɛŋa vs. ŋǀɛŋa], [biŋǀa vs. biŋǀa],[!ɔŋɛla vs. !ɔn̪ɛla], [ǂhoːŋǀɔ vs. ǂhoːŋ͡ǀɔ], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ],[ǁǂhakavs. ǁǂhaka],[isiǁǂhɔbɔvs.iṣiǁǂhɔbɔ], [ǁǁgabalaz̤a vs.ǁǁgabalaz̤a],[ǁǁgiɓa vs. ǁǁgiɓa],[ǁǁgi vs. ᵑǁgi],[ǁǁgaǁǁgaʃa vs. ǁǁgaǁ͡ǁgaʃa],[ŋǁɛsɛ vs. ŋǁɛsɛ],[bɔŋǁula vs. bɔŋǁula],[ǁǂhɔŋǁa vs. ǁǂhɔŋǁa]	-Assimilation of [ǁg] and [ŋǀ]sound -Backing to velar of [q] sound -Active nasal fricatives of [ŋ] sound -Gliding of fricatives of [s] sound

	8	[!akatha vs. !aťatha],[iqoqɔ vs. iʕqoqo],[ǀulavs. ǀula],[isiǀabuǀabu vs. isiǀabuǀabu], [!hiŋǁa vs. !hiŋǁa], [ǃhudɛvs.ǃhudɛ],[ǀhitha vs. ǀhitha],[ǂaǂgaa̱a vs. ǂga͡ǂgaa̱a],[ǀgviǀgviz̧a vs. ǀgviǀgviz̧a],[ǂgabitha vs. ǂgabitha],[vɛ!ga vs. ṿɛ!ga], [ǀgɔlilɛvs. ǀgɔlilɛ],[baǀgu̱ɛla vs. baǀgu̱ɛla],[ŋǁaka vs. ŋǁaka],[iŋǁamavs. iŋǁama],[ŋǁɛŋa vs. ŋǁɛŋa], [biŋǁa vs. biŋǁa],[!ɔŋɛla vs. !ɔŋɛla], [ǀhoːŋǀɔ vs. ǀhoːŋǀɔ], [ǁǀɔǁa vs. ǁɔǁa], [iǁiǁiǀɔ vs. iǁiǁiǀɔ],[ǁǀhakavs. ǁǀhaka],[isiǁǀhɔbɔvs.isiǁǀhɔbɔ], [ǁǂgabalaz̧a vs.ǁǂgabalaz̧a],[ǁǂgiɓa vs. ǁǂgiɓa],[ǁǂgi vs. ǂ>i],[ǁǂgaǁǂgaʃa vs. ǁǂgaǁǂgaʃa],[ŋǁǂɛsɛ vs. ŋǁǂɛsɛ],[bɔŋǁǂula vs. bɔŋǁǂula],[ǁǀhɔŋǁǂa vs. ǁǀhɔŋǁǂa]	-Assimilation of [ǂg] sound -Backing to velar of [ǁǀ] sound -Pharyngeal articulation of [ǂq] sound -Gliding of fricatives of [ʋ] sound

According to Table 5.13, the participants exhibited several cleft palate speech characteristics with the production of click sounds in Zulu. These included pharyngeal stops, gliding of fricatives, active nasal fricatives and glottal stops. Children with cleft palate typically struggle with the production of stop consonants (Peterson-Falzone *et al.* 2006:6), which may explain why the Zulu-speaking children had difficulties with the production of click sounds, as the place of articulation for these sounds is similar to the stop consonants (see 4.5.4), e.g. apico-alveolar, apico-postveolar and lamino-dental (le Roux & Groenewald, 2007:47). The protocol was able to elicit and identify the cleft palate speech characteristics exhibited by the children in Zulu. The protocol appears to be linguistically appropriate and, with further research and use, it can add important information on the speech patterns of children with cleft palate in Zulu. Furthermore, the clinical applicability was confirmed as the universal guidelines and suggested rating system could be used for the elicited responses of Zulu-speaking pre-school children with cleft palate.

The results obtained from this phase of the study should be interpreted with caution due to the limited sample size, as this was the unfortunate outcome from the responses of speech-language therapists in the Provincial Hospitals in Gauteng.

5.7 Phase four: determining the applicability of international guidelines on a Zulu perceptual speech analysis

- Objective four: To describe the applicability of international guidelines in the development of a perceptual speech assessment protocol for Zulu-speaking children with cleft palate.

The literature recommends the use of several international guidelines (www.eurocran.org) on the perceptual assessment of children with cleft palate. The challenge, however, was to determine whether these guidelines could be

used for the clinical development of an age, culturally and linguistically appropriate assessment protocol in the Zulu language and to determine the value of following these guidelines. Translation of the commercially available speech assessment tools in English was not an option, as the aim was specifically to make a tool available that would elicit and identify cleft palate speech characteristics in Zulu.

The applicability of international guidelines in the development of a perceptual speech assessment protocol for Zulu-speaking children with cleft palate was determined. Henningsson *et al*. (2007) and the Eurocran group (www.eurocran.org) recommended the use of these guidelines to create speech materials that will elicit an adequate perceptual speech sample from children with cleft palate. These guidelines were followed meticulously in compiling the protocol (see Chapter 4). After the administration of the Zulu perceptual speech assessment protocol, the researcher identified a need to determine whether the speech materials compiled provided sufficient information on the cleft palate speech characteristics to conduct accurate assessments and to provide guidelines for intervention planning (see Appendix P for examples of applications of these guidelines).

1. *Guideline 1: Single-word lists and short sentences*

   This guideline (www.eurocran.org) could be followed with ease as a word list and sentences could be compiled that include all the Zulu phonemes in the possible initial, medial and final positions to be elicited via pictures (see Appendix K). The use of these speech materials with the 12 Zulu-speaking pre-school children with cleft palate indicated that they were age and linguistically appropriate and yielded a speech sample that could be analyzed to describe the speech characteristics of the children.

2. *Guideline 2: Single-word lists – Single consonant inventory should include all pressure consonants, all or some non-pressure oral consonants and one or more nasal consonants.*

   This guideline (www.eurocran.org) could be followed effortlessly as it was possible to compile word lists that include the specified consonants, namely pressure consonants, non-pressure oral consonants and nasal consonants in Zulu. The word list used with the 12 participants with cleft palate proved to be age appropriate.

3. *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.*

   This guideline (Henningsson *et al.* 2007:11) could be adhered to by including all the vowels in the Zulu language in the word list and administration yielded appropriate responses by the children.

4. *Guideline 4: Single-word lists – The number of contextual sounds should be limited.*

   This guideline (Henningsson *et al.* 2007:11) could be followed with ease as the words selected in the list include the usage of one word to elicit more than one sound in a different position. The application of this guideline in the protocol generated linguistically appropriate responses.

5. *Guideline 5: Single-word lists – Clusters with non-pressure consonants, clusters with nasal consonants and other types of clusters should be included.*

   As the Zulu phonetic system does not include sound clusters (Naidoo *et al.* 2005:62), the click sounds of the Zulu language were included as they represent combined phonemes. These sounds yielded specific cleft palate speech characteristics in the responses from a number of the participants.

6. *Guideline 6: Single-word lists – The position of consonants should be in "strong" and other positions in words.*
   This guideline could be applied effortlessly in strong and other positions in words in the compiled word list (Henningsson *et al*. 2007:11).

7. *Guideline 7: Single-word lists – The number of representations of each test consonant should occur three times in strong positions, twice in other positions and twice in clusters.*
   This guideline could be followed by including the representations of each test consonant in the Zulu language in strong positions, in other positions and in the click sounds (Henningsson *et al.* 2007:11).

8. *Guideline 8: Single-word lists – Test consonants should be randomly ordered and high vowels should occur in approximately 10 of the words which also have a test consonant in the "strong" position.*
   Test consonants could be randomly ordered according to their place of articulation and included the vowels and consonants in strong positions by following the guideline as stated (www.eurocran.org).

9. *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.*
   Short sentences could be compiled to be loaded with pressure consonant targets in the Zulu language, with nasal consonants and other consonants (Henningsson *et al*. 2007:12).

10. *Guideline 10: Restricted speech material for cross-linguistic comparisons should include similar phonetic content and occur in similar phonetic context.*

The complete Zulu phoneme structure was used in the compilation of the speech materials of the protocol. Although the phoneme structure of Zulu may differ from that of other languages, e.g. different click sounds, the researcher could, by following the guidelines, develop speech materials to elicit the typical speech characteristics of children with cleft palate. The phonetic contexts are therefore similar and this will allow for comparisons to be made across languages (Henningsson *et al.* 2007:6).

11. *Guideline 11: Elicitation of single-word lists by using naming or semantic prompting.*

    This guideline was easily applied as all the Zulu words in the word list could be elicited by using pictures, and in some instances where pictures consisted of abstract nouns, semantic prompting was used to elicit specific responses.

12. *Guideline 12: The speech material should include rote speech and counting.*

    This guideline could be applied with ease (www.eurocran.org). However, during administration, the majority of children completed this task in English, possibly due to multilingualism and ELoLT (Dawber & Jordaan, 2002:23). Requesting verbal repetition rather than spontaneous counting and naming would address this situation.

13. *Guideline 13: Collecting a spontaneous speech sample.*

    This guideline could be adhered to with ease in the protocol by consulting texts on age-appropriate conversation topics (see Appendix K).

It is concluded that the international guidelines for the perceptual speech assessment of children with cleft palate could be applied to develop a Zulu perceptual speech assessment protocol. The protocol has clinical applicability as it could guide speech-language therapists in rating the speech of individuals with

cleft palate according to internationally accepted parameters. Such information could be used for intervention planning for pre-school children with cleft palate.

5.8 Conclusion

The results indicated that it was possible to compile an age, linguistically and culturally appropriate perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate by following the international guidelines. Currently not all children with cleft palate around the world are receiving optimal cleft care (Mars *et al.* 2008:1) for numerous reasons, e.g. limited availability of surgical and team services in developing contexts. Speech-language therapy services are often scarce and, when available, the local speech-language therapists may not have expertise in cleft palate speech assessment and intervention (Vallino *et al.* 2008:371) nor have resources to guide assessment and intervention. The results of the current study can serve as an example of how such clinical challenges can be addressed by research to improve service delivery. There is a great need for clinically reliable and valid assessment protocols in African languages for children with cleft palate in South Africa (Streicher, 2005:41). The results may be applied to develop similar protocols in other frequently used African languages, for example Xhosa, to improve the quality of cleft care in South Africa.

5.9 Summary

From the results it was evident that a reliable Zulu perceptual speech assessment protocol for pre-school children with cleft palate could be developed according to the international guidelines. This protocol was found to be culturally and linguistically appropriate for a small sample of three to six year old Zulu-speaking pre-school children. The speech-language therapist participants indicated that this protocol was clinically applicable and that they were willing to use it in clinical practice. They also indicated that it provided valuable information on the perceptual speech analysis and interpretation of the cleft palate speech characteristics.

The applicability of the international guidelines on perceptual assessment in developing a protocol in the Zulu language was demonstrated, as all of the guidelines could be applied in the development of the Zulu protocol.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

The aim of this final chapter is to discuss the conclusions based on the results of the study. The method and results of each of the four phases are reviewed critically. The clinical implications and recommendations arising from the development of a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate for further research are presented.

6.1 Introduction

"It is a widely held expectation that research itself, once disseminated, shared and applied, can enhance the effectiveness of practice."

(Kathard *et al*. 2007:5)

Research is a systematic process which allows for the collection, analysis and interpretation of the specific phenomena investigated. Results of research on communication disorders are important to provide the value of the specific phenomenon, to indicate the relevance of findings for patients in other settings and to build a foundation for decision-making (De Vos *et al*. 2005:115; Maxwell & Satake, 2006:384). One of the reasons for conducting research is to improve clinical decision-making. Research should be conducted according to the foundation of current knowledge (Maxwell & Satake, 2006:9) and speech-language therapists will then adapt the approach they follow in the intervention process to ensure evidence-based practice.

In the South African context, culturally and linguistically appropriate service delivery is imperative, as the South African society is characterized by a multicultural group of people with great diversity in terms of geography, language and culture (Louw & Avenant, 2002:146; SASLHA, 2003). Speech-language therapists working with this multicultural and multilingual population require

adequate resources to provide effective services. This will lead to improved outcomes for individuals with communication disorders. Demands are placed on speech-language therapists to test and evaluate previous best practice approaches and base their clinical decisions on recent research findings (Kathard *et al*. 2007:5).

The current study was conducted in response to several international attempts to improve the quality of service delivery to children with cleft palate (Henningsson *et al*. 2007:1; Kuehn & Henne, 2003:103; Lohmander & Olsson, 2003:64). The need to improve cleft palate care for local children was identified, and research on cleft palate service delivery in South Africa is required. Many children with cleft palate are currently not receiving adequate services and many of those who do have access to speech-language therapy, may receive services from therapists who are not familiar with the client's language or are not specialized in the evaluation and treatment of individuals with cleft palate (Kuehn & Henne, 2003:103). Speech-language therapists therefore intend to obtain an understanding of and insight into current service delivery to children with cleft palate in South Africa. This includes identifying the challenges relating to service delivery, the dearth of culturally sensitive and appropriate assessment materials to assess African children with cleft palate, and an urgent need for the development of culturally sensitive and appropriate materials to improve the situation in South Africa (Naudé *et al*. 2007:519).

Based on the results of this research project, conclusions were reached and several recommendations were made. The results and conclusions should ensure clinical applicability to maximize the outcomes of the study. The chapter therefore presents the conclusions from the current study, the clinical implications of the results and several suggestions and recommendations for future research.

6.2 Conclusions

Based on the results of the four phases of the study, the following conclusions were drawn.

Firstly the compilation of speech assessment materials for children with cleft palate should be based on sound theoretical underpinnings. A thorough literature review on the speech assessment of children with cleft palate was required. Based on the process of developing the protocol, the following deductions were made:

- The knowledge obtained from the literature review in phase one allowed for the identification of all the specific cleft palate speech characteristics to be included in the Zulu perceptual speech assessment protocol (Henningsson *et al*. 2007:6). This ensured that all the possible cleft palate speech characteristics in Zulu could be identified and classified. Such a literature review could serve as a guideline for the compilation of similar perceptual speech assessment protocols in other African languages for further diagnostic assessments of children with cleft palate.
- The parameters for the perceptual assessment of cleft palate speech proposed in the literature were considered to be essential in the compilation of a perceptual speech assessment protocol. The information obtained from the different sources on cleft palate speech assessment ensured that all the necessary aspects for an accurate perceptual speech assessment were included in the Zulu protocol (ACPA 2004; Henningsson *et al*. 2007; Louw & Kritzinger, 2001; Sell, 2005; Shipley & McAfee, 2004:15-18; Trost-Cardamone, 2004). This increased the reliability of the assessment protocol and created a framework for the compilation of the protocol in phase one of the study.
- The sound inventory and syllable structure of the language in which the speech materials are to be compiled need to be studied with care. In this case the Zulu sound inventory included click sounds which

serve as stops and were found to elicit cleft palate speech characteristics, namely pharyngeal stops, gliding of fricatives, active nasal fricatives and glottal stops, during the assessment of children with cleft palate in phase three of the study. A study of the individual sound inventory and syllable structures of the Zulu language was essential for the elicitation of specific cleft palate speech characteristics.

The desk study provided the basis for the Zulu perceptual speech assessment protocol and created a solid foundation for the compilation of the Zulu perceptual speech assessment protocol.

Secondly, consultation with an expert linguist in the language of the protocol was deemed to be necessary to ensure that a perceptual speech assessment protocol is compiled in a linguistically and culturally appropriate manner. In the current study, consultations with the expert Zulu linguist in phase one provided accurate information on the Zulu phoneme structure (le Roux & Groenewald, 2007:47) which allowed for the selection of speech materials that meet the specifications of the international guidelines (www.eurocran.org) that were followed. This allowed for the minimum standards for the perceptual speech assessment of children with cleft palate to be met (Kuehn & Henne, 2003:108; Lohmander & Olsson, 2003:64).

Thirdly, the piloting of speech materials on normal developing speakers of the language in which a perceptual speech assessment protocol is developed is essential for the validity and reliability of the protocol. This is important as responses from the pilot study could provide valuable information regarding the age, cultural and linguistic appropriateness of the material. In the current study, the results of the pilot study in phase two yielded information regarding the age- and linguistic appropriateness of the protocol for Zulu-speaking pre-school children. The following deductions were made:

- According to the literature, pre-school children are familiar with pictures that have a high attractiveness, high occurrence, real-object representation and pictures that are age and developmentally appropriate (Bernthal & Bankson, 2004:238; Roth & Worthington, 2001:23). The results of the pilot study indicated that the participants were familiar with the majority of the words and pictures presented to them during the picture-naming task, even though some needed semantic prompting to provide the correct responses.
- The administration time of a speech assessment tool should be appropriate for the targeted age groups as this would allow for the elicitation of accurate responses. The pilot study indicated that the time frame was appropriate for pre-school children in comparison to commercially available speech assessment tests (Fisher-Logeman, 1971; Fudula, 1963; Goldman-Fristoe, 1969).
- During the assessment of pre-school children it is important to note that some factors may contribute to non-compliance. The pilot study results attributed non-compliance to the level of concepts included and English as language of instruction. Speech-language therapists should consider these aspects during the administration of the protocol on Zulu speaking pre-school children with cleft palate, as their performance might not be a true reflection of their speech abilities (Naudé *et al.* 2007:520). Another option to ensure reliable responses from children on the Zulu perceptual speech assessment protocol is the inclusion of interpreters to assist with the administration and interpretation of the protocol (Hegde & Davis, 2005:213).
- It is important to take normal speech development into account when assessing children with cleft lip and palate. Articulation errors and developmentally phonological processes may be evident in pre-school children and the presence thereof might have an impact on the child's functioning on the Zulu perceptual speech assessment protocol. Speech-language therapists should determine whether or not such errors and

processes are age-appropriate. Factoring developmental speech errors into intervention planning is important, as this will determine the goals and priorities of intervention.

- The presence of a language delay might also influence the child's performance on the protocol. The administration of the protocol might place several demands on the children and a language delay will impact negatively on the child's performance. This is important to consider, as language delays might lead to children not comprehending what is expected of them, resulting in a poor score on tests and providing inaccurate information on their speech and language abilities.

Fourthly, it is important to determine consumers' perceptions of a compiled speech assessment tool to obtain their opinions on the use of such tools and to determine their willingness to use this tool. This will provide information on the clinical applicability of the protocol. In this study, the perceptions of speech-language therapists regarding the clinical applicability of the Zulu perceptual speech assessment process were noted in phase three. They found the protocol to be a valuable and useful tool for clinical practice. They felt that they were able to administer it with ease within a reasonable time frame. The speech-language therapists also indicated that the protocol provided valuable information on and insight into cleft palate speech characteristics (Henningsson *et al*. 2007:1). They expressed the opinion that such a tool would be useful in their current service delivery to children with cleft palate. The development of this Zulu perceptual speech assessment protocol was also viewed to be culturally sensitive and applicable to Zulu-speaking pre-school children with cleft palate. The protocol has the potential to meet the clinical need created by a lack of speech assessment tools in African languages (www.pansalb.org).

Fifthly, the results gained from the perceptions of the speech-language therapists obtained in phase three indicated that the Zulu perceptual speech

assessment protocol was found to be suitable for use with pre-school children with cleft palate in Provincial Hospitals in Gauteng. The speech-language therapists were able to administer the protocol and identify some of the cleft palate speech characteristics as well as concomitant articulation errors and developmentally phonological processes present in the speech of these children. Such information is crucial for referrals, planning and provision of intervention (Peterson-Falzone *et al*. 2006:124). The inclusion of the rating system to determine the severity of the speech deviations in the analysis of the speech sample proved to be useful, as the speech-language therapists reported that it provided guidelines for setting intervention goals (Henningsson *et al*. 2007:10).

Sixthly, it is crucial to administer a compiled speech protocol on the population for whom it is intended. Information on their performance is required to determine the usefulness of such a protocol and provide opportunities for standardization of such tools. In the current study the Zulu-speaking children with cleft palate assessed by the researcher performed appropriately in response to the elicitation tasks as prescribed by the Zulu perceptual speech assessment protocol. They were able to complete the speech tasks within a reasonable time. Comprehensive information was obtained regarding their cleft palate speech characteristics, the presence of articulation errors and developmental phonological processes. Speech understandability and acceptability could be rated accurately.

