

University of Cape Town



**Early Lexical and Grammatical Development of Xitsonga Spoken in Giyani,
Limpopo Using the Adapted Xitsonga MacArthur-Bates Communicative
Development Inventory: Toddlers' Form – A Preliminary Study**

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DEDICATION

I dedicate this work to

- My amazing sister, Dzunisani Alucia Ndhambi. Your shoes are too big to fill. I carry you in my heart each and every second of my life.
- My parents, Nelson “Navela” Thomas Ndhambi and Nkhensani “Ntimela” Catherine Ndhambi, ntombi ya Ettiene na Esther Mpapele.

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ABSTRACT

Background: Speech-language pathologists have limited culturally and linguistically relevant clinical assessments and normative data to draw on when working with African language speakers in South Africa. This limitation impacts on the early identification of children with language difficulties, essential for ensuring appropriate and timely support for such children and their families. The challenge of early identification is even more pronounced for children acquiring a minority language such as Xitsonga. Xitsonga is one of South Africa's official languages, yet relatively little is known about children's acquisition of this language.

Aims and objectives: This study aimed to describe the early lexical and grammar development of Xitsonga-speaking children, aged 16 to 32 months. The study objectives were to describe 1) the outcomes of the adaptation of the MacArthur-Bates Communicative Development Inventory (MB-CDI) for Xitsonga speakers 2) the relationship between age and vocabulary size 3) the trends and patterns of vocabulary growth and grammar development and 4) the development of mean length of utterance in this population.

Methods: The study used a mixed methods approach. For *Phase one*, a parent-report tool, the MB-CDI, was cross-culturally adapted for Xitsonga. *Phase two* was a pilot study where the first draft of the Xitsonga MB-CDI was administered to 43 caregivers of monolingual Xitsonga-speaking children aged 16 to 32 months in the Giyani region of South Africa's Limpopo Province. Descriptive statistics and Pearson's correlations were used to determine the lexical and grammatical items included in the main study. *Phase three* was the administration of the adapted Xitsonga MB-CDI with a larger sample ($n=99$) of caregivers of monolingual Xitsonga-speaking children aged 16 to 32 months residing in the Giyani region, who had not already participated in the pilot study. Vocabulary sizes, compositions, and morphosyntactic productions were outlined using descriptive statistics. Pearson's correlations and independent *t*-tests were done to describe correlations between age and the aforementioned variables.

Results: The adaptation/translation of the MB-CDI, focus groups and pilot study ensured the Xitsonga CDI was culturally and linguistically acceptable and effective for documenting 16 to 32 months old children's lexical and grammatical abilities. The findings of the pilot study showed a strong correlation between age and the items frequently used by Xitsonga-speaking children in this study. This guided the inclusion and exclusion of items for the adapted Xitsonga MB-CDI used as a tool in the main study to describe the early lexical and grammar development of Xitsonga. Findings from the final phase of the study confirm the prediction of an increase in vocabulary production with an increase in age, as expected in typically developing children. This reflects a linear correlation ($r = .45$; $p < .001$) with age accounting for 20.5% of the variance. Of the total items in the Xitsonga MB-CDI, common nouns made up the largest proportion of acquired words (322 items), followed by predicates (208 items) and function words (68 items). As for other languages, age has a significant effect ($F[1,97] = 33.2$; $r = .51$; $p < .001$) on children's grammatical development, accounting for 25.91% of the variance. The mean sentence length-morpheme (MSL-m) yielded a higher score than the mean sentence length-word (MSL-w) in Xitsonga. Both showed a weaker correlation with vocabulary size ($r = .11$; $p > .05$ and $r = .10$; $p > .05$, respectively) but a stronger correlation with sentence complexity ($r = .25$; $p < .05$ and $r = .20$; $p < .05$, respectively). However, there was a linear relationship between vocabulary and grammar used by Xitsonga-speaking children in this sample. Vocabulary development showed a stronger correlation with sentence complexity ($r = .45$; $p < .001$) and also with total grammar development ($r = .40$; $p < .001$).