Seventhly, when a researcher administers an assessment protocol to participants the possibility of bias needs to be identified and guarded against. Making use of an independent rater counteracts researcher bias. In the current study, an independent rater was employed and intra-observer reliability could be determined (Maxwell & Satake, 2006:121).

Lastly, it is imperative to follow international guidelines when compiling perceptual speech assessment materials to provide a theoretical underpinning and to allow for global use of such tools (Henningsson *et al*, 2007:2; www.eurocran.org). In phase four of the current study it was determined that international guidelines could be followed in the compilation of the Zulu protocol, and that this method could also be followed in the development of similar protocols in different languages, especially in South Africa. By applying this method of compilation to other languages, cross-linguistic comparisons of the perceptual speech of children with cleft palate would be possible and inter-centre comparisons of outcomes could be achieved (Hutters & Henningsson, 2004:548).

It is therefore concluded that a reliable and valid Zulu perceptual speech assessment protocol for pre-school children with cleft palate was developed and may be used by speech-language therapists in clinical practice. This protocol serves as an addition to locally developed speech assessment tools in African languages and provides a clinical tool specifically for use with Zulu-speaking pre-school children with cleft palate.

6.3 Critical evaluation of the study

A critical evaluation of this study was important as it allowed the researcher to determine the strengths and possible limitations of the research. According to Kamhi (2006:256), the methodology and results of research should be critically reviewed to allow for validating and obtaining reliable clinical decisions to reach appropriate conclusions.

The researcher reflected on the study to determine and identify *limitations* regarding the method and results of this study:

- ***Limited sample size***

The sample size of the research was limited, as speech-language therapists from the Provincial Hospitals in Gauteng responded poorly to the study and only four

children with cleft palate were assessed by them. This might have been indicative of the high workload currently experienced in Provincial Hospitals in Gauteng, overworked speech-language therapists due to limited staff being available in the Provincial Hospitals and several challenges faced by speech-language therapists working with children with cleft palate (Pillay *et al*. 1997:111). One of these challenges is that centralization of services has occurred to the different cleft palate centres and was available for every strata of society, race and income group (Dekker, 2007:5). In order to address this limitation, the researcher herself assessed eight Zulu-speaking children with cleft palate at the FCDC to expand the data on children's performance on the protocol and to obtain additional information on the clinical applicability of the protocol. A large sample group is important as such results would be meaningful in refining and adapting the protocol to allow speech-language therapists to use it in their clinical work contexts. The protocol is of a preliminary nature as only 12 children with cleft palate were assessed. Although the results were encouraging, further research is needed to apply the protocol to a larger group before it can be recommended for use in its current format.

- ***Researcher's knowledge of the Zulu language:***

Another limitation was the researcher's lack of knowledge of the Zulu language which necessitated the use of an expert Zulu linguist for the compilation of the protocol (Hutters & Henningsson, 2004:545). During the administration the use of interpreters was deemed necessary to obtain valid and reliable responses. This is, however, the reality in the South African context, as many speech-language therapists are not fluent in the home language of their clients (www.pansalb.org). It is recommended that the speech-language therapists train parents as assistants or interpreters to allow for more accurate responses and interpretations of these responses on the protocol (Hegde & Davis, 2005:214).

- ***Elicitation techniques:***

The provision of semantic prompting to elicit specific words was acceptable according to international guidelines (www.eurocran.org), but it is not the recommended manner for the elicitation of required responses. Spontaneous

identification of pictures is more appropriate (www.eurocran.org). Although it did not seem to have an significant influence on the results of the current study, it is recommended that an interpreter assist with this part of the assessment, as more valid responses would be elicited (Hegde & Davis, 2005:214).

- ***Conditions of recordings:***

Literature recommends specific conditions for optimal audio recordings, namely the use of the digital recordings to achieve greater scientific credibility of data and to conduct recordings in a quiet room avoiding noise sources as much as possible (Bernthal & Bankson, 2004:244; Henningsson *et al*. 2007:4). However, this could not be fully met by the researcher, as she used digital recordings for the assessment of children with cleft palate at the FCDC, but not in a quiet room. This was done as the researcher attempted not to interfere with the daily activities of the clinic. The independent rater was still able to use these recordings, but the background noise interfered and is viewed to be a limitation of the study. This did not, however, influence the results as recordings were still clear and audible and the independent rater was able to identify the specific cleft palate speech characteristics from the elicited responses.

It is also important to note the strengths of this study in providing suitable information on the perceptual assessment of Zulu-speaking children with cleft palate. The identified *strengths* are discussed below.

- ***Application of research ethical principles:***

One of the strengths of this study is that ethical principles were upheld for the participants, as they were vulnerable children with cleft palate (Fraser *et al*. 2006:99). Safeguards were applied as the participants were asked for their permission during the study. All of the children were aware of what was expected of them during the study and they provided verbal assent for the study (Fraser *et al*. 2006:100). The researcher also took precautions with regard to all of the different participants to ensure that the ethical principles of respect, beneficence and non-malfeasance and justice were upheld (Morgan *et al*. 2006:19). This was seen as a strength of the study, as none of the vulnerable participants were

subjected to any harm or risks that could have been caused by their participation in the research.

- ***Pilot study:***

During the execution of the research, a pilot study was conducted on normal Zulu-speaking pre-school children with cleft palate. The inclusion of a pilot study to pre-test the developed Zulu perceptual speech assessment protocol on normal Zulu-speaking children proved to be valuable as their specific behaviours could be observed (Leedy & Ormrod, 2005:180) and responses on the protocol were elicited to determine the age- and cultural appropriateness of the protocol. This was used to guarantee that a valid and reliable perceptual speech assessment protocol would be developed for pre-school Zulu-speaking children with cleft palate.

- ***Clinical applicability of the protocol:***

Although the Zulu perceptual speech assessment protocol for pre-school children with cleft palate was applied to only 12 children with cleft palate by three speech-language therapists and the researcher, it was found to be clinically relevant. It was the first attempt to compile and conduct a culturally and linguistically appropriate Zulu protocol on pre-school children with cleft palate (www.eurocran.org). The methodology may also serve as the basis for further research and development regarding the assessment of cleft palate speech in South Africa, due to its transparency and replicability.

This exploratory study was conducted to develop a perceptual speech assessment protocol for Zulu-speaking children with cleft palate in an attempt to address the dearth of clinical speech-language assessment materials currently available in South Africa. Based on the relevance of the research, the following clinical implications were identified.

6.4 Clinical implications of the results

It is important to relate research findings to clinical practice to ensure that knowledge is shared amongst professionals, to understand that research and

practice inform each other, to make researchers more responsive to the needs of practitioners and to improve clinical practice (Kathard *et al*. 2007:5). Several clinical implications of the research are presented below.

- Based on the limited sample of speech-language therapists involved in this study and literature reports of Pannbacker (2004:195) and Vallino *et al*. (2008:371), it is apparent that practising speech-language therapists could benefit from extended knowledge on the assessment of children with cleft palate and appropriate interventions in this regard. Continuing Professional Development is the ideal vehicle to achieve clinical experience in working with children with cleft palate and for in-service training (Pannbacker, 2004:195). The findings of the research clearly indicated that speech-language therapist participants had a limited knowledge base of and clinical experience in working with children with cleft palate (Vallino *et al*. 2008:371). With the assistance of trained interpreters, speech-language therapists may be able to obtain an in-depth working knowledge of the Zulu perceptual speech assessment protocol by conducting workshops, continuing professional development seminars or in-service training (Hegde & Davis, 2005:207; HPCSA, 2005).
- According to Henningsson *et al*. (2007:2), many speech-language therapists working with children with cleft palate have been using a particular system of documenting and reporting the speech characteristics of these children in their own clinical setting and they may be reluctant to change their systems. However, in light of the current focus on evidence-based care, it is important that speech-language therapists utilize newly developed assessment materials with the recommended ratings by experts in the field of cleft palate (Henningsson *et al*. 2007:10). This utilization of assessment materials would allow speech-language therapists to answer a universal call for the use of standardized assessment materials in order to allow for inter-centre comparisons of cleft data (Flinn *et al*. 2005:253; Hutters &

Henningsson, 2004:550, Lohmander & Olsson, 2004:65; Pannbacker, 2004:195).

- The perceptual speech assessment protocol for Zulu-speaking children with cleft palate was based on international guidelines and complied with the recommendations in literature (www.eurocran.org). The protocol could be utilized in future to collect data for research purposes as it indicated that children functioned well with improved understanding and responsiveness when familiar with the language of assessment materials (Naudé *et al*. 2007:520). This implies the use of the Zulu perceptual speech assessment protocol by speech-language therapists and cleft palate teams to allow for improved and accurate assessment materials.
- The ACPA parameters (2004) specify that speech-language evaluations should be conducted for each child at least annually until the age of four. This allows for the early identification of specific cleft palate speech characteristics in the child's speech and leads to the appropriate intervention to eliminate these speech errors from becoming habitual (Peterson-Falzone *et al*. 2006:5). The Zulu perceptual speech assessment protocol could be used to accurately assess Zulu-speaking children with cleft palate and to allow appropriate intervention goals to be developed based on their speech characteristics.
- The perceptual speech assessment protocol for Zulu-speaking children with cleft palate may also be used during outreach programmes such as Operation Smile (www.operationsmile.org) where the Zulu language is spoken to facilitate the task of the speech-language therapists on the team.
- The assessment of children with cleft palate in the Zulu language can be a daunting task for speech-language therapists unfamiliar with the language. It is recommended that parents or trained interpreters be used to assist during the assessment and analysis of data collected to

allow more reliable and valid data to be obtained from children (Hegde & Davis, 2005:214).

The results of the study provided several possibilities for further research. Recommendations for further research are presented as follows.

6.5 Recommendations for further research

Many researchers in the discipline of communication disorders follow an empirical approach to develop evidence for practice and to determine how practitioners use this evidence for treating patients in their clinical practice (Kathard *et al*. 2007:6). The researcher therefore concentrated on identifying aspects to improve the current service delivery to children with cleft palate in South Africa. The following recommendations regarding further research are made.

- ***Challenges in service delivery:***

  Current service delivery to children with cleft palate is often characterized by several challenges experienced by speech-language therapists. It can therefore be recommended that further research be conducted regarding the perceptual speech assessments of children with cleft palate to address the challenge posed by heavy caseloads, multilingualism and the educational level of the family and clients (Dekker, 2007:45). This will assist speech-language therapists with their intervention processes, as more resources would be available to them.

- ***Standardization of assessment materials:***

  Standardization of culturally and linguistically appropriate assessment materials is important within the South African context (Naidoo *et al*. 2005:76). The provision of norms for speech sound development in Zulu would allow for standardization of such materials. Additional studies are needed to assist with the development of norms and possible standardization of the Zulu perceptual speech assessment protocol.

- ***Improved service delivery:***

It is recommended that speech-language therapists develop perceptual speech assessment materials for use on children with cleft palate in the other African languages. The development of a perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate was seen as the first step towards improved service delivery to Zulu-speaking children with cleft palate. The methodology of the current study could be replicated and followed in the development of similar perceptual speech assessment protocols in the different African languages. This would allow for cross-linguistic comparisons between the languages, different cleft palate teams and speech outcomes after treatment (Hutters & Henningsson, 2004:550).

- ***Limited sample size:***

It is recommended that the perceptual speech protocol for Zulu-speaking pre-school children with cleft palate be disseminated to cleft palate teams in South Africa to obtain their perceptions and feedback on this protocol, and to ensure that the protocol is administered on a larger sample size. The current study consisted of limited data samples, as very poor co-operation was received from speech-language therapists in Provincial Hospitals in Gauteng. Even with the number of children additionally assessed by the researcher, it was still a limited sample size.

- ***Training of speech-language therapists:***

Further research is needed to determine where training can be adjusted in order to assist speech-language therapists with service delivery to African language-speaking children with cleft palate and to determine ways to reduce the gap between clinical practice and theoretical knowledge. The perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate may be used as a clinical instrument and regularly re-evaluated to determine the possible intervention guidelines derived from this tool, for example pre- and post-training of speech-

language therapists by using a descriptive study and focus groups (Henningsson *et al*. 2007:15; Lohmander & Olsson, 2004:70).

6.6 Final comments

The quality of speech and language services for cleft care internationally still ranges from poor to excellent due to a significant variation among training programmes with regard to academic course work and clinical practicum (Pannbacker, 2004:195). The focus should be on speech outcomes after treatment to allow comparisons between centres (Henningsson *et al*. 2007:2). Speech-language therapists should strive to provide optimal care and this requires an awareness of risks related to assessment and treatment, such as the presence of velopharyngeal incompetence, diagnostic errors, unnecessary and poorly timed treatment and inappropriate or poorly performed procedures (Pannbacker, 2007:198). Speech-language therapists should understand strategies to minimize these risks and follow acceptable patterns of clinical practice. Optimal care will only be achieved if speech-language therapists establish specific standards to identify speech outcomes after treatment (Pannbacker, 2007:199).

In South Africa, high quality cleft care is still not available to all children with cleft palate, as there are only seven teams countrywide (Dekker, 2007:23) and no standard assessment protocol to evaluate the speech of these children. Therefore, the speech outcomes of children with cleft palate in South Africa cannot yet be compared between the different centres or across languages. The current perceptual speech assessment protocol for Zulu-speaking pre-school children with cleft palate succeeded in addressing the dearth of Zulu speech assessment materials (Mphahlele, 2006:22) and guiding the speech assessment of Zulu-speaking pre-school children with cleft palate to make accurate diagnoses and appropriate referrals for instrumental assessments.

Services to children with cleft palate in South Africa are challenged by a number of factors, one being the limited budget of the South African Department of Health, which restricts the number of surgeries conducted in the public health sector. This leads to long waiting lists and interferes with treatment schedules which, in turn, impact negatively on the timeous surgical repair of cleft palate (Dekker, 2007:5). As a result, the speech outcomes of these children may not be on par with those of their peers in developed countries or with those treated in the private health sector.

In an attempt to improve the speech outcomes of children with cleft palate in South Africa, the perceptual speech assessment protocol for Zulu-speaking pre-school children was developed. This perceptual speech assessment protocol for Zulu-speaking pre-school children aims to answer the call of international experts to develop universally appropriate perceptual assessment tools that provide accurate and reliable information on the cleft palate speech of individuals to guide the intervention process.

"There remains a need for global measures of speech intelligibility and this has been described as the primary goal of therapeutic intervention. Valid and reliable measures of intelligibility are necessary for speech outcomes" (Whitehill, 2000:58).

REFERENCES

ACPA 2004. Parameters for evaluation and treatment of patients with cleft lip/palate or other craniofacial anomalies. *Official Publication of the American Cleft Palate-Craniofacial Association.*

ACPA 2007. Revision to the parameters of care document. *Newsletter of the Cleft Palate Foundation*, 33, 2.

Alderson, P. 2005. *Ethics. Doing research with children and young people.* Boston: Allyn & Bacon.

ASHA 2002. *Evidence based practice.* www.asha.org [Accessed April 30th 2006].

ASHA 2004. *Knowledge and skills needed by speech-language pathologists and audiologists to provide culturally and linguistically appropriate services* [Accessed June 26th 2008].

ASHA 2005. *Cultural competence (Issues in Ethics).* [Accessed June 26th 2008].

Bailey, K. 1994. *Methods of social research.* New York: The Free Press.

Bauman-Waengler, J. 2000. *Articulation and phonological impairments. A clinical focus.* Boston: Allyn and Bacon.

Bennet, T., Zhang, C. & Hojnar, L. 1998. Facilitating the full participation of culturally diverse families in the IFSP/IEP process. *Infant-Toddler Intervention, The Transdisciplinary Journal,* 8 (3), 227-249.

Bernthal, J. E. & Bankson, N. W. 2004. *Articulation and phonological disorders.* Fifth Edition. Boston: Allyn and Bacon.

Blakeley, R. W. & Brockman, J.H. 1995. Normal speech and hearing by age 5 as a goal for children with cleft palate: A demonstration project. *American Journal of Speech-Language Pathology,* 40, 25–32.

Bortz, M. A. 1995. *A language assessment for pre-school Zulu speaking children.* Unpublished Masters Dissertation, Department of Speech Pathology, Faculty of Arts. University of Witwatersrand.

Brodsky, L., Holt, L & Ritter-Schmidt, D. H. 1992. *Craniofacial anomalies. An interdisciplinary approach.* Mosby Year Book, Inc.

Bütow, K-W. 1995. *Treatment of facial cleft deformities. An illustrated guide.* St. Louis: Ishiyaju Euro America Inc.

Bzoch, K. R. 2004. *Communicative disorders related to cleft palate.* Fifth Edition. Austin TX: Pro-ed.

Carter, J. A., Lees, J. A., Murira, G. M., Gona, J., Neville, B. G. R. & Newton, C. R. J. C. 2005. Issues in the development of cross-cultural assessments of

speech and language for children. *International Journal of Language and Communication Disorders,* 40 (4), 385-401.

Creswell, J. W. 2007. *Mixed methods research: State of the art (What has developed in mixed methods).* Lecture on research design, Department of Educational Psychology, University of Nebraska-Lincoln.

Dawber, A. & Jordaan, H. 2002. *Second language learners in the classroom*. Content Solutions Online, Pretoria.

Dekker, B. 2007. *South African children with cleft lip and/or palate: Speech-language therapy in team care*. Unpublished Undergraduate Research Report, Department of Communication Pathology, University of Pretoria.

Department of Health. 2001. *Human genetics policy document for the management and prevention of genetic disorders, birth defects and disabilities.* Department of Health. Pretoria: Government Printer.

De Vos, A. S., Strydom, H., Fouché, C. B. & Delport, C. S. L. 2005. *Research at grassroots: for the social sciences and human service professions.* Third Edition. Pretoria: Van Schaik Publishers.

Dollaghan, C. 2004. Evidence-based practice myths and realities. *The ASHA Leader.*13 April 2004, 4-12.

Doke, C. M., Malcolm, D. M., Sikakana, J. M. A. & Vilakazi, B. W. 1990. *English/Zulu Zulu/English Dictionary.* Witwatersrand University Press.

Du Plessis, S. M. 2006. *Personal communication on timely repair of cleft palate.* Community Nurse at the Facial Cleft Deformity Clinic, Department of Oro-Maxillo-Facial Surgery, University of Pretoria.

Fair, L. & Louw, B. 1999. Early communication intervention within a community-based intervention model in South Africa. *The South African Journal of Communication Disorders,* 46, 13–23.

Fisher, H. B. & Logeman, J. A. 1971. *Fisher-Logeman Test of Articulation Competence.* Houghton Mifflin Company.

Flinn, W., Long, R.E,. Garattini, G. & Semb, G. 2005. A multicenter outcomes assessment of five-year-old patients with unilateral cleft lip and palate. *Cleft-Palate Craniofacial Journal,* 43 (3), 253–258.

Fraser, S., Lewis, V., Ding, S., Kellett, M. & Robinson, C. 2006. *Doing research with children and young people.* London: Sage.

Fudula, J. 1963. *Arizona Articulation Proficiency Scale: Revised.* Los Angeles: Western Psychological Services.

Golding-Kushner, K. 2000. *Therapy techniques for cleft palate speech and related disorders.* New York: Singular Thomson Learning.

Goldman, R. & Fristoe, M. 1969. *Goldman-Fristoe Test of Articulation.* Minnesota: American Guidance Services Inc.

Goldstein, B. 2000. *Cultural and linguistic diversity. Resource guide for speech-language pathologists*. San Diego, Singular Thomson Learning.

Hall, D. 1995. *Assessing the needs of bilingual pupils*. London, David Fulton Publishers Ltd.

Hammer, C. S. 1998. Toward a "think description" of families: Using ethnography to overcome the obstacles to providing family-centred early intervention services. *American Journal of Speech-Language Pathology,* 7 (1), 5-22.

Harding, A., Harland, K. & Razzell, R. 1997. *Cleft audit protocol for speech (CAPS).* Available for Speech/Language Department, St. Andrews Centre for Plastic Surgery, Broomfield Hospital, Court Road, Broomfield, Chelmsford, Essex, UK.

Hardin-Jones, M. A. & Jones, D. L. 2005. Speech production of preschoolers with cleft palate. *The Cleft Palate-Craniofacial Journal*, 42 (1), 7-13.

Hathorn, I. S., Atack, N. E., Butcher, G., Dickson, J., Durning, P., Hammond, M., Knight, H., Mitchell, N., Nixon, F., Shinn, D. & Sandy, J. R. 2006. Centralization of services: standard setting and outcomes. *Cleft palate Craniofacial Journal,* 43 (4), 401– 405.

Health Professions Council of South Africa (HPCSA). 2005. Policy guidelines.