Implications: From an applied perspective, the study contributes new and much-needed knowledge about children's early acquisition of Xitsonga vocabulary and grammar. This information is important for helping clinicians, families and early childhood development practitioners identify and support children with delayed language development and their families. The study provides a foundation of preliminary data about what is typical for children acquiring Xitsonga. It also supplies the initial version of a tool to assess young speakers of this language. From a theoretical standpoint, the findings enable cross-linguistic comparisons with the

acquisition of other languages and contribute to a broader understanding of the universal aspects of language acquisition in young children.

KEYWORDS: Xitsonga, early lexical development, early grammar development, cross-cultural adaptation, MacArthur-Bates Communicative Development Inventory (MB-CDI).

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LIST OF ABBREVIATIONS

AGREE – Agreement

ADJ – Adjective

CDS – Child Directed Speech

DEF – Definite

ECD – Early Childhood Development

FBQ – Family Background Questionnaire

HPCSA – Health Professional Council of South Africa

MB-CDI – MacArthur-Bates Communicative Development Inventory

MLU – Mean Length Utterances

MSL-w – Mean Sentence Length (words)

MSL-m – Mean Sentence Length (morphemes)

NC – Noun Class

OM – Object Marker

PREP – Preposition

PRON – Pronoun

SAE – South African English

SES – Socioeconomic Status

SM – Subject Marker

SLP – Speech Language Pathology

SVO – Subject Verb Object

TBU – Tone Bearing Unit

V – Verb

WHO – World Health Organisation

GLOSSARY OF TERMS

Bantu: a group of languages of Africa, including most of the principal languages spoken from the equator to Cape Town, excluding the Khoisan family which is now generally regarded as part of the Benue-Congo branch of the Niger-Congo family (Nurse & Philippson, 2003). The use of the term 'Bantu' is only acceptable outside South Africa and when talking about this group of languages and their speakers. The terms 'Black' and 'African' are acceptable within South Africa to refer to African people or peoples.

Caregiver: A parent in an African context is often viewed as the primary caregiver and protector of the family. The role of a parent in African culture extends beyond the biological relationship and includes responsibilities to the extended family and community. According to Mbiti (2006), the African concept of a parent involves "caring, nurturing, teaching, and guiding" the child, and it is believed that parents have a moral obligation to instil cultural and societal values in their children.

Correlation analysis: This is a statistical method that measures the strength of the relationship between two variables. In the context of this study, correlation analysis was used to determine the strength of the relationship between vocabulary size and age.

Culture: The language, history, religion, common traits, race, geographical area, art, music, and agriculture of ordinary people (Senosi, 2014). Culture is a subjective term that distinguishes the shared experiences of groups of people from those of other groups. These differences deserve individual research attention and should form part of studying diverse groups.

Cultural competence: The ability to acknowledge and incorporate, at all levels, the importance of culture, assessment of cross-cultural relations, vigilance toward the dynamics that result from cultural differences, expansion of cultural knowledge, and adaptation of services to meet culturally unique needs (Betancourt et al., 2003).

Cultural diversity: This is a debatable, open-ended term which generally refers to a reality of the coexistence of diverse knowledge, beliefs, arts, morals, laws, customs, religions, languages, abilities and disabilities, sexes, ethnicities, races, nationalities and sexual orientations of human beings. It could extend to the way people react to this reality and the way people choose to live together with this reality (Lin, 2019).

Descriptive statistics: These are statistical measures that describe the basic features of a dataset. They can be used to summarise the distribution of data, such as the mean, median, and mode. They can also be used to describe the relationships between variables, such as the correlation between vocabulary size and age.

Frequencies: This is a measure of how often something occurs. In the context of this study, frequencies were used to describe how often commonly used lexical and grammar items occurred in the data.

Interpretive content analysis: This is a qualitative research method that involves identifying and interpreting patterns of meaning in text data. The inductive approach means that the researcher allowed the data to guide the development of themes, rather than starting with a pre-determined set of themes.

Language acquisition: The process that starts three months before birth (MacWhinney, 2005) and gradually leads to the child's mastery of their native language/s at around adolescence (MacWhinney, 1998). The term 'acquisition' reflects Noam Chomsky's influence and nativist (generativist) models inspired by his work since the late 1950s (Prince & Smolensky, 2002). The term is rooted in linguistics and emphasises that grammar is only triggered by the environment rather than learned (Ambridge & Lieven, 2011).