Health Professions Council of South Africa (HPCSA). 2005. Final document: Continuing professional development. *Guidelines for the Health Professions.*

Health Professions Council of South Africa. 2009. *Speech, Language and Hearing Professionals.* Total number of professionals registered with the Board. Reviewed 31 May 2009. www.hpcsa.co.za.

Hegde, M. N. 2003. *A coursebook on scientific and professional writing for speech-language pathology.* USA. Third Edition. Thomson Delmar Learning.

Hegde, M. N. & Davis, D. 2005. *Clinical methods and practicum in speech-language pathology*. 4th Edition. USA, Thomson Learning.

Henningsson, G. 2004. *Eurocran Speech Group: good practice archive for speech.* www.eurocran.org. [Accessed January 4th 2008].

Henningsson, G. 2006. *Personal communication on perceptual assessment of cleft palate.* Lecturer at the Department of Logopedics and Phoniatrics, Karolinska Institute, Stockholm, Sweden.

Henningsson, 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,* 45 (1), 1-17.

Hodge, M. & Gotzke, C. L. 2007. Preliminary results of an intelligibility measure for English-speaking children with cleft palate. *The Cleft Palate Craniofacial Journal,* 44, (2), 163-174.

Hutters, B. & Henningsson, G. 2004. Speech outcome following treatment in cross-linguistic cleft palate studies: Methodological implications. *The Cleft Palate-Craniofacial Journal,* 41 (5), 544-549.

Johnson, C. J. 2006. Getting started in evidence-based practice for childhood speech-language disorders. *American Journal of Speech-Language Pathology,* 15, 20-35.

Kamhi, A. G. 2006. Combining research and reason to make treatment decisions. *American Speech-Language-Hearing Association,* 37, 255 – 256.

Kathard, H. , Naudé, E. , Pillay, M. & Ross, E. 2007. Improving the relevance of speech-language pathology and audiology research and practice. *The South African Journal of Communication Disorders,* 54, 5 – 19.

Klein, H. B. & Moses, N. 1999. *Intervention planning for children with communication disorders. A guide for clinical practicum and professional practice.* Boston: Allyn & Bacon.

Konst, E. M., Rietveld, T., Peters, H. F. M. & Weersink-Braks, H. 2003. Use of a perceptual evaluation instrument to assess the effects of infant orthopaedics on the speech of toddlers with cleft lip and palate. *The Cleft Palate Craniofacial Journal*, 40, (6), 597-605.

Kretzman, J. P. & McKnight, J. L. 1993. *Building communities from the inside out: A path toward finding and mobilizing a community's assets.* Evanston, I. L. Institute for Policy Research.

Kritzinger, A., Louw, B. & Hugo, R. 1996. Early communication functioning of infants with cleft lip and palate. *The South African Journal of Communication Disorders*, 43, 77-84.

Kuehn, D. P. & Henne, L. J. 2003. Speech evaluation and treatment for patients with cleft palate. *American Journal of Speech-Language Pathology,* 12, 103-109.

Kuehn, D. P. & Moller, K. T. 2000. Speech and language issues in the cleft palate population: The state of the art. *The Cleft Palate-Craniofacial Journal*, 37 (4), 348-418.

Kuehn, D. P., Sell, D., Henningsson, G. & Trost-Cardamone, J. 2005. Universal parameter system. *10th International Congress of Cleft Palate and Related Craniofacial Anomalies,* ICC Durban, South Africa, 4 – 8 September 2005.

Kummer, A. W. 2001. *Cleft palate and craniofacial anomalies.* San Diego: Singular Thomson.

Kummer, A. W. 2008. *Cleft palate and craniofacial anomalies.* Second Edition. San Diego: Singular Thomson.

Le Roux, M. 2007. *Personal consultation on the compilation of a Zulu perceptual speech assessment protocol.* Senior Lecturer at the Department of African Languages, University of South Africa.

Le Roux, M. & Groenewald, E. 2007. *Sounds and sounds systems: Tutorial letter 501/2007.* University of South Africa (UNISA), Department of African Languages.

Leedy, P. D. & Ormrod, J. E. 2005. *Practical research: Planning and design.* 6th Edition. USA: Merrill Publishing Company.

Lohmander-Agerskov, A., Soderpalm, E., Friede, H. & Lilja, J. 1995. A longitudinal study of speech in 15 children with cleft lip and palate treated by late repair of the hard palate. *Scandinavian Journal of Plastic and Reconstructive Hand Surgery,* 29, 21–31.

Lohmander, A. & Olsson, M. 2004. Methodology for perceptual assessment of speech in patients with cleft palate: A critical review of the literature. *Cleft Palate-Craniofacial Journal,* 41 (1), 64-70.

Louw, B. 2008. Collaborating with cleft teams: Optimizing cleft care. Paper presented at CHRIB seminar: *New developments in intervention with preschoolers with cleft palate.* Department of Communication Pathology, University of Pretoria.

Louw, B. 2006. *Research as a professional function in communication pathology.* Postgraduate Module KMP 781. Lecture on: Responsible Research Conduct. Department of Communication Pathology, University of Pretoria.

Louw, B. & Avenant, C. 2002. Culture as context for intervention: Developing a culturally congruent early intervention program. *International Pediatrics,* 17, (3), 145-150.

Louw, B. & Delport, R. 2006. *Obtaining informed consent from vulnerable groups in social science research in South Africa.* Presentation at the XVI ISA World congress of Sociology, Durban, South Africa, July 23 – 29, 2006.

Louw, B. & Kritzinger, A. 2001. *Facial cleft deformities clinic. Communication evaluation protocol 0 to 3 years*. Department of Communication Pathology, University of Pretoria.

Louw, B., Shibambu, M. & Roemer, K. 2006. Facilitating cleft palate team participation of culturally diverse families in South Africa. *The Cleft Palate Craniofacial Journal,* 43 (1), 47-54.

Lynch, E. W. 1998. Edited by E. W. Lynch & M. J. Hanson. Developing cross-cultural competence. Chapter 3 in *A guide for working with children and their families: developing cross-cultural competence*. Baltimore: Paul H Brooks.

Madding, C. C. 2000. Maintaining focus on cultural competence in early intervention services to linguistically and culturally diverse families. *Infant-Toddler Intervention, The Transdisciplinary Journal,* 10, (1), 9-18.

Mars, M. 2005. Keynote Address: No care for 80% of the World's population: What can be done? *10th International Congress on Cleft Palate and Related Craniofacial Anomalies.* ICC, Durban, South Africa, 4 – 8 September 2005.

Mars, M. , Sell, D. & Habel, A. 2008. Management of cleft palate in the developing world. UK: John Wiley & Sons.

Masiloane, M. 1983. *Performance of Zulu speaking children on a literal translation of the RDLS.* Unpublished undergraduate research report, Department of Speech and Hearing Therapy, University of Witwatersrand.

Maxwell, D. L. & Satake, E. 2006. *Research and statistical methods in communication sciences and disorders.* Canada: Thomson Delmar Learning.

McWilliams, B. J., Morris, H. L. & Shelton, R. L. 1990. *Cleft palate speech.* Fourth Edition. Philadelphia, PA: B. C. Decker.

Menen, I. & Stansfield, J. 2006. Speech and language therapy service delivery for bilingual children: A survey of three cities in Great Britain. *International Journal of Language and Communication Disorders,* 41 (6), 635-652.

Moodley, L. 2006. *Personal communication on current Zulu assessment instruments and procedures.* Lecturer at the Department of Speech-Language Pathology, Faculty of Health Sciences, University of Durban Westville.

Moore, N. 2000. *How to do research: The complete guide to designing and managing research projects.* 3rd Edition. London, Library Association Publishing.

Morgan, G. A., Gliner. J. A., Harmon, R. J., Kraemer, H. C., Leech. N. L. & Vaske, J. J. 2006. *Understanding and evaluating research in applied and clinical settings.* Lawrence Erlbaum Associates, Publishers.

Mphahlele, C. 2006. *A detailed inventory of linguistically and culturally sensitive speech- and language assessment material available to speech-language therapists working in South Africa.* Unpublished undergraduate research report, Department of Communication Pathology, University of Pretoria.

Naidoo, Y. 2003. *A developmental profile of speech sound and syllable acquisition in Zulu speaking children.* Unpublished Masters Dissertation, Department of Communication Pathology. University of Pretoria.

Naidoo, Y., van der Merwe, A., Groenewald, E. & Naudé, E. 2005. Developmen of speech sound and syllable structure of words in Zulu-speaking children. *Southern African Linguistics and Applied Language Studies,* 23 (1), 59-79.

Naudé, E. 2005. *Profiling language in young urban English additional language learners.* Unpublished D.Phil Dissertation, Department of Communication Pathology, University of Pretoria.

Naudé, E., Louw, B. & Weideman, A. 2007. First steps toward developing tools for language assessment in multilingual urban pre-schoolers. *South African Linguistics and Applied Language Studies,* 25 (4), 519-538.

Neuman, W. L. 1997. *Social research methods.* USA: Allyn and Bacon.

Owens, R.E. 2001. *Language development: An introduction.* 5th Edition. Boston: Allyn & Bacon.

Owens, R. E. 2005. *Language development: An introduction.* 6th Edition. Boston: Allyn &Bacon.

Pahl, J. 2006. *Personal communication on current Zulu assessment instruments and procedures.* Lecturer at the Department of Speech-Language Pathology, Faculty of Health Sciences, University of Durban Westville.

Pakendorf, C. 1998. Tien punt plan vir die vertaling en kulturele aanpassing van toetsmateriaal binne die Suid-Afrikaanse konteks. Clinica*: Applications in Clinical Practice of Communication Pathology. Monograph 3, 1-9.* Department of Communication Pathology, University of Pretoria.

Pannbacker, M. 2004. Velopharyngeal incompetence: The need for speech standards*. American Journal of Speech-Language Pathology*, 13, 195-201.

Pannbacker, M. H. & Middleton, G. F. 1994. *Introduction to clinical research in communication disorders.* San Diego, California. Singular Publishing Group.

Peterson-Falzone, S., Hardin-Jones, M. A. & Karnell, M. P. 2001. *Cleft palate speech.* Third Edition. St. Louis: Mosby.

Peterson-Falzone, S. J., Trost-Cardamone, J. E., Karnell, M. P. & Hardin-Jones, M. A. 2006. *The clinician's guide to treating cleft palate speech.* USA. Mosby, Elsevier.

Pillay, M., Kathard, H. & Samuel, M. A. 1997. The curriculum of practice: A conceptual framework for speech-language therapy and audiology practice with a black African first language clientele. *South African Journal of Communication Disorders,* 44, 109-117.

Priester, G. H. & Goorhuis-Brouwer, S. M. 2008. Speech and language development in toddlers with and without cleft palate. *International Paediatric Otorhinolaryngology,* 72, 801 – 806.

Reddy, D. 1997. *An investigation into the language assessment procedures conducted by speech-language therapists in their assessment of Zulu first language children being instructed in the English medium.* Unpublished undergraduate research report, Department of Speech and Hearing Therapy, University of Durban-Westville.

Rivers, K. O. Working with caregivers of infants and toddlers with special needs from culturally and linguistically diverse backgrounds. *Infant-Toddler Intervention, The Transdisciplinary Journal,* 10, (4), 61-72.

Roberts, K. L. 2000. *Speech-language therapy services available to Zulu first-language children in the Durban metropolitan area: An analysis*. Unpublished undergraduate research report, Department of Speech and Hearing Therapy, University of Durban-Westville.

Roberts, N. R., Rule, S. & Inocenti, M. S. 1998. *Families as partners in services. Strengthening the family-focused partnership in services for young children.* Baltimore: Paul H. Brookes.

Rossetti, L. M. 2001. *Communication intervention: Birth to three.* Second Edition. Canada. Singular Thomson Learning.

Roth, F. P. & Worthington, C. K. 2001. *Treatment resource manual for speech-language pathology.* 2nd Edition. United States. Singular Thomson Learning.

SASLHA. 1997. Ethics and standards committee. *Code of Ethics*.

SASLHA. 2003. Ethics and standards committee. *Guidelines on* w*orking with bilingual populations in speech-language pathology.*

Scherer, N. J. & Kaiser, A. P. 2007. Early intervention for children with cleft palate. *Infants & Young Children: An Interdisciplinary Journal of Special Care Practices,* 20, 355-366.

Sell, D. 2005. Issues in perceptual speech analysis in cleft palate and related disorders: A review. *International Journal of Language and Communication Disorders,* 40, 103-121.

Sell, D. 2005. *ScandCleft Protocol.* Assessment of 3 year olds. Single case data.

Sell, D; Harding, A & Grunwell, P. 1994. A screening assessment of cleft palate speech. *European Journal of Disorders of Communication*, 29 , 1-15.

Sell, D., Harding, A. & Grunwell, P. A. 1999. GOS.SP.ASS'98: An assessment for speech disorders associated with cleft palate and/or velopharyngeal dysfunction. *International Journal of Language and Communication Disorders,* 34, 17-33.

Shaw, W. 2004. Global strategies to reduce the health care burden of craniofacial anomalies: Report of WHO meetings on international research on craniofacial anomalies. *The Cleft Palate Craniofacial Journal,* 42 (3), 238-243.

Shipley, K.G. & McAfee, J.G. 1998. *Assessment in Speech-Language Pathology.* Second Edition. San Diego, London. Singular Publishing Group, Inc.

Shipley, K.G. & McAfee, J.G. 2004. *Assessment in Speech-Language Pathology.* Third Edition. San Diego, London. Singular Publishing Group, Inc.

Shprintzen, R. J. & Bardach, J. 1995. *Cleft palate speech management. A multi-disciplinary approach.* St. Louis: Mosby Inc.

Streicher, D. 2005. *A preliminary perceptual speech assessment protocol for Sepedi-speaking pre-school children with cleft palate.* Unpublished undergraduate research report, Department of Communication Pathology, University of Pretoria.

Swanepoel, D. W. 2004. A Review of the South African context: Information for community-based speech-language and hearing services. *Clinica: Applications in Clinical Practice of Communication Pathology* Monograph, 9, 11-16. Department of Communication Pathology, University of Pretoria.

Taljaard, P. C. & Snyman, J. W. 1989. An introduction to Zulu phonetics. Cape Town: Marius Lubbe Publishers.

The constitution of the Republic of South Africa. 1996. Government Printer.

Trost-Cardamone, J. E. 2004. *Cleft lip and palate clinic. Speech and orofacial consultation.* California State University at Northridge.

Vallino, L. D. , Norman, M. S. , Lass, J. , Bunnell, H. T. & Pannbacker, M. 2008. Academic and clinical training in cleft palate for speech-language pathologists. *The Cleft Palate Craniofacial Journal*, 45 (4), 371-380.

Vallino, L. D. , Zuker, R. & , Napoli, J. A. 2008. A study of speech, language and hearing in children with cleft lip only. *The Cleft Palate Craniofacial Journal*, 45 (5), 485-494.

Vance, M., Stackhouse, J. & Wells, B. 2005. Speech production skills in children aged 3 to 7 years. *International Journal of Language and Communication Disorders.* 40 (1), 29-48.

Van Lierde, K. M., De Bodt, M., Van Borsel, J., Wuyts, F. L. & Van Cauwenberge, P. 2002. Effect of cleft type on overall speech intelligibility and resonance*. International Journal of Phoniatrics, Speech Therapy and Communication Pathology,* 54 (3), 158-168.

Vermaak, C. E. 2006. *Phonological awareness skills of a group of grade 4 learners, in a multi-cultural, multi-lingual education context with English as language of learning and teaching (ELoLT).* Unpublished Masters Research Report*,* Department of Communication Pathology, University of Pretoria.

Visser, C. M. 2005. *Die toepaslikheid van 'n Afrikaanse vertaling van die Scan-C: Test for auditory processing disorders in children-revised vir voorskoolse kinders.* Unpublished Masters Research Report*,* Department of Communication Pathology, University of Pretoria.

Weinmann, A. C. K. 2004. *'n Voorlopige Afrikaanse weergawe van die phonological awareness literacy screening-kindergarten (PALS-K).* Unpublished Masters Research Report*,* Department of Communication Pathology, University of Pretoria.

Wessels, M. & van den Berg, R. 2007. *Practical guide to facilitating language learning. Methods, activities and techniques for OBE.* Cape Town: Oxford University Press, Southern Africa.

Whitehill, T. L. 2000. Assessing intelligibility in speakers with cleft palate: A critical review of the literature. *The Cleft Palate Craniofacial Journal,* 39 (1), 50-58.

Whitehill, T. L. & Chau, C. H. F. 2004. Single-word intelligibility in speakers with repaired cleft palate. *Clinical Linguistics and Phonetics,* 18, (4-5), 341-355.

Willenberg, I. 1987. A Xhosa translation of the English Carrow Test of Auditory Comprehension. *Unpublished undergraduate research report,* University of Cape Town.

Wilkes, A. & Nkosi, N. 1998. *Say it in Zulu: for beginners/third language speakers*. South Africa: Kagiso Education.

www.cia.gov [Accessed January 4th 2008]

www.eurocran.org [Accessed January 4th 2008].

www.hpcsa.co.za [Accessed May 31st 2009].

www.operationsmile.org [Accessed September 9th 2008].

www.pansalb.org.za [Accessed September 7th 2008].

www.rotaplast.org [Accessed September 9th 2008].

www.smiletrain.com [Accessed June 18th, 2006].

www.statssa.gov.za [Accessed 4th February 2008].

APPENDICES

APPENDIX A
PERMISSION FROM THE RESEARCH PROPOSAL AND ETHICS COMMITTEE

100
1908 - 2008
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Humanities
Research Proposal and Ethics Committee

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

APPENDIX B

LETTER OF INFORMED CONSENT TO THE GAUTENG DEPARTMENT OF HEALTH

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

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

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

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

Tel: 082 837 9234
E-mail: dorettestreicher@yahoo.com

RESEARCH SUPERVISOR:

B Louw
Prof. Brenda Louw

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

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

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

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

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

Tel: 082 837 9234
E-mail: dorettestreicher@yahoo.com

RESEARCH SUPERVISOR:

Prof. Brenda Louw

APPENDIX D

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

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

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

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

RESEARCH SUPERVISOR:

Prof. Brenda Louw

APPENDIX E

LETTER OF INFORMED CONSENT FOR SPEECH-LANGUAGE THERAPISTS

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

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

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

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

Tel: 082 837 9234
E-mail: dorettestreicher@yahoo.com

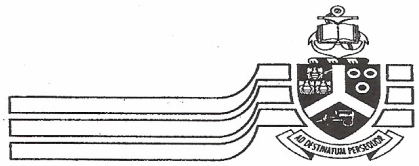
RESEARCH SUPERVISOR:

B Louw
Prof. Brenda Louw

APPENDIX F

LETTER OF INFORMED CONSENT FOR PARENTS

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA



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

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

D Swiegers

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

RESEARCH SUPERVISOR:

B Louw

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: _____

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

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

March 2008

Bazali abathandekayo, baka_____

Imvume yokwenza ucwangisiso lweziqu zeMasters.

Ngiwumfundi weziqu zeMasters kumnyango weCommunication Pathology eNyuvesi yasePretoria, ngenza ucwaningo lo**Didiyelo 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 oluvulukile, 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

ingxenye ngemva kokuthola imvume kubazali. Kulinganiswele ukuthi locwaningo luzothatha isikhathi esingaba imizuzu engamashumi amane nesihlanu umntwana ngamunye. Ukuhlolwa komntwana kuzokwenziwa kwihora leTherapy, ngemvume kaDokotela (Therapist). Ngesikhathi sokuhlola, ingxoxo nomtwana izoshicilelwa kwiziqophi zezithombe (Video) nakuziqophi zomsindo (Audio), ngemva kokuphela kocwaningo luzolahlwa lolushicilelo. Ngingathanda ukuqala lolucwaningo kusukelangoMarch 2008.

Umntwana wakho ukhethelwe ukuba ngomunye ozohlolelwa lolucwaningo. Singajabula uma ungavumela umntwana wakho athathe ingxenye kulolucwaningo. Uma ufuna ukwazi ngomphumela, singakujabulela ukuxoxa nawe ngasese ngemva kokuhlolwa komntwana wakho. Ucwaningo lwethu luzobe luyimfihlo lapho siqhubeka nokuhlola abantwana. Umntwana ngamunye uzonikezwa inombolo. Konke okuzotholakala ekuhlolweni kuzobe kwenzelwa ucwaningo futhi kuzothathwa njengomphumela wocwaningo.