Language development: A process of ontogenetic, gradual, complex, and adaptive change that can be driven by the interaction of experience and the learning brain, including some general innate constraints (Bates et al., 1994).

Language difference: Hammer et al. (2004) define a language difference as the outcome of the typical second language acquisition process and how it influences the development of the second language. Although second language acquisition may manifest as a delay in the second language (e.g., English), children with language differences have language skills in their native language that are commensurate with typically developing children.

Toddlers: Hoff (2006) defines toddlers as children between ages of 12 and 36 months who are rapidly developing their language skills. However, toddlers in this study will be referring to children between ages of 16 to 32 months.

OUTLINE OF THE THESIS

This section provides an outline of the chapters comprising the dissertation.

Chapter 1: The chapter provides an introduction and background to this research project. Measuring language development in cross-cultural and under-resourced settings can be challenging, but providing effective language assessment and intervention to children requiring support is crucial. This chapter gives an overview of the cultural and linguistic background of South Africa, Xitsonga language and culture, the challenges faced by the speech-language pathologist (SLP) when assessing language and the importance of adapting assessments. It introduces the use of the MB-CDI in cross-cultural and cross-linguistic environments to describe language development. The chapter also gives a framework of the research design dimensions and explains the study's key concepts and rationale.

Chapter 2: This chapter reviews the literature on early lexical and grammatical development and language acquisition theories. It discusses the theoretical framework employed as a summary of the language acquisition theories concerning Xitsonga. It also introduces the philosophical basis of the research through linking theoretical aspects of language acquisition and early lexical and grammatical development in Xitsonga. Mertens (2019) notes that a theoretical framework has implications for every decision made in the research process.

Chapter 3: This chapter describes the research design and methods. The methodology followed three phases, i.e. in the first phase, formulation and planning, early development and implementation. The formulation phase addresses the aims of the study and validated the use of mixed methods. This was followed by the planning phase which addresses the sampling and research designs. This was the early

development phase to validate the questionnaire and piloted it on a smaller sample. Last was the implementation phase which describes the process of doing mixed methods research with regard to the research procedures, data collection and analysis. The focus was on legitimising the research.

Chapter 4: This chapter describes findings from phase 1 – the cross-cultural adaptation of the MB-CDI from American English to Xitsonga and subsequent focus groups. Adaptation of the MB-CDI tool required a systematic process and carefully selecting participants that informed the development of the tool used for this study. The study adopted the guidelines for the cross-cultural adaptation process as recommended by Beaton et al. (2000). This study is part of a larger Southern African CDI project. Thus, it will also show the words included or excluded from the tool as reviewed with the other Southern African languages group.

Chapter 5: This chapter provides the results of the statistical analysis of the main study. The data presented were collected in the final phase of this three-phase sequential study. It describes patterns of early lexical and grammatical development of Xitsonga-speaking children between 16 and 32 months. The chapter begins by reporting trends in word and grammatical production by the Xitsonga-speaking children in Giyani. The section will conclude by reporting on the similarities and differences in vocabulary size and grammar and on trajectories of early vocabulary and grammar development in Xitsonga-speaking children from Giyani.

Chapter 6: This chapter discusses the findings from this study, relating them to the findings from other studies of children's early lexical and grammatical acquisition, with a particular focus on other studies that have used adaptations of the MB-CDI, as well as more generally. Theoretical and clinical implications of the work are discussed, with suggestions made for future research that builds on the present study. The study

limitations are also outlined, before concluding with a summary of the main contributions of the work.

Chapter 7: This chapter draws conclusions from the study. It provides the summary of the findings of the three phases of the study. It further outlines clinical implications and the limitations of the study.

CHAPTER 1: A STUDY OF LANGUAGE DEVELOPMENT IN XITSONGA-SPEAKING CHILDREN

“I alone cannot change the world, but I can cast a stone across the water to
create many ripples.”

-Mother Teresa

A few authors have thrown the proverbial stone by challenging South African speech-language pathologists (SLPs) from diverse cultural and linguistic backgrounds to interrogate the contextual relevance and responsiveness of current service delivery and clinical training practices (Khoza-Shangase & Mophosho, 2018; Pascoe & Norman, 2011; Pascoe et al., 2013). To respond to service delivery challenges and clinical training needs, one needs to understand the SLP scope of practice in managing language disorders and acknowledge the gap caused by the scarcity of culturally and linguistically appropriate resources. Such resources and knowledge are essential to distinguish a language disorder from a language difference.

1.1. Introduction

Kunene and Ahmed (2016) emphasised the importance of research on the emergence of early lexical comprehension and production. It enhances one's understanding of language development and is vital for identifying children with difficulties. Many theories have been formulated to explain language development since the early 1900s (Bates et al., 2017; Hoff, 2013). From that time, there has been an increase in early lexicon development research, with increasing momentum to include the full range of the world's linguistic and cultural diversity in studies of first language acquisition (de Abreu et al., 2013; Rijlaarsdam et al., 2013; Sousa & Rojjanasrirat, 2011; Vogt et al., 2015a).

This chapter will look at the linguistic and cultural diversity of South Africa with a particular focus on the marginalised language, Xitsonga. It will further argue for the

use of parental report in language assessment and the cultural adaptation of a language evaluation tool, the MacArthur-Bates Communicative Development Inventory (MB-CDI). In addition, the section introduces the theoretical framework underpinning this study and the components of research design. This study expands the knowledge of South Africa's cultural and linguistic diversity and has important implications for language development assessment and interventions.

1.2. Cultural and linguistic diversity in South Africa

Kozulin (2003) argued that defining the boundaries of language can be challenging because of its complexity, limitlessness and constantly changing nature. This complexity is exemplified in a diverse country like South Africa, with people from different groups and cultures living together because of historical events and human migrations. For example, the discovery of diamonds and gold increased human migration into South Africa. That discovery intensely changed the economic and political structure of Southern Africa because South Africa had a precious resource that attracted foreign capital and large-scale immigration. The discovery of these resources led hundreds of thousands of Africans to seek work in the newly developed mines and cities of industrialised areas (Fourie, 2018; Kalitanyi & Visser, 2010). This human migration was the reason Archbishop Desmond Tutu famously dubbed South Africa the "*rainbow nation*" (Buqa, 2015; Ndimande-Hlongwa & Ndebele, 2017). His statement portrayed hope for the nation that it could unify and overcome its ugly history and become a liberal, multilingual and multicultural democracy.

The majority of people in Africa are bi- or multilingual (Posel & Zeller, 2020). Naturally, in sub-Saharan Africa, this might mean acquiring a local language first, which, in the case of this study, is Xitsonga. Later, many people will develop a language of wider communication, such as English or a national language, and other languages such as an international language will develop last (Demuth et al., 2006; Hoff, 2013; Morgan & Demuth, 2014). One cannot deny the stigmatisation of African

languages. Multilingualism's value has often been ignored and undermined, including by the 'owners' of those languages (Cummins, 2019; May, 2014). However, multilingualism in South Africa and the rest of the African continent is a fact of life. Most South Africans are bi- or multilingual, especially those in lower-income and previously disadvantaged communities (Kruger et al., 2007).

As a result of the socio-political changes in South Africa, the twelve official languages, namely isiZulu, isiXhosa, Sepedi, Setswana, Sesotho, Siswati, Tshivenda, isiNdebele, South African Sign Language, English, Afrikaans, and Xitsonga were granted recognition as the official languages of the country (Constitution of RSA, 1996; Ndimande-Hlongwa & Ndebele, 2017). A relatively small number of South Africans speak Xitsonga, but it is not the least spoken official language in the country. Others, such as isiNdebele and Siswati, have a lower number of first language speakers. The South African Census (2011) registered just over 2 million (4.5%) South Africans speaking Xitsonga as their home language, mainly in Limpopo and Mpumalanga (Statistics SA, 2011). Figure 1 shows the clustering of languages in different parts of the country.