Uma uvuma ukuba umntwana wakho athathe ingxenye kulolucwaningo, sicela ugcwalise ifomu elingemuva ulifake emvilophini, bese ulinikeza uDokotela (Therapist) wakho.

Siyabonga ngokusivumela ukuba sihlole umntwana wakho. Uma unemibuzo ungangithinta kulenombolo engezantsi:

Cell: 082 837 9234
E-mail: dorettestriecher@yahoo.com

Othandekayo

D Swiegers

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

Research Supervisor:

B Louw

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: _____

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.

APPENDIX H

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

GAUTENG PROVINCIAL GOVERNMENT

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: 011 880 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:			
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 • The nomenclature used is correct • The references used are relevant, comprehensive and accurate (corrected) • The spelling and grammar are correct • The language needs improvement • The research proposal needs restyling and rewriting	X X X X	 X X	
7.Are the research methods appropriate to the study	X		
8. Does the study have ethical approval? If yes, name the ethics committee **University of Pretoria**	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? Are financial implications and financial support transparent?	X 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

APPENDIX I

PERMISSION FROM THE NURSERY SCHOOL TO CONDUCT THE STUDY AT THE INSTITUTION

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

KLEUTERSKOOL
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

APPENDIX J

QUESTIONNAIRE TO THE SPEECH-LANGUAGE THERAPISTS

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

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:	□ Primary □ Secondary □ Tertiary
Language/s of therapist in which therapy is provided:	□ English □ Afrikaans □ Zulu □ Sepedi □ Other, please specify
Qualification in Speech-Language therapy:	□ Bachelor's degree □ Master's degree □ Doctorate □ Other, please specify
Years of experience with cleft palate:	
Are there children with cleft lip/palate in your current case load:	□ Yes □ No
Prevalence of children with cleft palate in case load:	____ Approximate number of children with cleft lip/palate in case load ____ 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:

□ Unclear □ Clear □ Comprehensive

2. Do you feel that the description of the cleft palate speech characteristics are:

Necessary:
□Yes □ No

Clear:
□Yes □ No

Accurate:
□Yes □ 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 □ Yes □ No
    - Four year old children □ Yes □ No
    - Five year old children □ Yes □ No
    - Six year old children □ Yes □ No

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

□ Language delay □ English As Additional Language (EAL)
□ Clarity of Pictures □ Level of concepts included

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

□ Yes □ No, if not, please specify: _____
_____

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

□ Tswana □ Ndebele □ Xhosa □ Venda □ 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:

□ No case available □ No time available
□ Did not feel the need to perform on a case □ 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 □ Yes □ No
   - Rating □ Yes □ No

3. Did you feel the length of the protocol was:
   - Age-appropriate □ Yes □ No
   - Suitable for hospital contexts □ Yes □ 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.

APPENDIX K

PERCEPTUAL SPEECH ASSESSMENT PROTOCOL FOR ZULU SPEAKING CHILDREN WITH CLEFT PALATE

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Perceptual speech assessment protocol for Zulu speaking children with cleft palate

Dorette Swiegers
University of Pretoria

Contents of speech assessment protocol:

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) 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). These parameters include the use of speech material consisting of a word list, short sentences, spontaneous speech, sentence repetition and counting (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:** _____

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

No / Yes / Unknown	**If yes, from what age:**	**Duration of therapy:**
Where:		
Progress:	**__ 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:* Henningsson, 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)
2. iqoqo (a collection)
3. qhinqa (to wait)
4. fengqa (to use nickname)
5. ncenga (to deplore)
6. qonkela (to amass)
7. chonkco (perched)
8. gxiba (to slander)
9. ngxi! (tight)
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)*

Word	Child's elicited response
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)*

Word	Child's elicited response
uMsombuluko *(Monday)*	
uLwesibili (*Tuesday)*	
uLwesithathu *(Wednesday)*	
uLwesisine *(Thursday)*	
uLwesihlanu *(Friday)*	
uMgqibelo *(Saturday)*	
iSonto *(Sunday)*	

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		isinqumo	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 ungitshele 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/ ithenisi/ 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:

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

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

Appendix 1

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

Dorette Swiegers

2009

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Zulu words used to elicit speech during the assessment

Manner of Airstream release	Traditional Ortography	Phonetic Symbol	Initial word position	Elicited Response	Medial word position	Elicited Response	Final word position	Elicited Response
PLOSIVES	p	pʻ	-peta (to dig with a spade)		ipipi (a pipe)		-	
	t	tʻ	-taklaza (to hit on body/stomach)		itiye (tea)		-	
	k	kʻ	-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	b̤	-mbatha (to dress)		imbali (flower)		-	
	(n)d	d̤	-ndiza (to fly)		indoda (man)		-	
	(n)g	g̤	-ngoma (to sing)		-anga (kiss)		-	
	k	k̬	-kuhle (good)		qakatha (to plait hair)		-	
IMPLOSIVE	b	ɓ	-bala (to count)		udlubu (peanut)		-	

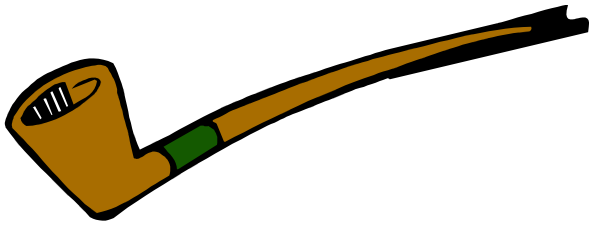
AFFRICATE	(n)dl	dɮ	-ndlala (to spead)		indlovu (elephant)		-	
	(m)v	ⁿv	-mvenene (to run fast)		imvula (rain)		-	
	(n)z	dz	-nzima (black)		inzonzo (legs of bird)		-	
	(n)j	dʒ	-njoza (to cover)		inja (dog)		-	
	j	dʒ	-jikijela (to throw)		ijuba (dove)		-	
	(m)f	⊗f/ɱv	-mfimfa (to ooze out)*		imfene (baboon)		-	
	ts	tsʻ	-tsatsaza (to spray)		-tsatsaza (to spray)		-	
	tsh	tʃʻ	-tshala (to plant trees)		utshani (grass)		-	
	(n)hl	tɬʻ	-nhlo (to flower)		inhlanzi (fish)		-	
	kl	kɬʻ	-klikliza (to choke)		-taklaza (to hit on body/in stomach)		-	
CLICKS	q	ǃ	-qakatha (to plait hair)		iqoqo (a collection)*		-	
	c	ǀ	-cula (to sing)		isicabucabu (spider)		-	
	qh	ǃh	-qhinqa (to wait)*		iqhude (a rooster)		-	
	ch	ǀh	-chitha (to throw out)		-chitha (to throw out)		-	
	gq	ǃg	-gqagqaza (to scatter)		-gqagqaza (to scatter)		-	
	gc	ǀg	-gcwigcwiza (to bubble)		-gcwigcwiza (to bubble)		-	
	(n)gq	ǃg	-ngqabitha (to jump down)		-fengqa (to use nickname)*		-	

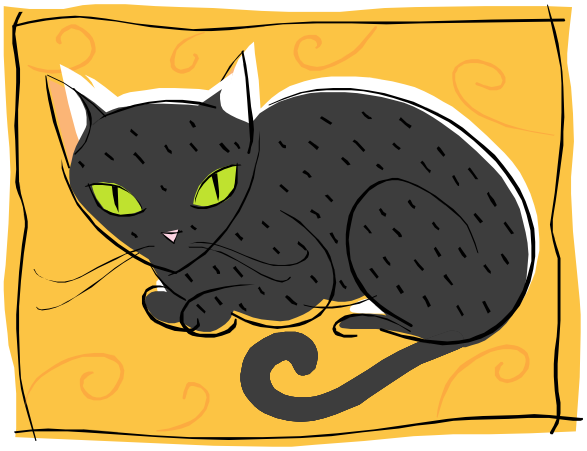
CLICKS	(n)gc	ǀg	-ngcolile (is dirty)		-bhangcuzela (to walk unarmed)		-	
	nq	ŋǂ	-nqaka (to catch)		inqama (ram)		-	
	nc	ŋǂ	-ncenga (to deplore)*		-bhinca (to put on/ wear)		-	
	(n)kq	ŋ	-		-qonkqela (to amass)*		-	
	(n)kc	ŋǀ	-		chonkco (perched)(ideophone)*		-	
	x	ǁ	-xoxa (to chat)		ixixo (frog)		-	
	xh	ǁh	-xhaka (to grip/catch)		isixhobo (heaps of rock and stones)		-	
	gx	ǁg	-gxabalaza (to sit at ease)		-gxiba (to slander)*		-	
	(n)gx	ǁg	ngxi! (tight) (ideophone)*		-ngxangxasha (to hop)		-	
	(n)x	ŋǁ	nxese (regret) (ideophone)*		-bhonxula (to pull out)		-	
	(n)kx	ŋǁ	-		-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)		-	

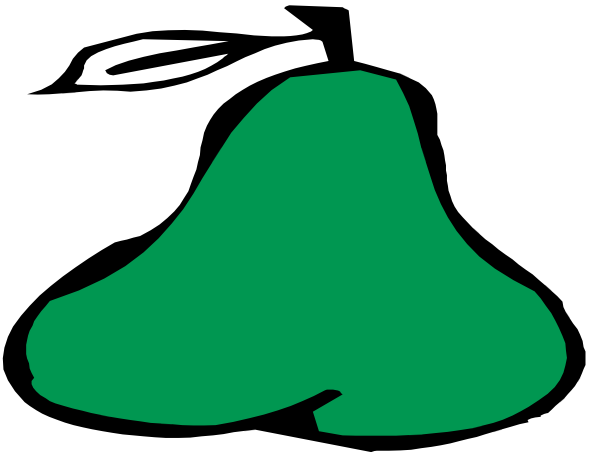
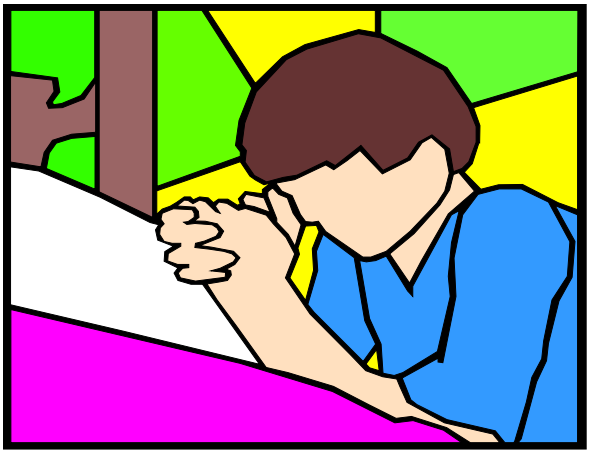
FRICATIVES	v	v̤	-vula (to open)		indlovu (elephant)		-	
	z	z̤	-zalela (to lay eggs)		ukhezo (spoon)		-	
	hh	ɦ̤	-hhala (to rake)		ihhashi (horse)		-	
	hl	ɬ	-hlala (to sit/stay)		isihlahla (tree)		-	
	dl	ɮ̤	-dlala (to play)		udlubu (peanut)		-	
TRILL	r	r̤	-reka (to act to music)		irayisi (rice)		-	
APPROXI-MANT	l	l	-lakalaka (swinging /hanging down)		-umvula (rain)		-	
	l	l̤	(variation of [l] above; [l] can be pronounced with breathy voiced, thus l̤)		(variation of [l] above; [l] can be pronounced with breathy voiced, thus l̤)		-	
	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	ɱ	mvu (sound made when hitting) ideophone		imvula (rain)		-	
	n	n	-nabuzela (to crawl)		utshani (grass)		-	
	ny	ɲ	-nyaliza (to lick; cat licking itself)		inyoni (bird)		-	

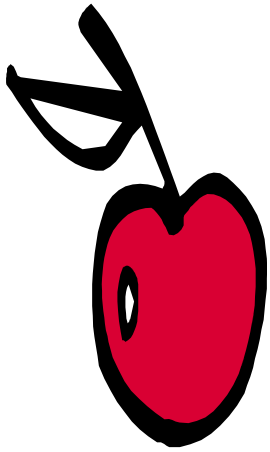
NASALS	(n)g	ŋ	-ngena (to come in)		iketanga (chain)		-	
	m	m̩	(variation of [m] above; [m] can be pronounced with breathy voiced, thus m̤)		(variation of [m] above; [m] can be pronounced with breathy voiced, thus m̤)		-	
	nh	n̤	-nhinhiza (to speak through nose)*		-nhinhiza (to speak through nose)*		-	
VOWELS	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)	

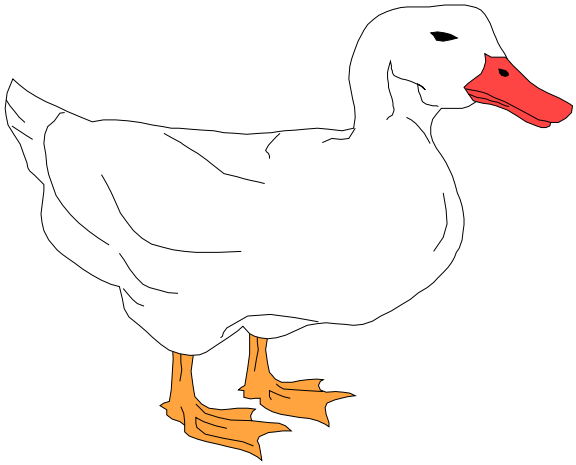
* Words marked with a * are the words elicited without pictures, elicited and responses indicated in 4.1.

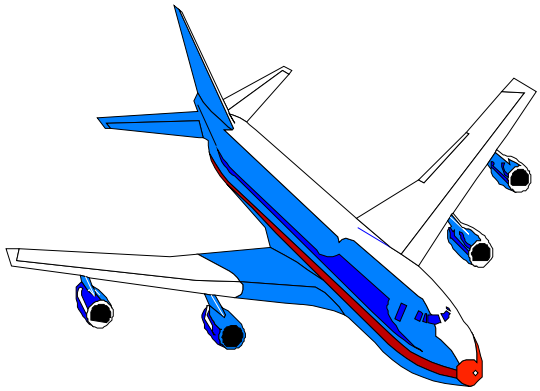


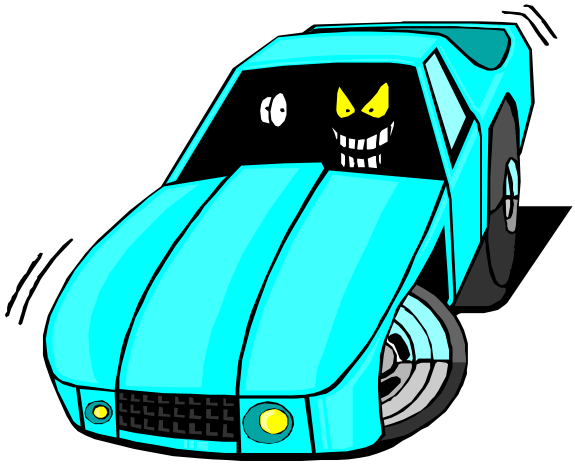
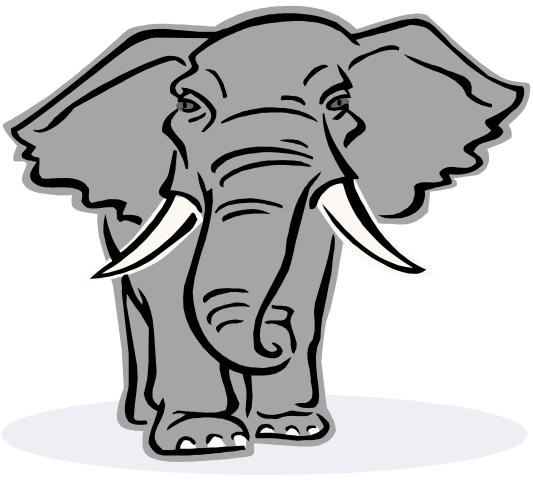


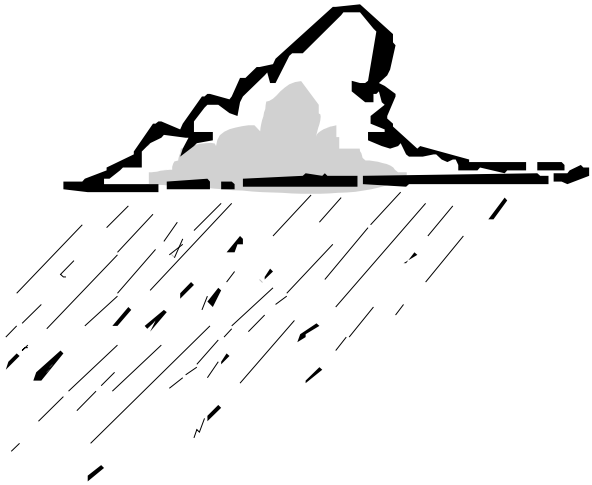
	
	
	

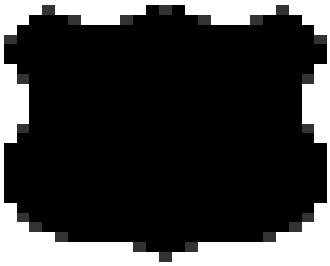


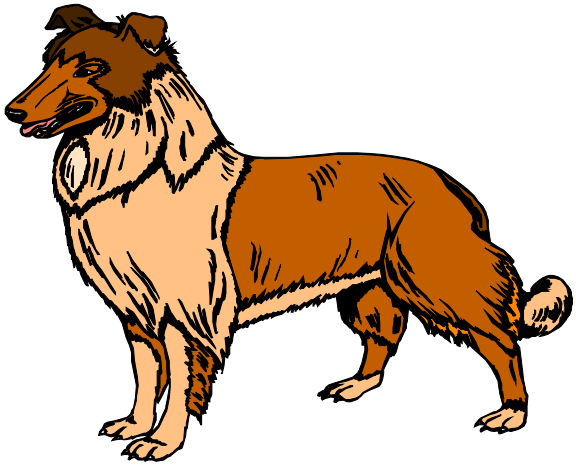


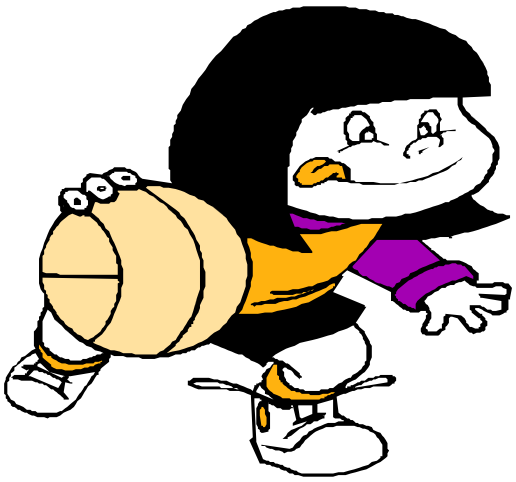
	
	
	

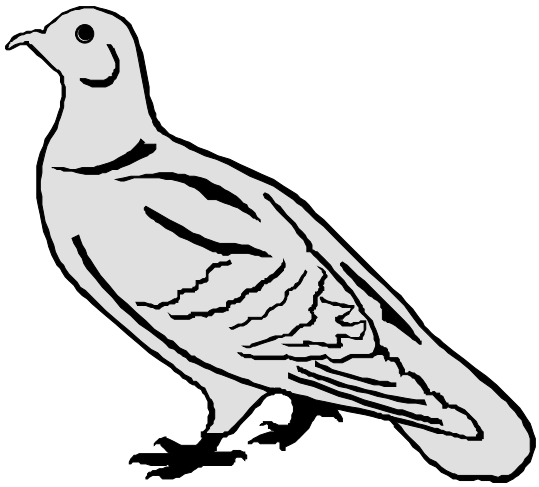
	
	
	

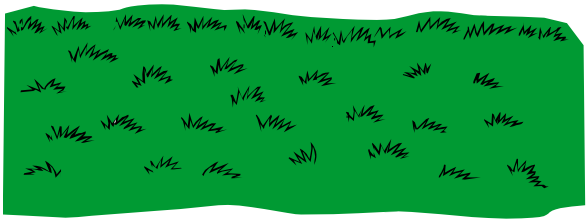


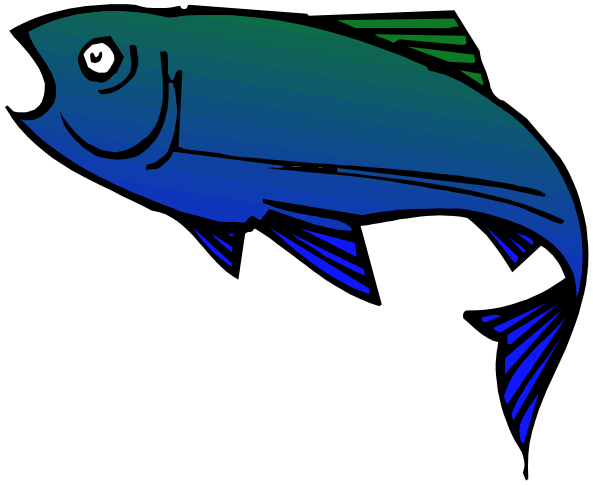


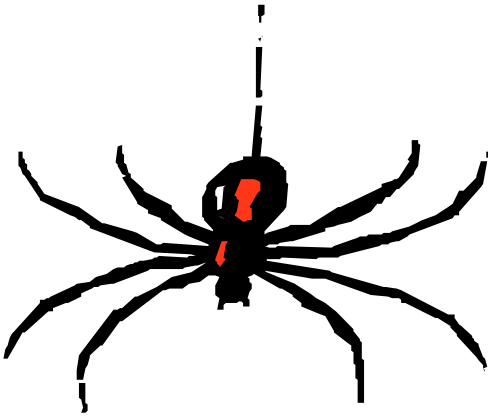


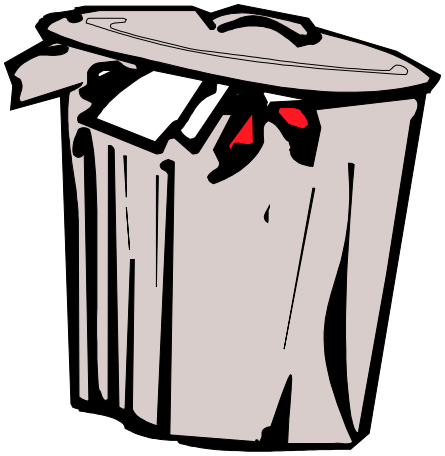


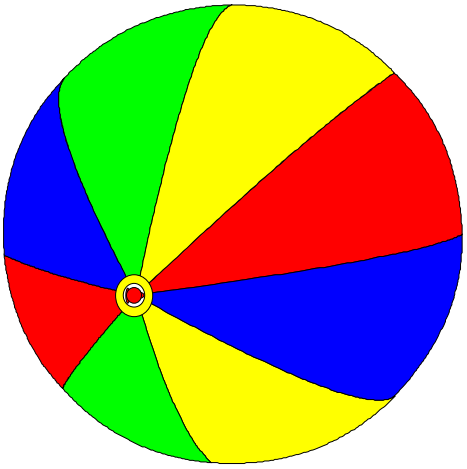


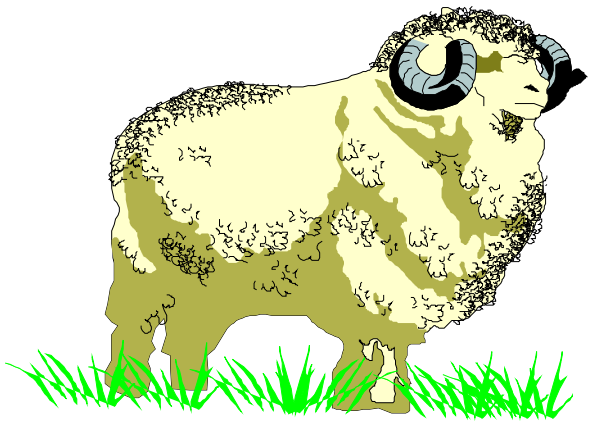


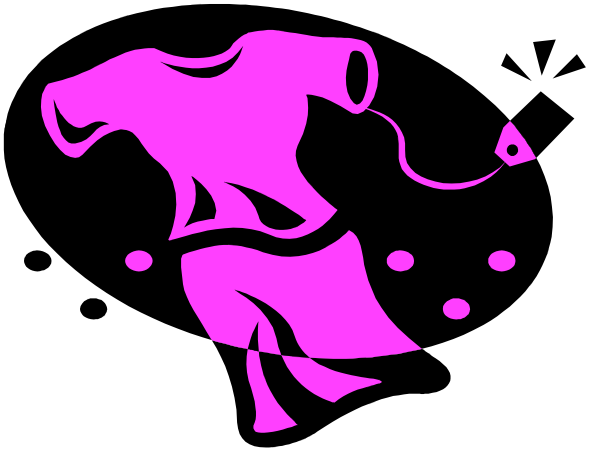


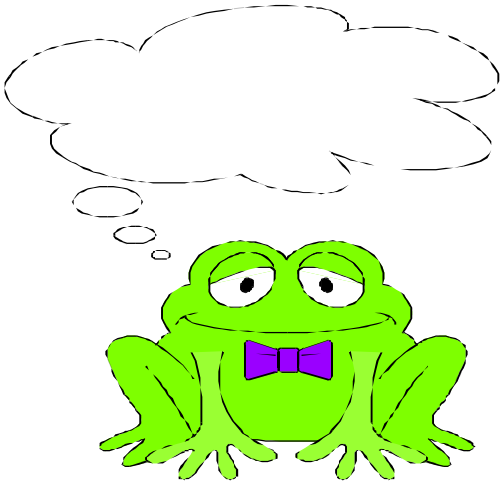


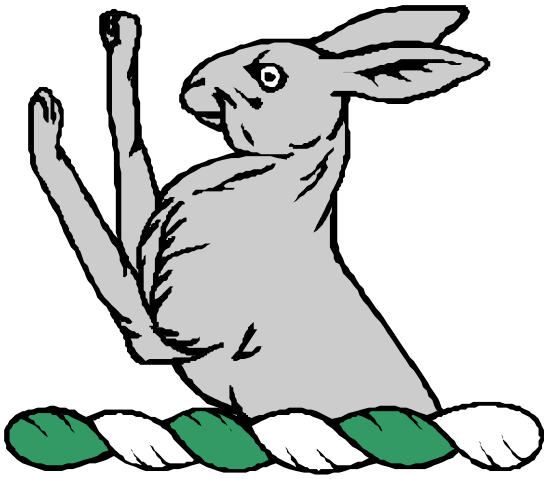
	
	
	

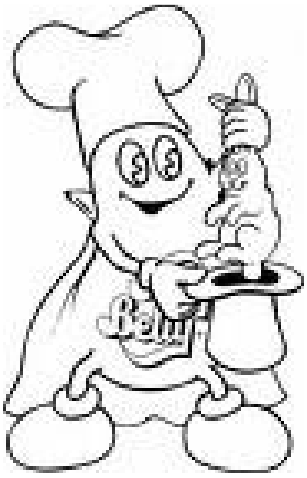


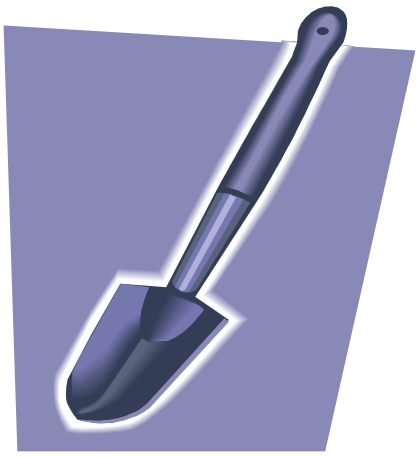


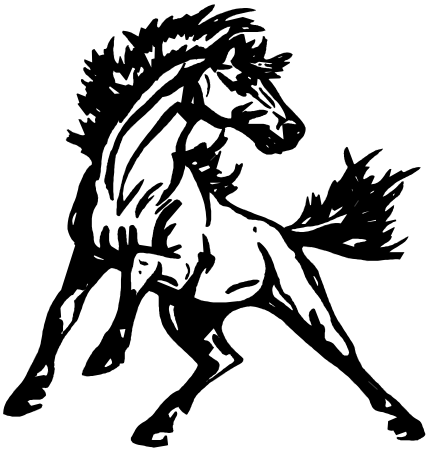


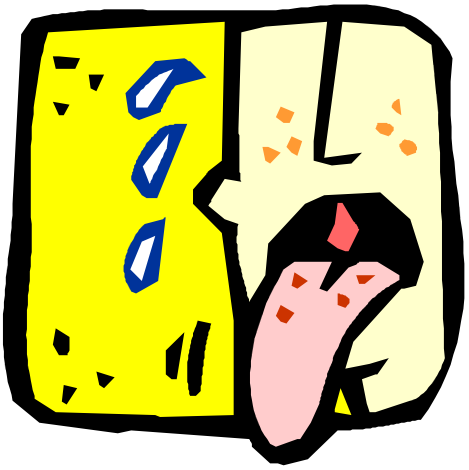


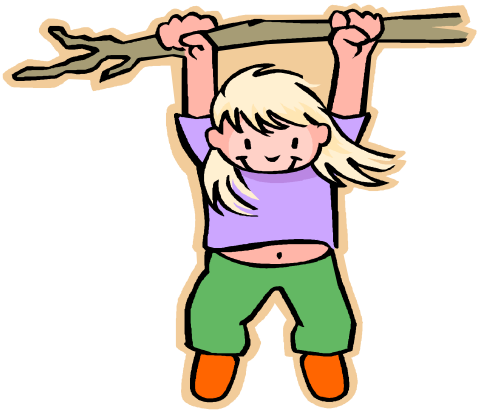


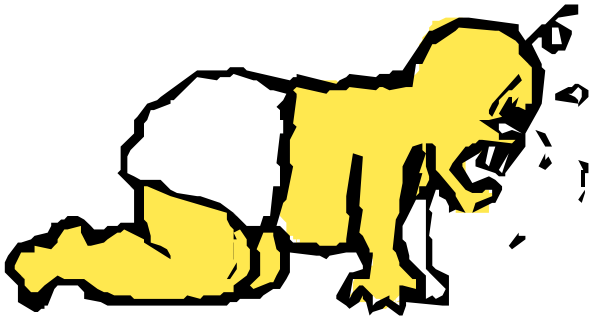
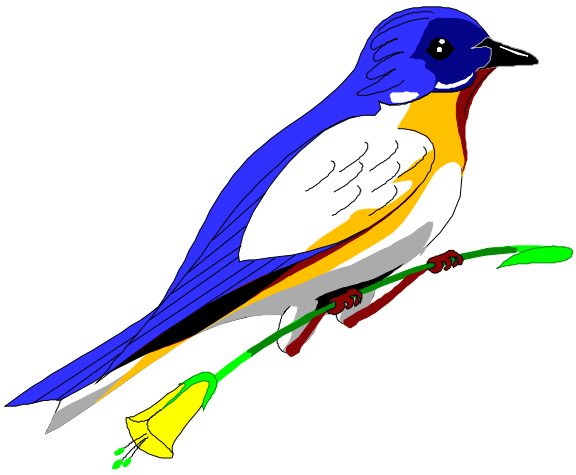


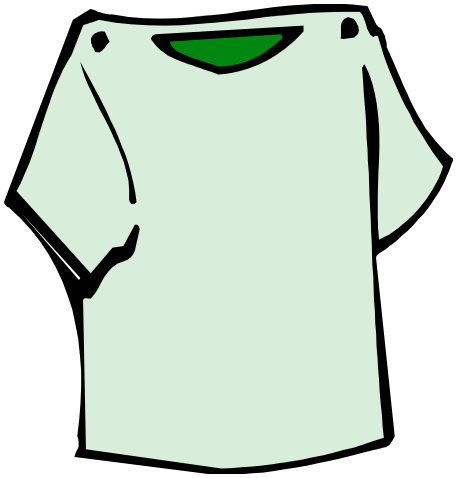


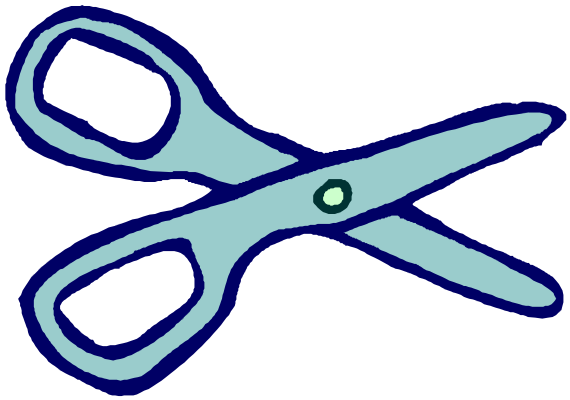
	
	
	

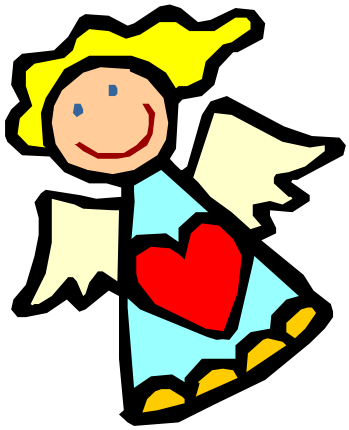








 LUX	

APPENDIX L
SOURCES ON CLEFT PALATE SPEECH CHARACTERICTICS

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

Literature Review:	Characteristics:	Sources:
Cleft palate speech characteristics	• Articulation deficits • Compensatory articulation • Audible nasal emission • Inaudible nasal emission • Hyponasality (denasality) • Hypernasality • Hyper-hyponasality • Nasal substitution • Laryngeal/voice symptoms • Cul-de-sac resonance • Poor pressure consonants • Sibilant distortion • Velopharyngeal inadequacy • Nasal blockage • Nasal Turbulence • Nasal Grimace • Intelligibility of speech	• Brodsky et al., 1992 • Bütow, 1995 • Golding-Kushner, 2001 • Harding, Harland & Razzell, 1997 • Hardin-Jones & Jones, 2005 • Hutters & Henningsson, 2004 • Kritzinger, Louw & Hugo, 1996 • Kuehn & Henne, 2003 • Kuehn & Moller, 2000 • Kummer, 2008 • McWilliams, 1990 • Peterson-Falzone et al. 2001 • Peterson-Falzone et al. 2006 • Sell, Harding & Grunwell, 1999 • Sell, Harding & Grunwell, 1994 • Sphrintzen & Bardach, 1995 • Van Lierde et al, 2004
Assessment of cleft palate speech characteristics	• Articulation tests e.g. The Iowa Pressure Articulation Test,	• Bauman & Waengler, 2000 • Brodsky et al., 1992

	Goldman-Fristoe Test of Articulation • Cold Mirror test • Nostril Pinching tests • Stimulability testing • Observation of voice characteristics to determine the quality or normality • Perceptual judgements • Ratings of nasality • Video recording of speech characteristics	• Bütow, 1995 • Golding-Kushner, 2001 • Harding, Harland & Razzell, 1997 • Hardin-Jones & Jones, 2005 • Hutters & Henningsson, 2004 • Kritzinger, Louw & Hugo, 1996 • Kuehn & Henne, 2003 • Kuehn & Moller, 2000 • Kummer, 2008 • McWilliams, 1990 • Peterson-Falzone et al. 2001 • Peterson-Falzone et al. 2006 • Sphrintzen & Bardach, 1995 • Sell, Hardin & Grunwell, 1999 • Sell, Harding & Grunwell, 1994 • Van Lierde et al, 2004
Normal development of vocabulary in pre-school children	• 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.	• Kuder, 2003 • Nicolosi, Harryman & Kresheck, 1996 • Owens, 2001 • Roth & Worthington, 2001 • Shipley & McAfee, 1998

	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. • 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. • 4 to 5 years: Develops semantic classifications, comparatives, same-different relations, temporal	

	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. • 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	

	passive statements and subordinating conjunctions. Mastered most syntactic rules, use past and future verb tenses and continues to master irregular morphological and syntactic forms.	

APPENDIX M
DATA RECORDING SHEET USED IN PHASE TWO

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

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)

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	[ɷviɷva vs. viɷa], [iqoqɔ vs. iqoqo], [!hiŋǰa vs. !hiŋǰa], [vɛ!ga vs. vɛ!ga], [ŋǰɛŋa vs. ŋǰɛŋa], [!ɔŋɛla vs. !ɔŋɛla], [ǀho:ŋǀɔ vs. ǀho:ŋǀɔ], [ǁgiɓa vs. ǁgiɓa], [ǁgi vs. ǁgi], [ŋǰǁɛsɛ vs. ŋǰǁɛsɛ], [n̪in̪iz̪a vs. n̪in̪iz̪a], [ɔŋula vs. ɔŋula], [pˈɛta vs. pˈɛta], [i:pˈi:pi vs. i:pˈi:pi], [tˈaklaza vs. kˈlaza], [itˈijɛ vs. itˈijɛ], [kˈaba vs. kˈaba], [ikˈati vs. ikˈati], [phɛvu:mula vs. phɛvu:mula], [iliphɛja vs. phɛla], [thaḍaza vs. thaḍaza], [ubuthɔŋɔ vs. ubuthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. ukhɛzɔ], [bala vs. bala], [ɓabula vs. ɓabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. ǀhɔpa], [ugɔgɔ vs. ugɔgɔ], [b̪atha vs. b̪atha], [ib̪ali vs. vlaɷvɛr], [ḍiz̪a vs. ḍiz̪a], [iḍɔda vs. iḍɔda], [g̪ɔma vs. g̪ɔma], [aga vs. aga], [ǩu:łɛ vs. ǩu:łɛ], [!akatha vs. !atˈatha], [ɓala vs. ɓala], [u:lʒbu: vs. pi:nat], [dlʒala vs. khu:lu], [idlʒɔvu vs. idlʒɔvu], [ɻ̈vɛnɛnɛvs. ɻ̈vɛnɛnɛ], [iɻ̈vu:la vs. iɻ̈vu:lɛlɛ], [dz̪ima vs. dz̪ima], [iḍɔdz̪ɔ vs. iḍɔdz̪ɔ], [dʒɔz̪a vs. dʒɔz̪a], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. idʒuba], [iɷvɛnɛ vs. iɷvɛnɛ], [tsˈatsˈaz̪a vs. tsˈatsˈaz̪a], [tʃala vs. tʃala], [utʃani vs. utʃani], [tɬˈɔ vs. tɬˈɔ], [itɬˈadz̪i vs. itɬˈadz̪i], [kɬˈikɬˈiz̪a	• Deletion of unstressed syllable e.g. [ɷv], [tˈa], [ili]. • Backing of sounds e.g. [tˈ] for [k] • Addition / epenthesis of sounds e.g. [n] • Idiosyncratic processes e.g. [ispaidɛr] • Substitution of sounds e.g. [t] for [l].	• Bauman – Waengler, 2000 • Bernthal & Bankson, 2004 • Naidoo, van der Merwe, Groenewald & Naudé, 2005

	vs. kɬˈikɬˈiɻa], [ǀulavs. ǀula], [isiǀabuǀabu vs. ispaidɛr], [ǃhudɛvs. ǃhudɛ], [ǁhitha vs. ǁhitha], [ǂgaǂgaɻa vs. ǂgaǂgaɻa], [ǁgviǁgviɻa vs. ǁgviǁgviɻa], [ǂgabitha vs. ǂgabitha], [ǁgɔlilɛvs. ǁgɔlilɛ], [baǁguɻɛla vs. baǁguɻɛla], [ŋǁaka vs. ŋǁaka], [iŋǁamavs. iŋǁama], [biŋǁa vs. biŋǁa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. ifɔgi], [ǁhakavs. ǁhaka], [isiǁhɔbɔvs. isiǁhɔbɔ], [ǁgabalaɻa vs.ǁgabalaɻa], [ǁǂgaǁǂgaʃa vs. ǁǂgaǁǂgaʃa], [bɔŋʈǁula vs. bɔŋʈǁula], [ǁhɔŋǁa vs. ǁhɔŋǁa], [fɛla vs. fɛla], [iʃalufu vs. iʃalufu], [saha vs. saha], [isiǀathulu vs. isiǀathulu], [ʃajana vs. ʃajana], [iɲ̈aʃi vs. iɲ̈ɔʃi], [xamba vs. xamba], [ukuxɔlavs. ukuxɔla], [hɛha vs. hɛha], [ɣ̈ulavs. ɣ̈ula], [ʐ̈alɛla vs. ʐ̈alɛla], [ɲ̈ala vs. ɲ̈ala], [ɬala vs. ɬala], [isiɬała vs. isiɬała], [lʒalavs. lʒala], [ɻ̈ɛka vs. ɻ̈ɛka], [iɻ̈ajisi vs. iɻ̈ajisi], [lakalaka vs. lakalaka], [waʃa vs. waʃa], [jɛŋǁa vs. jɛŋǁa], [makɬˈakˈa vs. makɬˈakˈa], [ikˈamu vs. ikˈamu], [ɱu vs. ɱu], [nabuʐ̈ela vs.nabuʐ̈ela], [ɲaliɻ̈a vs. ɲaliɻ̈a], [iɲɔni vs. iɲɔni], [ŋɛna vs. ŋɛna], [ikɛtaŋa vs. ikɛntaŋa], [jɛmbɛ vs. jɛmbɛ], [ɛphula vs. ɛphula], [isɛthulɔ vs. isɛthulɔ], [isikhɛlɛ vs. isikhɛlɛ], [insiphɔ vs. insiphɔ], [igɛlɔsi vs. igɛlɔsi]		
2	[ɷviɷva vs. ɷviɷa], [iqoqɔ vs. iqoqo], [!hiŋǁa vs. !hiŋǁa], [vɛ!ga vs. vɛ!ga], [ŋǁɛŋa vs.˜ɛŋa], [!ɔŋɛla vs. ɔŋɛla], [ǁhoːŋǀɔ vs. ǁhoːŋǀɔ], [ǁgiɓa vs. ǁgiɓa], [ǁgi vs. ǁgi], [ŋʈǁɛsɛ vs. ʈǁɛsɛ], [ɲ̈iɲ̈iɻ̈a vs. ɲ̈iɲ̈iɻ̈a], [ɔŋula vs. ɔŋula], [pˈɛta vs. pˈɛta], [iːpˈiːpi vs. iːpˈiːpi], [tˈaklaza vs. tˈakˈlaza], [itˈijɛ vs. itˈijɛ], [kˈaba vs. kˈaba], [ikˈati vs. kˈati], [phɛvuːmula vs.	• Normal speech development	• Bauman – Waengler, 2000 • Bernthal & Bankson,