Figure 1: South African languages concentration (Languages of South Africa, 2011)

The South African government has validated its support for language diversity, which was approved by the African Heads of State in 1986, by adopting an original and creative policy of multilingualism to eradicate the legacy of inequality (Constitution of RSA, 1996; Phillipson, 1996). The cultural and linguistic environment of the child influences language learning, as such, SLPs need to profile the child's and family's demographics (McLeod et al., 2017). The bioecological systems theory grounding this study considers that children learn through direct experiences in their surrounding environment as they observe people's actions. Furthermore, a child's development is based mainly on social interaction with a more competent role model (Bronfenbrenner et al., 1986; Jaramillo, 1996; Rosa & Tudge, 2013).

There have been many debates on how culture and environment play a role in language development. Early researchers argued that the variations in social input do not affect language acquisition or development (McCartney, 1984). However, other scholars have argued that there are environmental effects on language development. These scholars suggest that language development could be affected by factors such as sex, developmental milestones, mother-child interactions, differences between

families (socioeconomic status, or SES), child-rearing practices, the context for language use, and even the amount of exposure to a language (Bates et al., 2017; Ford et al., 2020; Mustafa et al., 2018; Tudge et al., 2009). In summary, South Africa has a diverse array of official languages, and multilingualism is officially supported. However, many of the minority languages, such as Xitsonga are neglected, as will be outlined in the following section.

1.3. Marginalisation and language development of Xitsonga

Xitsonga is a cross-border language belonging to the Bantu¹ branch of the Niger-Congo languages. The word 'Bantu' has gone through a variety of changes in meaning. It has had both positive and negative meanings, depending on the "historical moment, social positionality, and user experience" (van der Waal, 2011, p.33). In literature, 'Bantu' is an international linguistic term that represents the kinship links between a large number of African indigenous languages as used in the field of linguistics and anthropology (Nurse & Philippson, 2003; van der Waal, 2011). However, before democracy in South Africa, Khumalo (1984) argued that the word has negative connotations for many South Africans who associate it with the Apartheid regime and derogatory usage. He was later supported by Schlebusch (2010). Due to the researcher's historical background and user experience, the word 'Bantu' will be replaced by 'African'.

The name 'Tsonga' is the root of Xitsonga (culture, language or ways of the Tsonga), Mutsonga (a Tsonga person), and Vatsonga (Tsonga people). In the language of the Vatsonga themselves, the root never appears by itself, but 'Tsonga' is typically used for the ease and accessibility of the wider international community. According to Guthrie's classification (1967-71), traditionally the African-speaking area is divided

¹ Use of the term 'Bantu' is only acceptable outside South Africa and when talking about this group of languages and their speakers. To refer to African people or peoples, the terms 'Black' and 'African' are acceptable within South Africa.

into sixteen zones (A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S). Each letter of the alphabet represents a group of languages. Xitsonga is grouped as S53 and is less closely related to any of the other African languages spoken in South Africa (see Figure 2), like Sesotho (S30) or isiZulu (S40) (Nurse & Philippson, 2003; Zerbian, 2007).