	phɛvu:mula], [iliphɛja vs. phɛja], [thaḍaza vs. thaḍaza], [ubuthɔŋɔ vs. buthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. kukhɛzɔ], [bala vs. bala], [ɦabula vs. ɦabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔgɔ vs. ugɔgɔ], [b̤atha vs. batha], [iḅali vs. bali], [ḍiẓa vs. diẓa], [iḍɔda vs. iḍɔda], [ɠɔma vs. gɔma], [aɠa vs. aga], [ǩu:łɛ vs. ǩu:łɛ], [!akatha vs. !atˈatha], [ɓala vs. ɓaja], [u:lʒbu: vs. u:lʒbu:], [dlʒala vs. dlala], [idlʒɔvu vs. idlʒɔvu], [ˑvɛnɛnɛvs. ˑvɛnɛnɛ], [iːˑvu:la vs. iːˑvu:la], [dẓima vs. ẓima], [iḍɔdẓɔ vs. zɔdẓɔ], [dʒɔẓa vs. dʒɔẓa], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. idʒuba], [iɷvɛnɛ vs. vɛnɛ], [tsˈatsˈaẓa vs. tsˈatsˈaẓa], [tʃala vs. tʃala], [utʃani vs. utʃani], [tǂˈɔ vs. tǂˈɔ], [itǂˈadẓi vs. itǂˈadẓi], [kǂˈikǂˈiẓa vs. kǂˈikǂˈiẓa], [ǀulavs. ǀuja], [isiǀabuǀabu vs. isiǀabuǀabu], [ǃhudɛvs. ǃhudɛ], [ǀhitha vs. ǀhitha], [ǃgaǃgaẓa vs. ǃgaǃgaẓa], [ǀgviǀgviẓa vs. ǀgviǀgviẓa], [ǃgabitha vs. ǃgambitha], [ǀgɔlilɛvs. ǀgɔlilɛ], [baǀguẓɛla vs. baǀguẓɛla], [ŋʃaǩa vs. ŋʃanǩa], [iŋʃamavs. iŋʃama], [biŋʃa vs. biŋʃa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ], [ǁhakavs. ǁhaka], [isiǁhɔbɔvs. isiǁhɔbɔ], [ǁgabalaẓa vs.ǁgabalaẓa], [ǁɠaǁɠaʃa vs. ɠaǁɠaʃa], [bɔŋʃǁula vs. bɔŋʃǁula], [ǁhɔŋǁa vs. ǁhɔŋǁa], [fɛla vs. fɛla], [iʃalufu vs. iʃalufu], [saha vs. saha], [isiǀathulu vs. isiǀathulu], [ʃajana vs. ʃajana], [iɦaʃi vs. iɦaʃi], [xamba vs. xamba], [ukuxɔlavs. ukuxɔja], [hɛha vs. hɛha], [y̤ulavs. y̤uja], [ẓalɛla vs. ẓajɛja], [ɦala vs. ɦaja], [ɬala vs. ɬala], [isiɬała vs. isiɬała], [lʒalavs. lʒala], [ɻɛka vs. jɛka], [iɻajisi		2004 • Naidoo, van der Merwe, Groenewald & Naudé, 2005

	vs. iɻajisi], [lakalaka vs. lakalaka], [waʃa vs. waʃa], [jɛŋ̟a vs. jɛŋ̟a], [makɬ'ak'a vs. makɬ'ak'a], [ik'amu vs. ik'amu], [ɱu vs. ɱu], [nabuʐɛla vs. nabuʐɛla], [ɲaliʐa vs. ɲaliʐa], [iɲɔni vs. iɲɔni], [ŋɛna vs. nɛna], [ikɛtaŋa vs. ikɛntaŋa], [jɛmbɛ vs. jɛmbɛ], [ɛphula vs. ɛphula], [isɛthulɔ vs. isɛthulɔ], [isikhɛlɛ vs. isikhɛlɛ], [insiphɔ vs. insiphɔ], [igɛlɔsi vs. igɛlɔsi]		
3	[ɷviɷva vs. ɷviɷa], [iqoqɔ vs. iqoqo], [!hiŋ̟a vs. !hiŋ̟a], [vɛ!ga vs. vɛ!ga], [ŋ̟ɛŋa vs.˜ɛŋa], [!ɔŋɛla vs. ɔŋɛla], [ǀho:ŋǀɔ vs. ǀho:ŋǀɔ], [ǁgiɓa vs. ǁgiɓa], [ǁgi vs. gi], [ŋ̟ǁɛsɛ vs. ǁɛsɛ], [n̪iɳiʐa vs. n̪iɳiʐa], [ɔŋula vs. ɔŋula], [p'ɛta vs. p'ɛta], [i:p'i:pi vs. i:p'i:pi], [t'aklaza vs. t'ak'laza], [it'ijɛ vs. t'ijɛ], [k'aba vs. k'aba], [ik'ati vs. k'ati], [phɛvu:mula vs. phɛvu:mula], [iliphɛja vs. phɛja], [thaḍaza vs. thaḍaza], [ubuthɔŋɔ vs. ubuthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. kukhɛzɔ], [bala vs. bala], [ɦ̪abula vs. ɦ̪abula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔgɔ vs. gɔgɔ], [b̪atha vs. batha], [iḇali vs. bali], [ḍiʐa vs. diʐa], [iḍɔda vs. kɛḍɔda], [g̪ɔma vs. gɔma], [aga vs. naga], [ǩu:ɬɛ vs. t'u:tɬɛ], [!akatha vs. !at'atha], [ɓala vs. kɔɓaja], [u:lʒbu: vs. u:lʒbu:], [dlʒala vs. dlala], [idlʒɔvu vs. dlʒɔvu], [ˌːvɛnɛnɛvs. vɛnɛnɛ], [iˌːvu:la vs. kɛˌːvu:la], [dʐima vs. ʐmima], [iḍɔdʐɔ vs. zɔdʐɔ], [dʒɔʐa vs. dʒɔʐa], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. midʒuba], [iɷvɛnɛ vs. ɛvɛnɛ], [ts'ats'aʐa vs. ts'ats'aʃa], [tʃala vs. tʃala], [utʃani vs. ɛtʃani], [tɬ'ɔ vs. tɬ'ɔ], [itɬ'adʐi vs. ladʐi], [kɬ'ikɬ'iʐa vs. kɬ'ikɬ'iʐa], [ǀulavs. ǀula], [isiǀabuǀabu vs.	• Normal speech development	• Bauman – Waengler, 2000 • Bernthal & Bankson, 2004 • Naidoo, van der Merwe, Groenewald & Naudé, 2005

	ǀabu], [ǃhudɛvs. ǃhudɛ], [ǀhitha vs. ǀhitha], [ǃgaǃgaʐ̈a vs. pˈapˈaʐ̈a], [ǀgviǀgviʐ̈a vs. pˈlvipˈlviʐ̈a], [ǃgabitha vs. kˈaɓitha], [ǀgɔlilɛvs. kɔlilɛ], [baǀgu̱ʐ̈ɛla vs. baǀgu̱ʐ̈ɛla], [ŋǁaǩa vs. ɔkaǩa], [iŋǁamavs. iŋǁama], [biŋǁa vs. biŋǁa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. kɛǁiǁɔ], [ǁǁhakavs. ǁǁhaka], [isiǁǁhɔbɔvs. ǁǁhɔbɔ],[ǁǁgabalaʐ̈a vs.ǁǁgabalaʐ̈a], [ǁǁgaǁǁgaʃa vs. ga‖gaʃa], [bɔŋǁǁula vs. pˈɛŋǁǁula], [ǁǁhɔŋǁǁa vs. ǁǁhɔŋǁǁa], [fɛla vs. fɛla], [iʃalufu vs. ʃalufu], [saha vs. saha], [isiǀathulu vs. ǀathulu], [ʃajana vs. ʃajana], [iɲ̈aʃi vs. iɲ̈aʃi], [xamba vs. xamba], [ukuxɔlavs. ukuxɔja], [hɛha vs. hɛha], [y̱ulavs. y̱uja], [ʐ̈alɛla vs. ʐ̈alɛla], [ɲ̈ala vs. ɲ̈ala], [ɬala vs. ɬala], [isiɬaɬa vs. isiɬaɬa], [lʒalavs. lʒala], [ɻɛka vs. ɻɛka], [iɻ̈ajisi vs. iɻ̈ajisi], [lakalaka vs. lakalaka], [waʃa vs. waʃa], [jɛŋǁa vs. jɛŋǁa], [makɬˈakˈa vs. makɬˈakˈa], [ikˈamu vs. ikˈamu], [ɱu vs. ɱu], [nabu̱ʐ̈ɛla vs. nabu̱ʐ̈ɛla], [ɲaliʐ̈a vs. ɲaliʐ̈a], [iɲɔni vs. iɲɔni], [ŋɛna vs. ŋɛna], [ikɛtaŋa vs. ikɛntaŋa], [jɛmbɛ vs. jɛmbɛ], [ɛphula vs. ɛphula], [isɛthulɔ vs. isɛthulɔ], [isikhɛlɛ vs. isikhɛlɛ], [insiphɔ vs. insiphɔ], [igɛlɔsi vs. igɛlɔsi]		
4	[ɷ̈viɷ̈va vs. ɷviɷ̈a], [iqoqɔ vs. iqoqo], [ǃhiŋǁa vs. ǃhiŋǁa], [vɛǃga vs. vɛǃga], [ŋǁɛŋa vs. ŋǁɛŋa], [ǃɔŋɛla vs. ɔŋɛla], [ǀhoːŋǀɔ vs. ǀhoːŋǀɔ], [ǁgiɓa vs. pˈlaɓa], [ǁgi vs. ǁgi], [ŋǁɛsɛ vs. ŋǁɛsɛ], [ɲiɲiʐ̈a vs. ɲ̈iɲ̈ija], [ɔŋula vs. ɔŋula], [pˈɛta vs. pˈɛta], [iːpˈiːpi vs. iːpˈiːpi], [tˈaklaza vs. tˈakˈlaza], [itˈijɛ vs. tˈijɛ], [kˈaba vs. kˈaba], [ikˈati vs. ikˈati], [phɛvuːmula vs. phɛvuːmula], [iliphɛja vs. iliplhɛja], [thaɖ̈aza vs.	• Normal speech development	• Bauman – Waengler, 2000 • Bernthal & Bankson,

	thaḏaza], [ubuthɔŋɔ vs. thɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. ukhɛzɔ], [bala vs. bala], [ɦ̤abula vs. ɦ̤abula], [dansa vs. dansa], [idada vs. idada], [gavula vs. kavula], [ugɔgɔ vs. gɔgɔ], [b̤atha vs. ɛbatha], [iḇ̤ali vs. ibali], [ḏ̤iz̤a vs. ḏ̤iz̤a], [iḏ̤ɔda vs. iḏ̤ɔda], [g̤ɔma vs. gɔma], [aga vs. aga], [ǩu:ɬɛ vs. ǩu:tɬɛ], [!akatha vs. !at'atha], [ɓala vs. ɓala], [u:lʒbu: vs. u:lʒbu:], [dlʒala vs. lala], [idlʒɔvu vs. idlʒɔvu], [ˑ̤vɛnɛnɛvs. ˑ̤vɛnɛnɛ], [i̤ˑvu:la vs. i̤ˑvu:la], [dz̤ima vs. dz̤ima], [iḏ̤ɔdz̤ɔ vs. iz̤ɔdz̤ɔ], [dʒɔz̤a vs. dʒɔz̤a], [idʒa vs. idʒa], [dʒkidʒɛla vs. ʒɛ̤kidʒɛla], [idʒuba vs. idʒuba], [iɯ̤vɛnɛ vs. iɯ̤ɛvɛnɛ], [ts'ats'az̤a vs. ts'ats'az̤a], [tʃala vs. tʃala], [utʃani vs. udʒani], [tɬ'ɔ vs. untɬ'ɔ], [itɬ'adz̤i vs. itɬ'adz̤i], [kɬ'ikɬ'iz̤a vs. kɬ'ikɬ'iz̤a], [ǀulavs. ǀula], [isiǀabuǀabu vs. ǀabuǀabu], [ǀhudɛvs. ǀhudɛ], [ǀhitha vs. ǀhitha], [ǃgaǃgaz̤a vs. ǃgaǃgaz̤a], [ǁgviǁgviz̤a vs. ǁg'viǁgviz̤a], [ǂgabitha vs. k'aɓitha], [ǂgɔlilɛvs. ǂgɔlilɛ], [baǂguz̤ɛla vs. baǂgujɛla], [ŋʃaǩa vs. ŋʃaǩa], [iŋʃamavs. iŋʃama], [biŋʃa vs. biŋʃa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ], [ǁhakavs. ǁhaka], [isiǁhɔbɔvs. isiǁhɔbɔ], [ǁgabalaz̤a vs.ǁgabalaz̤a], [ǁg̤aǁg̤aʃa vs. g̤aǁg̤aʃa], [bɔŋʃ̃ula vs. bɔŋʃ̃ula], [ǁhɔŋǁa vs. ǁhɔŋǁa], [fɛla vs. fɛla], [iʃalufu vs. iʃalufu], [saha vs. saha], [isiǀathulu vs. isiǀathulu], [ʃajana vs. ʃajana], [iɦ̤aʃi vs. iɦ̤aʃi], [xamba vs. xamba], [ukuxɔlavs. ukuxɔla], [hɛha vs. hɛha], [y̤ulavs. y̤ula], [z̤alɛla vs. z̤alɛla], [ɦ̤ala vs. ɦ̤ala], [ɬala vs. ɬala], [isiɬaɬa vs. isiɬaɬa], [lʒalavs. lʒala], [ɾɛka vs. lɛka], [iɾ̤ajisi vs. iɾ̤ajisi], [lakalaka		2004 • Naidoo, van der Merwe, Groenewald & Naudé, 2005

	vs. lakalaka], [waʃa vs. waʃa], [jɛŋǀa vs. jɛŋǀa], [makǂakˈa vs. makǂakˈa], [ikˈamu vs. kˈamu], [ɱu vs. ɱu], [nabuᵕzɛla vs. nabuᵕzɛla], [ɲaliᵕza vs. ɲaliᵕza], [iɲɔni vs. iɲɔni], [ŋɛna vs. ŋɛla], [ikɛtaŋa vs. ikɛntaŋa], [jɛmbɛ vs. jɛmbɛ], [ɛphula vs. ɛphula], [isɛthulɔ vs. isɛthulɔ], [isikhɛlɛ vs. isikhɛlɛ], [insiphɔ vs. insiphɔ], [igɛlɔsi vs. gɛlɔsi]		
5	[ɷviɷva vs. viɷa], [iqoqɔ vs. iqoqo], [!hiŋǀa vs. !hiŋǀa], [vɛ!ga vs. vɛ!ga], [ŋǀɛŋa vs. ŋǀɛŋa], [!ɔŋɛla vs. !ɔŋvɛla], [ǀho:ŋǀɔ vs. ǀho:ŋǀɔ], [ǁgiɓa vs. pˈlaɓa], [ǁgi vs. ǁgi], [ŋǁɛsɛ vs. kˈɛsɛ], [n̪iṇiᵕza vs. n̪iṇiᵕza], [ɔŋula vs. ɔŋula], [pˈɛta vs. pˈɛta], [i:pˈi:pi vs. i:pˈi:pi], [tˈaklaza vs. tˈakˈlaza], [itˈijɛ vs. itˈijɛ], [kˈaba vs. kˈaba], [ikˈati vs. ikˈati], [phɛvu:mula vs. mɔmamula], [iliphɛja vs. iliplhɛja], [thaḏaza vs. thaḏaza], [ubuthɔŋɔ vs. ubuthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. amakhɛzɔ], [bala vs. bala], [ɦabula vs. ɦabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔgɔ vs. ŋɔgɔ], [b̪atha vs. habatha], [iḇali vs. iḇali], [ḏiᵕza vs. ḏiᵕza], [iḏɔda vs. aḏɔda], [g̪ɔma vs. gɔma], [aga vs. aga], [ḳu:ɬɛ vs. ḳu:tɬɛ], [!akatha vs. !atˈatha], [ɓala vs. ɓala], [u:lʒbu: vs. u:lʒbu:], [dlʒala vs. dlʒlala], [idlʒɔvu vs. idlʒɔvu], [ˑvɛnɛnɛvs. ˑvɛnɛnɛ], [iˑvu:la vs. aˑvu:la], [dᵕzima vs. dᵕzima], [iḏɔdᵕzɔ vs. iḏɔdᵕzɔ], [dʒɔᵕza vs. dʒɔᵕza], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. idʒuba], [iɷvɛnɛ vs. iɷɛvɛnɛ], [tsˈatsˈaᵕza vs. tsˈatsˈaᵕza], [tʃala vs. tʃala], [utʃani vs. utʃani], [tɬˈɔ vs. tɬˈɔ], [itɬˈadᵕzi vs. itɬˈadᵕzi], [kɬˈikɬˈiᵕza vs. kɬˈikɬˈiᵕza], [ǀulavs. ǀula], [isiǀabuǀabu vs.	• Normal speech development	• Bauman – Waengler, 2000 • Bernthal & Bankson, 2004 • Naidoo, van der Merwe, Groenewald & Naudé, 2005