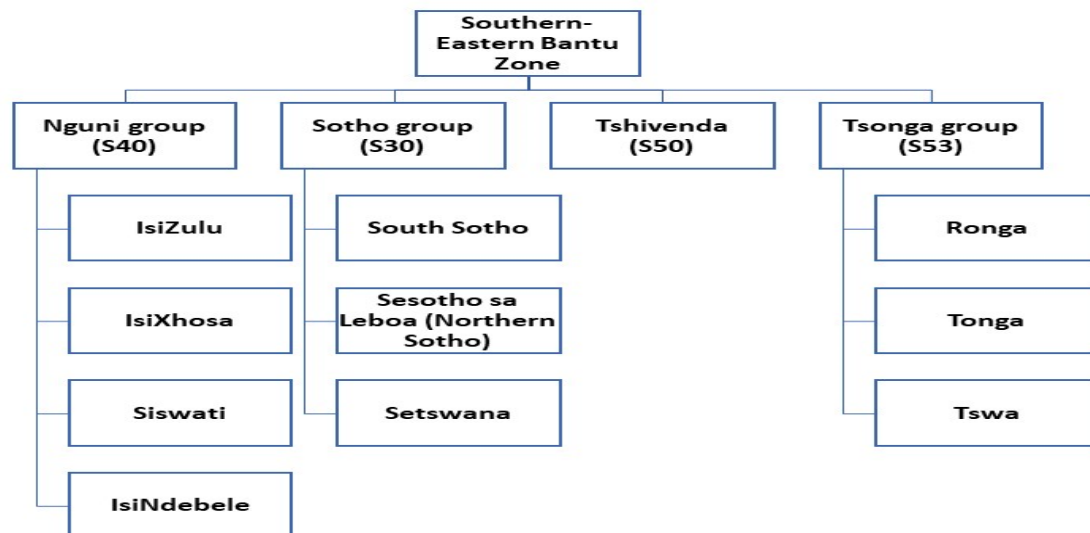


Figure 2: African languages in South Africa according to Guthrie’s classification.

The term ‘Tsonga’ is a “standard, generic way of referring to all the Tsonga dialects rather than indicating a specific language” (Baumbach, 1974 as cited in Mabaso, 2017). It is an umbrella term to refer to the Xitsonga language spoken in Southern Africa, Xirhonga and Xitshwa as spoken in Mozambique, and Xichangana as spoken in Mozambique and Zimbabwe (Nurse & Philippson, 2003a; Prinsloo & de Schryver, 2001; Zerbian, 2007). Herbert and Bailey (2002) point out discrepancies in grammatical rules governing these dialects. The varieties at times differ in lexicon and the strategies used in noun class (NC) agreements, as seen in the example below (Duarte, 2011; Mitchley, 2015; Zerbian, 2007).

Example:

English: The boy (*singular subject*) kicks (*singular verb*) the ball.

Xitsonga: Mufana (noun class (NC)1 singular subject) u (subject marker (SM) NC1 agreement) raha bolo

BoyNC1-AGREE kick ball.

Xichangana (Mozambique): A (DEF) mufana (NC1 singular subject) a (SM NC1 agreement) raha bolo

The stereotypes and negative attitudes towards Xitsonga as a language and culture have led to its marginalisation. Many Xitsonga home language speakers have assimilated into other language communities based on the dominance of that community (Nkhwashu, 2010). The Mail & Guardian newspaper published an article on 14 June 2013 titled “Xitsonga: How can a marginalised language thrive?” Shivambu, the author, asked this question because Vatsonga (the Tsonga people or Tsonga ethnic group) suffered humiliation and intimidation, which manifested in xenophobic attacks. Vatsonga suffered the worst social discrimination at the hands of other African groups (Shivambu, 2013).

In another report, Hlongwane, a street photographer and a writer at People’s Stories Project, wrote an article entitled “The complexion of xenophobia”. He noted that xenophobia in South Africa has a particular “tone” rooted in tribalism, colourism, and colonialism. Growing up, he relates how he was constantly told not to behave like a Shangaan (a term perceived as a prejudiced word used to refer to Vatsonga), or he experienced constant ridicule because of a darker skin tone, saying “he/she looks like a Shangaan” (Hlongwane, 2020). In South Africa, the name “Shangaan” or “Machangana” commonly refers to the entire Tsonga population, but this is a common misconception, and some people even take offence to it with regard to tribal affiliation (Mathebula, 2002). This social discrimination, together with limited resources, means that Xitsonga is often not taught as a home language in schools. Parents typically do not encourage their children to speak Xitsonga. They then assimilate to other majority African languages, such as isiZulu and Setswana, and learn them at schools as their first language (Nkhwashu, 2010).