	ǀabuǀabu], [ǃhudɛvs. ǃhudɛ], [ǀhitha vs. ǀhitha], [ǃgaǃgaʐa vs. ǃgaǃgaʐa], [ǀgviǀgviʐa vs. ǀgˈviǀgviʐa], [ǃgabitha vs. ǃgaɓitha], [ǀgɔlilɛvs. gɔlilɛ], [baǀguʐɛla vs. baǀgujɛla], [ŋǁakʂa vs. ŋǁakʂa], [iŋǁamavs. iŋǁama], [biŋǁa vs. biŋǁa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ], [ǁhakavs. ǁhaka], [isiǁhɔbɔvs. isiǁhɔbɔ], [ǁgabalaʐa vs.ǁgabalaʐa], [ǁgaǁgaʃa vs. gaǁgaʃa], [bɔŋǁula vs. bɔŋǁula], [ǁhɔŋǁa vs. ǁhɔŋǁa], [fɛla vs. fɛla], [iʃalufu vs. iʃalufu], [saha vs. sala], [isiǀathulu vs. ǀathulu], [ʃajana vs. ʃajana], [iɲaʃi vs. iɲaʃi], [xamba vs. xamba], [ukuxɔlavs. ɔkuxɔla], [hɛha vs. hɛha], [ɣulavs. ɣula], [ʐalɛla vs. ʐalɛla], [ɲala vs. ɲala], [ɬala vs. ɬala], [isiɬaɬa vs. ɬaɬa], [lʒalavs. lʒala], [ɻɛka vs. jɛka], [iɻajisi vs. iɻajisi], [lakalaka vs. lakalaka], [waʃa vs. waʃa], [jɛŋǁa vs. jɛŋǁa], [makɬˈakˈa vs. makɬˈakˈa], [ikˈamu vs. hakˈamu], [ɱu vs. ɱu], [nabuʐɛla vs. nabuʐɛla], [ɲaliʐa vs. ɲaliʐa], [iɲɔni vs. iɲɔni], [ŋɛna vs. ŋɛla], [ikɛtaŋa vs. kɛntaŋa], [jɛmbɛ vs. hɛmbɛ], [ɛphula vs. ɛphula], [isɛthulɔ vs. isɛthulɔ], [isikhɛlɛ vs. sikhɛlɛ], [insiphɔ vs. insiphɔ], [igɛlɔsi vs. ŋɛlɔsi]		
6	[ɷviɷva vs. ɷviɷa], [iqoqɔ vs. iqoqo], [!hiŋǁa vs. !hiŋǁa], [vɛ!ga vs. vɛ!ga], [ŋǁɛŋa vs. ŋǁɛŋa], [!ɔŋɛla vs. !ɔŋvɛla], [ǀhoːŋǀɔ vs. ǀhoːŋǀɔ], [ǁgiɓa vs. ǁgiaɓa], [ǁgi vs. ǁgi], [ŋǁɛsɛ vs. ŋǁɛsɛ], [ɲiɲiʐa vs. ɲiɲiʐa], [ɔŋula vs. ɔŋula], [pˈɛta vs. pˈɛta], [iːpˈiːpi vs. iːpˈiːpi], [tˈaklaza vs. tˈakˈlaza], [itˈijɛ vs. itˈijɛ], [kˈaba vs. kˈaba], [ikˈati vs. ikˈati], [phɛvuːmula vs. mɔmamula], [iliphɛja vs. phɛja], [thaʤaza vs.	• Normal speech development	• Bauman – Waengler, 2000 • Bernthal & Bankson, 2004

	thaḏaza], [ubuthɔŋɔ vs. ubuthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. ukhɛzɔ], [bala vs. bala], [ɲ̈abula vs. ɲ̈abula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔgɔ vs. gɔgɔ], [ḇatha vs. ḇatha], [iḇali vs. iḇali], [ḏiẓa vs. ḏiẓa], [iḏɔda vs. iḏɔda], [ɠɔma vs. gɔma], [aga vs. aga], [ǩu:ɬɛ vs. ǩu:tɬɛ], [!akatha vs. !atˈatha], [ɓala vs. ɓala], [u:lʒbu: vs. u:lʒbu:], [dlʒala vs. dlʒlala], [idlʒɔvu vs. idlʒɔvu], [ˌ:vɛnɛnɛvs. ˌ:vɛnɛnɛ], [iˌ:vu:la vs. miˌ:vu:la], [dẓima vs. dẓima], [iḏɔdẓɔ vs. iḏɔdẓɔ], [dʒɔẓa vs. dʒɔẓa], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. idʒuba], [iѽvɛnɛ vs. iѽɛvɛnɛ], [tsˈatsˈaẓa vs. tsˈatsˈaẓa], [tʃala vs. tʃala], [utʃani vs. utʃani], [tɬˈɔ vs. tɬˈɔ], [itɬˈadẓi vs. itɬˈadẓi], [kɬˈikɬˈiẓa vs. kɬˈikɬˈiẓa], [ǀulavs. ǀula], [isiǀabuǀabu vs. isiǀabuǀabu], [ǃhudɛvs. ǃhudɛ], [ǀhitha vs. ǀhitha], [ǂgaǂgaẓa vs. ǂga!gaẓa], [ǁgviǁgviẓa vs. ǁgˈviǁgviẓa], [ǂgabitha vs. ǂgaɓitha], [ǁgɔlilɛvs. ǁgɔlilɛ], [baǁguẓɛla vs. baǁgujɛla], [ŋ̃ǁaǩa vs. ŋ̃ǁaǩa], [iŋ̃ǁamavs. iŋ̃ǁama], [biŋ̃ǁa vs. biŋ̃ǁa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ], [ǁhakavs. ǁhaka], [isiǁhɔbɔvs. insiǁhɔbɔ], [ǁgabalaẓa vs.ǁgabalaẓa], [ǁǧaǁǧaʃa vs. kˈaǁǧaʃa], [bɔŋ̃ǁula vs. bɔŋ̃ǁula], [ǁhɔŋǁa vs. ǁhɔŋǁa], [fɛla vs. fɛla], [iʃalufu vs. ʃalufu], [saha vs. saha], [isiǀathulu vs. ǀathulu], [ʃajana vs. ʃajana], [iɲ̈aʃi vs. iɲ̈aʃi], [xamba vs. xamba], [ukuxɔlavs. ukuxɔla], [hɛha vs. hɛha], [ɣ̈ulavs. ɣ̈ula], [ẓalɛla vs. ẓalɛla], [ɲ̈ala vs. ɲ̈ala], [ɬala vs. ɬala], [isiɬała vs. ɬała], [lʒalavs. lʒala], [ɻ̈ɛka vs. jɛka], [iɻ̈ajisi vs. iɻ̈ajisi], [lakalaka vs.		• Naidoo, van der Merwe, Groenewald & Naudé, 2005

	lakalaka], [waʃa vs. waʃa], [ǰɛŋǰa vs. ǰɛŋǰa], [makɬ'ak'a vs. makɬ'ak'a], [ik'amu vs. ik'amu], [ŋu vs. ŋu], [nabuʐɛla vs. babuʐɛla], [ɲaliʐa vs. ɲaliʐa], [iɲɔni vs. iɲɔni], [ŋɛna vs. ŋɛna], [ikɛtaŋa vs. kɛntaŋa], [ǰɛmbɛ vs. hɛmbɛ], [ɛphula vs. ɛphula], [isɛthulɔ vs. isɛthulɔ], [isikhɛlɛ vs. isikhɛlɛ], [insiphɔ vs. insiphɔ], [iǥɛlɔsi vs. iǥɛlɔsi]		
7	[ɷviɷva vs. ɷviɷa], [iqoqɔ vs. qoqo], [!hiŋǰa vs. !hiŋǰa], [vɛ!ga vs. vɛ!ga], [ŋǰɛŋa vs. ɔŋǰɛŋa], [!ɔŋɛla vs. !ɔŋvɛla], [ǀho:ŋǀɔ vs. ǀho:ŋǀɔ], [ǁgiɓa vs. ǁgiaɓa], [ǁgi vs. mǁgi], [ŋǰǁɛsɛ vs. ŋǁɛsɛ], [n̪in̪iʐa vs. n̪in̪iʐa], [ɔŋula vs. ɔŋula], [p'ɛta vs. p'ɛta], [i:p'i:pi vs. i:p'i:pi], [t'aklaza vs. k'laza], [it'ijɛ vs. t'ijɛ], [k'aba vs. k'aba], [ik'ati vs. ik'ati], [phɛvu:mula vs. phɛvu:mula], [iliphɛja vs. phɛja], [thaḑaza vs. thaḑaza], [ubuthɔŋɔ vs. ubuthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. ukhɛzɔ], [bala vs. bala], [ɦ̪abula vs. ɦ̪abula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔgɔ vs. gɔgɔ], [b̪atha vs. b̪atha], [iḇ̪ali vs. iḇ̪ali], [ḑiʐa vs. ḑiʐa], [iḑ̪ɔda vs. iḑ̪ɔda], [ǥɔma vs. gɔma], [aga vs. aga], [ǩu:ɬɛ vs. ǩu:tɬɛ], [!akatha vs. !at'atha], [ɓala vs. ɓala], [u:lʒbu: vs. u:lʒbu:], [dlʒala vs. dlʒlala], [idlʒɔvu vs. idlʒɔvu], [ˑvɛnɛnɛvs. ˑvɛnɛnɛ], [iˑvu:la vs. iˑvu:la], [dʐima vs. dʐima], [iḑ̪ɔdʐɔ vs. iḑ̪ɔdʐɔ], [dʒɔʐa vs. dʒɔʐa], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. idʒuba], [iɷvɛnɛ vs. iɷɛvɛnɛ], [ts'ats'aʐa vs. ts'ats'aʐa], [tʃala vs. tʃala], [utʃani vs. utʃani], [tɬ'ɔ vs. tɬ'ɔ], [itɬ'adʐi vs. itɬ'adʐi], [kɬ'ikɬ'iʐa vs. kɬ'ikɬ'iʐa], [ǀulavs. ǀula], [isiǀabuǀabu vs. isiǀabuǀabu],	• Deletion of unstressed syllable e.g. [t'a], [ili], • Omission of sounds e.g. [i], [u] • Addition / epenthesis of sound e.g. [ɔ], [m] • Backing of sound e.g. [k'] sound for [t'] sound	• Bauman – Waengler, 2000 • Bernthal & Bankson, 2004 • Naidoo, van der Merwe, Groenewald & Naudé, 2005

	[ǃhudɛvs. ǃhudɛ], [ǀhitha vs. ǀhitha], [ǃgaǃgaʐ̈a vs. ǃgaǃgaʐ̈a], [ǀgviǀgviʐ̈a vs. ǀgˈviǀgviʐ̈a], [ǃgabitha vs. ǃgaɓitha], [ǀgɔlilɛvs. ǀgɔlilɛ], [baǀguʐ̈ɛla vs. baǀgujɛla], [ŋǁaǩa vs. ŋǁaǩa], [iŋǁamavs. iŋǁama], [biŋǁa vs. biŋǁa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ], [ǁhakavs. ǁhaka], [isiǁhɔbɔvs. isiǁhɔbɔ], [ǁgabalaʐ̈a vs.ǁgabalaʐ̈a], [ǁǧaǁǧaʃa vs. ǁgaǁgaʃa], [bɔŋǁǁula vs. bɔŋǁǁula], [ǁhɔŋǁǁa vs. ǁhɔŋǁǁa], [fɛla vs. fɛla], [iʃalufu vs. ʃalufu], [saha vs. saha], [isiǀathulu vs. isiǀathulu], [ʃajana vs. ʃajana], [iɲ̈aʃi vs. iɲ̈aʃi], [xamba vs. xamba], [ukuxɔlavs. kuxɔla], [hɛha vs. hɛha], [ʏ̈ulavs. ʏ̈ula], [ʐ̈alɛla vs. ʐ̈alɛla], [ɲ̈ala vs. ɲ̈ala], [ɬala vs. ɬala], [isiɬaɬa vs. ɬaɬa], [lǯalavs. lǯala], [ɻɛka vs. ɻɛka], [iɻ̈ajisi vs. iɻ̈ajisi], [lakalaka vs. lakalaka], [waʃa vs. waʃa], [jɛŋǁa vs. jɛŋǁa], [makɬˈakˈa vs. makɬˈakˈa], [ikˈamu vs. ikˈama], [ɱu vs. ɱu], [nabuʐ̈ɛla vs. nabuʐ̈ɛla], [ɲaliʐ̈a vs. ɲaliʐ̈a], [iɲɔni vs. iɲɔni], [ŋɛna vs. ŋɛna], [ikɛtaŋa vs. ikɛntaŋa], [jɛmbɛ vs. jɛmbɛ], [ɛphula vs. ɛphula], [isethulɔ vs. isethulɔ], [isikhɛlɛ vs. isikhɛlɛ], [insiphɔ vs. insiphɔ], [igɛlɔsi vs. igɛlɔsi]		
8	[ɷviɷva vs. ɷviɷa], [iqoqɔ vs. iqoqo], [!hiŋǁa vs. !hiŋǁa], [vɛ!ga vs. vɛ!ga], [ŋǁɛŋa vs. ŋǁɛŋa], [!ɔŋɛla vs. !ɔŋvɛla], [ǀhoːŋǀɔ vs. ǀhoːŋǀɔ], [ǁgiɓa vs. ǁgiaɓa], [ǁgi vs. gi], [ŋǁɛsɛ vs. ǁɛsɛ], [ɲiɲiʐ̈a vs. miʐ̈a], [ɔŋula vs. ɔŋula], [pˈɛta vs. pˈɛta], [iːpˈiːpi vs. pˈiːpi], [tˈaklaza vs. saklaza], [itˈijɛ vs. itˈijɛ], [kˈaba vs. kˈaba], [ikˈati vs. ikˈati], [phɛvuːmula vs. phɛvuːmula], [iliphɛja vs. idiphɛja], [thaḑaza vs.	• Deletion of unstressed syllable e.g. [ǁ], [iː], [isi] • Omission of sounds e.g. [u],[i], [ɛ] • Cluster reduction e.g. [ǁ] for [ŋǁ] cluster, [m] for [ɲ̈i]	• Bauman – Waengler, 2000 • Bernthal & Bankson, 2004

	thaḏaza], [ubuthɔŋɔ vs. ubuthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. khɛzɔ], [bala vs. bala], [ɦabula vs. ɦabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔgɔ vs. gɔgɔ], [ḇatha vs. ḇatha], [iḇali vs. iḇali], [ḏiẓa vs. ḏiẓa], [iḏɔda vs. iḏɔda], [ɠɔma vs. gɔma], [aga vs. aga], [ǩu:ɬɛ vs. ǩu:tɬɛ], [!akatha vs. !atˈatha], [ɓala vs. ɓala], [u:lʒbu: vs. u:lʒbu:], [dlʒala vs. dlʒlala], [idlʒɔvu vs. idlʒɔvu], [ˑvɛnɛnɛvs. ˑvɛnɛnɛ], [iˑvu:la vs. iˑvu:la], [dẓima vs. ẓima], [iḏɔdẓɔ vs. iḏɔdẓɔ], [dʒɔẓa vs. dʒɔẓa], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. idʒuba], [iѽvɛnɛ vs. iѽɛvɛnɛ], [tsˈatsˈaẓa vs. tsˈatsˈaẓa], [tʃala vs. tʃala], [utʃani vs. utʃani], [tɬˈɔ vs. tɬˈɔ], [itɬˈadẓi vs. itɬˈadẓi], [kɬˈikɬˈiẓa vs. kɬˈikɬˈiẓa], [ǀulavs. ǀula], [isiǀabuǀabu vs. isiǀabuǀabu], [ǀhudɛvs. ǀhudɛ], [ǀhitha vs. ǀhitha], [ǃgaǃgaẓa vs. ǃgaǃgaẓa], [ǁgviǁgviẓa vs. ǁgˈvuǁgviẓa], [ǃgabitha vs. gaɓitha], [ǁgɔlilɛvs. gɔlilɛ], [baǁguẓɛla vs. baǁgujɛla], [ŋʃlaǩa vs. ǩaǩa], [iŋʃamavs. iŋʃama], [biŋʃa vs. biŋʃa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ], [ǁhakavs. ǁhaka], [isiǁhɔbɔvs. ǁhɔbɔ], [ǁgabalaẓa vs.ǁgabalaẓa], [ǁgaǁgaʃa vs. gaǁgaʃa], [bɔŋʃǁula vs. bɔŋʃǁula], [ǁhɔŋǁa vs. ǁhɔŋǁa], [fɛla vs. fɛla], [iʃalufu vs. ʃalufu], [saha vs. saha], [isiǀathulu vs. ǀathulu], [ʃajana vs. ʃajana], [iɦaʃi vs. iɦaʃi], [xamba vs. xamba], [ukuxɔlavs. ukuxɔla], [hɛha vs. hɛha], [ẏulavs. ẏula], [ẓalɛla vs. ẓalɛla], [ɦala vs. ɦala], [ɬala vs. ɬala], [isiɬała vs. isiɬała], [lʒalavs. lʒala], [ɾɛka vs. ɾɛka], [iɾajisi vs. iɾajnisi], [lakalaka vs.	cluster, [g] for [ɠ] cluster, [ẓ] sound for [dẓ] cluster, [g] sound for [!g] cluster, [g] sound for [ǀg] cluster, [ǩ] sound for [ŋʃ] cluster • Substitution of sound e.g. [s] sound for [tˈ] sound, [u] sound for [i] sound • Gliding of [d] sound for [l] sound • Addition / epenthesis of sound e. g. [n]	• Naidoo, van der Merwe, Groenewald & Naudé, 2005

	lakalaka], [waʃa vs. waʃa], [jɛŋǁa vs. jɛŋǁa], [makɬ'ak'a vs. makɬ'ak'a], [ik'amu vs. k'ama], [ŋu vs. ŋu], [nabuᵕzɛla vs. nabuᵕzɛla], [ɲaliᵕza vs. ɲaliᵕza], [iɲɔni vs. iɲɔni], [ŋɛna vs. ŋɛna], [ikɛtaŋa vs. kɛntaŋa], [jɛmbɛ vs. jɛmbɛ], [ɛphula vs. phula], [isɛthulɔ vs. thulɔ], [isikhɛlɛ vs. isikhɛlɛ], [insiphɔ vs. insiphɔ], [igɛlɔsi vs. igɛlɔsi]		
9	[ɷviɷva vs. ɷviɷa], [iqoqɔ vs. iqoqo], [!hiŋǁa vs. !hiŋǁa], [vɛ!ga vs. vɛ!ga], [ŋǁɛŋa vs. ŋǁɛŋa], [!ɔŋɛla vs. !ɔŋɛla], [ǀho:ŋlɔ vs. ǀho:ŋlɔ], [ǁgiɓa vs. ǁgiaɓa], [ǁgi vs. ǁgi], [ŋǂǁesɛ vs. ŋǁɛsɛ], [ɳiɳiᵕza vs. ɳiɳiᵕza], [ɔŋula vs. ɔŋula], [p'ɛta vs. p'ɛta], [i:p'i:pi vs. p'i:pi], [t'aklaza vs. t'aklaza], [it'ijɛ vs. it'ijɛ], [k'aba vs. k'aba], [ik'ati vs. ik'ati], [phɛvu:mula vs. phɛvu:mula], [iliphɛja vs. idiplhɛja], [thaḏaza vs. thaḏaza], [ubuthɔŋɔ vs. ubuthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. ukhɛzɔ], [bala vs. bala], [ɱabula vs. ɱabula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔgɔ vs. gɔgɔ], [ḇatha vs. ḇatha], [iḇali vs. iḇali], [ḍiᵕza vs. ḍiᵕza], [iḍɔda vs. iḍɔda], [ɠɔma vs. gɔma], [aga vs. aga], [ǩu:ɬɛ vs. ǩu:tɬɛ], [!akatha vs. !at'atha], [ɓala vs. ɓala], [u:lʒbu: vs. lʒbu:], [dlʒala vs. dlʒlala], [idlʒɔvu vs. idlʒɔvu], [ˑvɛnɛnɛvs. ˑvɛnɛnɛ], [iˑvu:la vs. iˑvu:la], [dᵕzima vs. dᵕzima], [iḍɔdᵕzɔ vs. iḍɔdᵕzɔ], [dʒɔᵕza vs. dʒɔᵕza], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. dʒuba], [iɷvɛnɛ vs. iɷɛvɛnɛ], [ts'ats'aᵕza vs. ts'ats'aᵕza], [tʃala vs. tʃala], [utʃani vs. utʃani], [tɬ'ɔ vs. tɬ'ɔ], [itɬ'adᵕzi vs. itɬ'adᵕzi], [kɬ'ikɬ'iᵕza vs. kɬ'ikɬ'iᵕza], [ǀulavs. ǀula], [isiǀabuǀabu vs. isiǀabuǀabu],	• Deletion of unstressed syllable e.g. [u:], [!], [isi] • Omissions of sounds e.g. [i], [u] • Gliding of sound e.g. [d] for [l] • Addition / epenthesis of sound e.g. [l], [i] • Cluster reduction of [g] sound for [!g] cluster, [l] sound for [lʒ] cluster	• Bauman – Waengler, 2000 • Bernthal & Bankson, 2004 • Naidoo, van der Merwe, Groenewald & Naudé, 2005