Most African languages are tonal, with complex tonal phonologies (Marlo & Odden, 2019). Even though Xitsonga speakers often assimilate to other African languages, these languages and dialects differ significantly. Xitsonga and isiZulu

dialects, for example, may have highly different tone systems despite their closeness. Many Nguni languages, such as isiZulu, isiNdebele and isiXhosa, have been researched for the effect of consonants on tone (Lee, 2009). Voiced stops, breathy voice and aspirated consonants are all depressors in Tsonga. Aspirated consonants are unusual depressors, although voiced pauses and breathy voice consonants are depressors in other languages. Marlo and Odden (2019) undertook a comprehensive overview of African phonology and reported that Xitsonga has the process of tone tripling, also found in Shona, Venda, Kalanga and the Kanye dialect of Tswana. Other studies that addressed Xitsonga, such as van der Spuy (1990), provided a few examples of tone use. The rich morphology, complicated syntax, and tonomorphology of Xitsonga are often the focus of studies (Duarte, 2011; Kubayi, 2013; Lee, 2009; Lee & Burheni, 2014).

Xitsonga is an endangered language (Nkhwashu, 2010) and has been minimally investigated (Odden & Bickmore, 2014), especially when it comes to children's language acquisition. Most affluent parents do not encourage their children to speak Xitsonga, and the children assimilate to other majority languages such as isiZulu, Setswana and even English. This study set out to break new ground in understanding children's language development in Xitsonga.

1.4. Challenges in early identification of language disorders in Xitsonga-speaking toddlers

Bates et al. (2002) acknowledge that language is part of our biological heritage, an achievement that depends upon the unique characteristics of the human brain. There has been a vast and detailed body of information about language acquisition gathered from different languages (Alcock & Alibhai, 2013; Babatsouli et al., 2017; Dale & Penfold, 2011), systematic differences within families (Bassano et al., 2005; da Silva Guimarães et al., 2013), and typical and atypically developing children (Dale et al., 2003; Hasson et al., 2013). These research findings reveal that comparative studies in first language acquisition in different languages and contexts might be a way to

identify potential universals in child language. Understanding the diverse context requires comparing sequences of the acquisition process at the level of grammatical, lexical, conversational and narrative skill development (Engel de Abreu et al., 2013; Kelly et al., 2015). Thus, it is crucial in the South African context to investigate and document early language development to contribute to this body of knowledge. In addition, there is a need to understand the child's patterns of language development to reflect on expected language performance. Finally, tools must be developed to assess children in their home languages for a speech-language pathologist to determine whether a child presents with a language disorder or a language difference.

Hammer et al. (2004) define a language difference as the outcome of the typical second language acquisition process and how it influences the development of the second language. Although second language acquisition may manifest as a delay in the second language (e.g., English), children with a language difference have language skills in their native language that are commensurate with typically developing children. Whilst language disorders are characterised by difficulties in comprehension and the use of spoken, written or other symbol systems, as Toppelberg & Shapiro (2000) explain it may include any combination of the following aspects of language: the structure of language (phonology, morphology, and syntax), the meaning of language (semantics), and/or the role of language in communication (pragmatics).

SLPs may struggle to differentiate between language differences related to environmental context and language impairments. Thus, contextual relevance and responsiveness are crucial in a multilingual and multicultural country like South Africa (Engel de Abreu et al., 2013; Hernández et al., 2020; Khoza-Shangase & Mophosho, 2018; Mdlalo et al., 2019; Pascoe et al., 2018). The Health Professional Council of South Africa (HPCSA) established a Language and Culture Task Team with the mandate to write standards that will assist SLPs in their work with a culturally and linguistically diverse population. The guidelines propose five values for speech, language, and hearing professions to follow: valuing diversity, equity and accessibility of services, valuing human rights, focusing on clinical training, and lifelong development of critical consciousness (Khoza-Shangase & Mophosho, 2018;

Pascoe et al., 2018). The authors suggest that following these principles would not only improve outcomes for patients but also contribute to making SLP programmes more inclusive. Assessment helps professionals determine if a child's language reflects age-expected performance in their home language or delayed language development (Paul & Norbury, 2012; Shipley & McAfee, 2019). Thus, SLPs must know and understand children's expected patterns of early lexical and grammatical development to identify language disorders in that language.