	[ǂhudɛvs. hudɛ], [ǀhitha vs. ǀhitha], [ǃgaǃgaz̪a vs. ǃga!gaz̪a], [ǀgviǀgviz̪a vs. ǀgˈvuǀgviz̪a], [ǃgabitha vs. gaɓitha], [ǀgɔlilɛvs. gɔlilɛ], [baǀguz̪ɛla vs. baǀgujɛla], [ŋǁaǩa vs. ŋǁaǩa], [iŋǁamavs. iŋǁama], [biŋǁa vs. biŋǁa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ], [ǁhakavs. ǁhaka], [isiǁhɔbɔvs. isiǁhɔbɔ], [ǁgabalaz̪a vs.ǁgabalaz̪a], [ǁg̊aǁg̊aʃa vs. gaǁgaʃa], [bɔŋǁula vs. bɔŋǁula], [ǁhɔŋǁa vs. ǁhɔŋǁa], [fɛla vs. fɛla], [iʃalufu vs. ʃalufu], [saha vs. saha], [isiǀathulu vs. ǀathulu], [ʃajana vs. ʃajana], [iɲ̈aʃi vs. iɲ̈aʃi], [xamba vs. xamba], [ukuxɔlavs. ukuxɔla], [hɛha vs. hɛha], [y̪ulavs. y̪ula], [z̪alɛla vs. z̪alɛla], [ɲ̈ala vs. ɲ̈ala], [ɬala vs. ɬala], [isiɬaɬa vs. isiɬaɬa], [lʒalavs. lala], [ɾɛka vs. ɾɛka], [iɾajisi vs. iɾajnisi], [lakalaka vs. lakalaka], [waʃa vs. waʃa], [jɛŋǁa vs. jɛŋǁa], [makɬˈakˈa vs. makɬˈakˈa], [ikˈamu vs. ikˈami], [ɱu vs. ɱu], [nabuz̪ɛla vs. nabuz̪ɛla], [ɲaliz̪a vs. ɲaliz̪a], [iɲɔni vs. iɲɔni], [ŋɛna vs. iŋɛna], [ikɛtaŋa vs. kɛntaŋa], [jɛmbɛ vs. jɛmbɛ], [ɛphula vs. ɛphula], [isɛthulɔ vs. isɛthulɔ], [isikhɛlɛ vs. sikhɛlɛ], [insiphɔ vs. insiphɔ], [igɛlɔsi vs. igɛlɔsi]		
10	[ɷviɷva vs. ɷviɷa], [iqoqɔ vs. qoqo], [!hiŋǁa vs. !hiŋǁa], [vɛ!ga vs. vɛ!ga], [ŋǁɛŋa vs. ǀɛŋa], [!ɔŋɛla vs. !ɔŋɛla], [ǀho:ŋǀɔ vs. ǀho:ŋǀɔ], [ǁgiɓa vs. ǁgiaɓa], [ǁgi vs. gi], [ŋǁɛsɛ vs. ǁɛsɛ], [n̪iɲ̈iz̪a vs. n̪iɲ̈iz̪a], [ɔŋula vs. ɔŋula], [pˈɛta vs. pˈɛta], [i:pˈi:pi vs. ipˈi:pi], [tˈaklaza vs. tˈaklaza], [itˈijɛ vs. tˈijɛ], [kˈaba vs. kˈaba], [ikˈati vs. kˈati], [phɛvu:mula vs. phɛvu:mula], [iliphɛja vs. iliphɛja], [thaḑaza vs.	• Normal speech development	• Bauman – Waengler, 2000 • Bernthal & Bankson, 2004

	thaḏaza], [ubuthɔŋɔ vs. ubuthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. pɛkhɛzɔ], [bala vs. bala], [ɲabula vs. ɲabula], [dansa vs. dansa], [idada vs. dada], [gavula vs. havula], [ugɔgɔ vs. ugɔgɔ], [ḇatha vs. ḇatha], [iḇali vs. ḇali], [ḏiẓa vs. ḏiẓa], [iḏɔda vs. iḏɔda], [ɠɔma vs. gɔma], [aɠa vs. aga], [ǩu:łɛ vs. ǩu:tɬɛ], [!akatha vs. !atˈatha], [ɓala vs. ɓala], [u:lʒbu: vs. u:lʒbu:], [dlʒala vs. dlʒlala], [idlʒɔvu vs. idlʒɔvu], [ˑvɛnɛnɛvs. ˑvɛnɛnɛ], [iˑvu:la vs. iˑvu:la], [dẓima vs. dẓima], [iḏɔdẓɔ vs. iḏɔdẓɔ], [dʒɔẓa vs. dʒɔẓa], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. idʒuba], [iѽvɛnɛ vs. iѽɛvɛnɛ], [tsˈatsˈaẓa vs. tsˈatsˈaẓa], [tʃala vs. tʃala], [utʃani vs. utʃani], [tɬˈɔ vs. tɬˈɔ], [itɬˈadẓi vs. itɬˈadẓi], [kɬˈikɬˈiẓa vs. kɬˈikɬˈiẓa], [ǀulavs. ǀula], [isiǀabuǀabu vs. isiǀabuǀabu], [ǃhudɛvs. !hudɛ], [ǁhitha vs. ǁhitha], [ǃgaǃgaẓa vs. !gaǃgaẓa], [ǁgviǁgviẓa vs. ǁgˈvuǁgviẓa], [ǃgabitha vs. !gaɓitha], [ǁgɔlilɛvs. ǁgɔlilɛ], [baǁguẓɛla vs. baǁgujɛla], [ŋǁaǩa vs. ŋǁaǩa], [iŋǁamavs. iŋǁama], [biŋǁa vs. biŋǁa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ], [ǁhakavs. ǁhaka], [isiǁhɔbɔvs. isiǁhɔbɔ], [ǁgabalaẓa vs.ǁgabalaẓa], [ǁgaǁgaʃa vs. gaǁgaʃa], [bɔŋʧula vs. bɔŋʧula], [ǁhɔŋǁa vs. ǁhɔŋǁa], [fɛla vs. fɛla], [iʃalufu vs. ʃalufu], [saha vs. saha], [isiǀathulu vs. isiǀathulu], [ʃajana vs. ʃajana], [iɲaʃi vs. iɲaʃi], [xamba vs. xamba], [ukuxɔlavs. ukuxɔla], [hɛha vs. hɛha], [ɣulavs. ɣula], [ẓalɛla vs. ẓalɛla], [ɲala vs. ɲala], [ɬala vs. ɬala], [isiɬała vs. isiɬała], [lʒalavs. lʒala], [ɾɛka vs. ɾɛka], [iɾajisi vs. iɾajnisi], [lakalaka		• Naidoo, van der Merwe, Groenewald & Naudé, 2005

	vs. lakalaka], [waʃa vs. waʃa], [jɛŋǀa vs. jɛŋǀa], [makǂ'ak'a vs. makǂ'ak'a], [ik'amu vs. k'amu], [ŋu vs. ŋu], [nabuʐɛla vs. nabuʐɛla], [ɲaliʐa vs. ɲaliʐa], [iɲɔni vs. iɲɔni], [ŋɛna vs. k'ɛna], [ikɛtaŋa vs. kɛntaŋa], [jɛmbɛ vs. jɛmbɛ], [ɛphula vs. aphula], [isɛthulɔ vs. sɛthulɔ], [isikhɛlɛ vs. sikhɛlɛ], [insiphɔ vs. insiphɔ], [igɛlɔsi vs. igɛlɔsi]		
11	[ɷviɷva vs. ɷviɷa], [iqoqɔ vs. iqoqo], [!hiŋǀa vs. !hiŋǀa], [vɛ!ga vs. vɛ!ga], [ŋǀɛŋa vs. ŋǀɛŋa], [!ɔŋɛla vs. !ɔŋɛla], [ǀho:ŋǀɔ vs. ǀho:ŋǀɔ], [ǁgiɓa vs. ǁgiaɓa], [ǁgi vs. ǁgi], [ŋǂǁɛsɛ vs. ǁɛsɛ], [n̪i̪n̪iʐa vs. n̪i̪n̪iʐa], [ɔŋula vs. ɔŋula], [p'ɛta vs. p'ɛta], [i:p'i:pi vs. ip'i:pi], [t'aklaza vs. t'aklaza], [it'ijɛ vs. it'ijɛ], [k'aba vs. k'aba], [ik'ati vs. k'ati], [phɛvu:mula vs. phɛvu:mula], [iliphɛja vs. phɛja], [thaḍaza vs. thaḍaza], [ubuthɔŋɔ vs. ubuthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. khɛzɔ], [bala vs. bala], [ɦ̪abula vs. ɦ̪abula], [dansa vs. dansa], [idada vs. idada], [gavula vs. gavula], [ugɔgɔ vs. gɔgɔ], [b̪atha vs. b̪atha], [iḇ̪ali vs. iḇ̪ali], [ḍ̪iʐa vs. ḍ̪iʐa], [iḍ̪ɔda vs. iḍ̪ɔda], [g̪ɔma vs. gɔma], [aga vs. aga], [ǩu:ɬɛ vs. ǩu:tɬɛ], [!akatha vs. !at'atha], [ɓala vs. ɓala], [u:lʒbu: vs. lʒbu:], [dlʒala vs. dlʒlala], [idlʒɔvu vs. idlʒɔvu], [ˑvɛnɛnɛvs. ˑvɛnɛnɛ], [i̪ˑvu:la vs. i̪ˑvu:la], [dʐima vs. dʐima], [iḍ̪ɔdʐɔ vs. iḍ̪ɔdʐɔ], [dʒɔʐa vs. dʒɔʐa], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. idʒuba], [iɷvɛnɛ vs. iɷɛvɛnɛ], [ts'ats'aʐa vs. ts'ats'aʐa], [tʃala vs. tʃala], [utʃani vs. utʃani], [tǂ'ɔ vs. tǂ'ɔ], [itǂ'adʐi vs. itǂ'adʐi], [kǂ'ikǂ'iʐa vs. kǂ'ikǂ'iʐa], [ǀulavs. ǀula], [isiǀabuǀabu vs. ǀabuǀabu],	• Normal speech development	• Bauman – Waengler, 2000 • Bernthal & Bankson, 2004 • Naidoo, van der Merwe, Groenewald & Naudé, 2005

	[ǂhudɛvs. !hudɛ], [ǀhitha vs. ǀhitha], [ǃgaǃgaʐa vs. !ga!gaʐa], [ǀgviǀgviʐa vs. ǀgˈvuǀgviʐa], [ǃgabitha vs. !gaɓitha], [ǀgɔlilɛvs. gɔlilɛ], [baǀguʐɛla vs. baǀgujɛla], [ŋǁaǩa vs. ǩaǩa], [iŋǁamavs. iŋǁama], [biŋǁa vs. ɛbiŋǁa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ], [ǁhakavs. ǁhaka], [isiǁhɔbɔvs. isiǁhɔbɔ], [ǁgabalaʐa vs.ǁgabalaʐa], [ǁǂaǁǂaʃa vs. ǁgaǁǂaʃa], [bɔŋǁǁula vs. bɔŋǁǁula], [ǁhɔŋǁǂa vs. ǁhɔŋǁǂa], [fɛla vs. fɛla], [iʃalufu vs. ʃalufu], [saha vs. saha], [isiǂathulu vs. isiǂathulu], [ʃajana vs. ʃajana], [iɲ̈aʃi vs. iɲ̈aʃi], [xamba vs. xamba], [ukuxɔlavs. ukuxɔla], [hɛha vs. hɛha], [ʏ̈ulavs. ʏ̈ula], [ʐ̈alɛla vs. ʐ̈alɛla], [ɲ̈ala vs. ɲ̈ala], [ɬala vs. ɬala], [isiɬaɬa vs. ɬaɬa], [lʒ̈alavs. lʒ̈ala], [ɻɛka vs. ɻ̈ɛka], [iɻ̈ajisi vs. iɻ̈ajnisi], [lakalaka vs. lakalaka], [waʃa vs. waʃa], [jɛŋǁa vs. jɛŋǁa], [makɬˈakˈa vs. makɬˈakˈa], [ikˈamu vs. ikˈamu], [ɱu vs. ɱu], [nabuʐ̈ɛla vs. nabuʐ̈ɛla], [ɲaliʐ̈a vs. ɲaliʐ̈a], [iɲɔni vs. iɲɔni], [ŋɛna vs. iŋɛna], [ikɛtaŋa vs. kɛntaŋa], [jɛmbɛ vs. jɛmbɛ], [ɛphula vs. ɛphula], [isɛthulɔ vs. thulɔ], [isikhɛlɛ vs. isikhɛlɛ], [insiphɔ vs. insiphɔ], [igɛlɔsi vs. igɛlɔsi]		
12	[ɷ̈viɷ̈va vs. ɷ̈viɷ̈a], [iqoqɔ vs. qoqo], [!hiŋǁa vs. !hiŋǁa], [vɛ!ga vs. vɛ!ga], [ŋǁɛŋa vs. ǩɛŋa], [!ɔŋɛla vs. !ɔŋɛla], [ǀho:ŋǀɔ vs. ǀho:ŋǀɔ], [ǁgiɓa vs. ǁgiaɓa], [ǁgi vs. gi], [ŋǁɛsɛ vs. ŋǁɛsɛ], [ɲiɲiʐ̈a vs. ɲiɲiʐ̈a], [ɔŋula vs. ɔŋula], [pˈɛta vs. pˈɛnta], [i:pˈi:pi vs. ipˈi:pi], [tˈaklaza vs. tˈaklaza], [itˈijɛ vs. itˈijɛ], [kˈaba vs. kˈaba], [ikˈati vs. kˈati], [phɛvu:mula vs. phɛvu:mula], [iliphɛja vs. phɛja], [thaḑaza vs.	• Deletion of unstressed syllable e.g. [ː], [isi], [la] • Omission of sounds e.g. [i] • Cluster reduction [ǩ] sound for [ŋǁ] cluster, [ɡ] sound for	• Bauman – Waengler, 2000 • Bernthal & Bankson, 2004

	thaḏaza], [ubuthɔŋɔ vs. ubuthɔŋɔ], [khala vs. khala], [ukhɛzɔ vs. ukhɛzɔ], [bala vs. bala], [ɦ̤abula vs. ɦ̤abula], [dansa vs. dansa], [idada vs. idada], [gavula vs. ɠavula], [ugɔgɔ vs. ugɔgɔ], [ḇatha vs. ḇatha], [iḇali vs. iḇali], [ḏiẓa vs. ɛḏiẓa], [iḏɔda vs. iḏɔda], [ɠɔma vs. gɔma], [aɠa vs. aɠa], [ǩu:łɛ vs. ǩu:łɛ], [!akatha vs. !aťatha], [ɓala vs. ɓala], [u:lʒbu: vs. ulʒbu:], [dlʒala vs. dlʒlala], [idlʒɔvu vs. dlʒɔvu], [ˑvɛnɛnɛvs. vɛnɛnɛ], [iˑvu:la vs. iˑvu:la], [dẓima vs. ɛdẓima], [iḏɔdẓɔ vs. iḏɔdẓɔ], [dʒɔẓa vs. dʒɔẓa], [idʒa vs. idʒa], [dʒkidʒɛla vs. dʒkidʒɛla], [idʒuba vs. idʒuba], [iɷvɛnɛ vs. iɷɛvɛnɛ], [ts'ats'aẓa vs. ts'ats'aẓa], [tʃala vs. tʃala], [utʃani vs. utʃani], [tɬ'ɔ vs. tɬ'ɔ], [itɬ'adẓi vs. itɬ'adẓi], [kɬ'ikɬ'iẓa vs. kɬ'ikɬ'iẓa], [ǀulavs. ǀula], [isiǀabuǀabu vs. ǀabuǀabu], [ǃhudɛvs. !hudɛ], [ǁhitha vs. ǁhitha], [ɠaǂgaẓa vs. !gaǂgaẓa], [ǁgviǁgviẓa vs. ǁg'vuǁgviẓa], [ǃgabitha vs. !gaɓitha], [ǁgɔlilɛvs. gɔlilɛ], [baǁguẓɛla vs. baǁgujɛla], [ŋ̃ǂaǩa vs. ŋ̃ǂaǩa], [iŋ̃ǂamavs. iŋ̃ǂama], [biŋ̃ǂa vs. biŋ̃ǂa], [ǁɔǁa vs. ǁɔǁa], [iǁiǁɔ vs. iǁiǁɔ], [ǁǁhakavs. ǁǁhaka], [isiǁǁhɔbɔvs. ǁǁhɔbɔ], [ǁǁgabalaẓa vs.ǁǁgabalaẓa], [ǁǁgaǁǁgaʃa vs. gaǁǁgaʃa], [bɔŋ̃ʈ̃ula vs. bɔŋ̃ʈ̃ula], [ǁǁhɔŋǁǁa vs. ǁǁhɔŋǁǁa], [fɛla vs. fɛla], [iʃalufu vs. ʃalufu], [saha vs. saha], [isiǀathulu vs. ǀathulu], [ʃajana vs. ʃajana], [iɦ̤aʃi vs. iɦ̤aʃi], [xamba vs. xamba], [ukuxɔlavs. ukuxɔla], [hɛha vs. hɛha], [ɣ̤ulavs. ɣ̤ula], [ʐalɛla vs. ʐalɛla], [ɦ̤ala vs. ɦ̤ala], [ɬala vs. ɬala], [isiɬała vs. ɬała], [lʒalavs. lʒala], [ɻɛka vs.	[ǁg] cluster • Addition / epenthesis of sound e.g. [n], [ɛ], [k] • Substitution of sound e.g. [b] sound for [n] sound	• Naidoo, van der Merwe, Groenewald & Naudé, 2005

	ɾɛka], [iɾajisi vs. iɾajnisi], [lakalaka vs. lakaka], [waʃa vs. waʃa], [jɛŋ͡ɲa vs. jɛŋ͡ɲa], [makɬ'ak'a vs. makɬ'ak'a], [ik'amu vs. k'amu], [ŋu vs. ŋu], [nabuʐɛla vs. babuʐɛla], [ɲaliʐa vs. ɲaliʐa], [iɲɔni vs. iɲɔni], [ŋɛna vs. iŋɛna], [ikɛtaŋa vs. ikɛntaŋa], [jɛmbɛ vs. jɛmbɛ], [ɛphula vs. ɛphula], [isɛthulɔ vs. thulɔ], [isikhɛlɛ vs. isikhɛlɛ], [insiphɔ vs. insiphɔ], [iɡɛlɔsi vs. kiɡɛlɔsi]		

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)

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)	• 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) • Selected Zulu phonemes and developed short sentences with the assistance of the Zulu linguist (See Appendix K, 4.3).
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)	• Followed as the complete Zulu phoneme inventory was included in the word lists of the protocol. • Included pressure consonants [pʻ] in peta (to dig with a spade), [kʻ] in kabha (to chop wood) and [b̤] in mbatha (to dress) • Non-pressure oral consonants included were [ɓ] in bala (to count) • Nasal consonants included words for elicitation consisting of nasal consonants only (see Appendix K, 4.4) e.g. umfula (river) and indoda (man).
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)	• 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

	position, [o] in ingelosi (angel) in the non-high position and [a] in anga (to kiss) in the non-low position
Guideline 4: Single word lists: the number of contextual sounds should be limited (www.eurocran.org)	• 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 [tsʻ] sound in initial and medial positions and iketanga (chain) for the [a] and [ɛ] sounds.
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)	The Zulu language have no consonants clusters (Taljaard & 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) • The (n)gq sound [ǃg] in ngqabitha (to jump down). • The (n)gc sound [ǂg] in ngcolile (is dirty). • The nc sound [ɲǰ] in bhinca (to put on/ wear).
Guideline 6: Single word lists- The position of consonants should be in “strong” and other positions in words (www.eurocran.org)	• Applied in the [b] sound in bhala (to write) and in bhangcuzela (to walk unarmed).
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)	• Adhered to by ensuring that all consonants were in the initial, medial and if possible final position in words • Evident in [th] in thandaza (to pray) and ubuthongo (sleep) and qakatha (to plait hair) in the strong positions;

	isicathulo (shoe) and isethulo (gift/present) in other positions • The Zulu language did not consist of sound clusters; this was not observed in sound clusters.
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 (www.eurocran.org)	• Consonants were randomly ordered according to manner of articulation e.g. plosives, implosives, affricates, clicks, fricatives, trill, approximant and nasals • 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)
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 (www.eurocran.org)	• Short sentences included consonants consisting of the Zulu sound structure e.g. Um**f**ana u**dl**a**l**a **ng**e**bh**o**l**a (The boy plays with a ball) • Short sentences included nasal consonants e.g. Ubaba ulu**ng**isa u**mny**a**ng**o (Father is mending the door) • 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)

	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 (www.eurocran.org)	• This will be applicable when words in the protocol are compared to other word lists. • Important to compare similar phonetic content and contexts.
Guideline 11: Elicitation of single word lists by using naming or semantic prompting (www.eurocran.org)	• Used by eliciting single words by showing it to children and if necessary to explain by semantic prompting.
Guideline 12: Data should include rote speech and counting (www.eurocran.org)	• Included counting from one to ten and naming the days of the week (See Appendix K, 4.2). Children mostly counted and named days of the week in English, due to the influence of multilingual languages in South Africa (Dawber & Jordaan, 2002:4).
Guideline 13: Collecting a spontaneous speech sample (www.eurocran.org)	• A 2 minute spontaneous speech sample section was included in protocol (See Appendix K, 4.5). • Topics used were family, friends, sport, hobbies, animals, jobs and explanations of sport games.