The lack of resources for the Xitsonga-speaking population further compounds the challenge in the early identification of language disorders. Early detection of a language delay or disorder is imperative as it has shown remarkable benefits to developing children's language skills and preventing negative psychosocial and academic sequelae (Curtis et al., 2019; Snow & Matthews, 2016). Identification of a language problem in the early years of life will often lead to early intervention. Early identification can prevent the delay or disorder from becoming more severe, or can even eliminate it, saving the child from going through hardships secondary to language disorders (Barnes & Bloch, 2019; Duyme et al., 2011). Difficulties with oral language comprehension are typically limiting for reading comprehension. Grolig (2020) argues that reading research has shown the difference between lower-level language skills, which are related to word and sentence processing (e.g., vocabulary and grammar skills), and higher-level language skills, associated with the processing of texts (e.g., comprehension monitoring and narrative skills). Both skills are necessary for effective reading and learning in the school years and are underpinned by a solid foundation of lexical and grammatical development in the early years.

Where language problems are left untreated, significant social, emotional, academic, and financial difficulties may surface later in life (Pethick & Stephens, 2008). For example, research has shown a linear relationship between communication skills and academic performance. As the language problem persists, it increases the risks of learning difficulties during school years (Grolig, 2020; Pethick & Stephens, 2008). SLPs diagnose language difficulties and their severity using either formal (standardised) or informal language assessment tools that need to be culturally appropriate and age-

appropriate to acquire dependable results (Eriks-Brophy, 2014; Hegde & Pomaville, 2021; Snow & Van Hemel, 2008). Thus, SLPs have an ethical responsibility to manage clients in their mother tongue (Gxilishe, 2008; Khoza-Shangase & Mophosho, 2018; Mdladlo et al., 2016; Pascoe & Smouse, 2012). It is crucial for SLPs to distinguish typical from atypical language development in a client's mother tongue reliably in order to provide adequate language assessment and intervention to children and adults requiring these services (Mdladlo et al., 2016; Mdlalo, 2013; Van Dulm & Southwood, 2013).

Understanding the patterns of language development is essential. However, this is challenging in a cross-cultural and under-resourced setting such as South Africa. Furthermore, a lack of normative language development data in languages such as Xitsonga leads to challenges in developing culturally and linguistically relevant assessment tools (Mdlalo, 2013). Currently, speech and language assessments in the South African context rely mainly on tools developed for an affluent, monolingual English population, grounded on different cultural, linguistic, and even socioeconomic backgrounds (Gxilishe, 2008; Pascoe et al., 2018). These tools are usually designed for children acquiring English in the United States (US) and United Kingdom (UK), not for first language South African English (SAE) speakers, let alone African language speakers. Thus, this study aims to initiate investigations of Xitsonga, an under-resourced and under-researched language, to document the trajectory of language development in young children.

Language assessment is a complex activity requiring SLPs to synthesise information collected from different sources to make evidence-based clinical decisions. If SLPs are to make sound decisions, they should incorporate data from both quantitative and qualitative sources. In addition, data collection should use tools that are valid and reliable. The tool should be able to document the child's language competence in their home language. Data should include biographical information from case histories, naturalistic environmental observations, informal assessments such as checklists, spontaneous language sampling, and criterion-referenced tests (Friberg, 2010; Li'el et al., 2019; McLeod et al., 2017). In South Africa, the number and

quality of assessment tools available for SLPs to use with first language speakers of all local languages remains limited but has been increasing in recent years. There are some languages with small but growing efforts at adding to the available tools. For example, the phonological awareness (Diemer et al., 2015), speech (Mahura, 2014; Mapthalala et al., 2014) and language development (Dowling & Whitelaw, 2018; Southwood et al., 2021) of young isiXhosa-speaking children can now be assessed reliably through recently developed tools. Other languages, like Xitsonga, have received less attention and lack any of these tools to date. See Pascoe and McLeod (2016), however, for the Intelligibility in Context Scale which has been translated into all South Africa's official languages including Xitsonga.

Language is part of human biological heritage and studies contrasting first language acquisition in different languages and contexts are progressing to identify potential universals in child language. SLPs must know and understand early lexical and grammatical development to identify language disorders in a given language. The lack of resources for the Xitsonga-speaking population also leads to a challenge in the early identification of language disorders, imperative for supporting children with difficulties. This is challenging in a cross-cultural and under-resourced setting like South Africa. The lack of normative data in Xitsonga has compounded challenges of developing culturally and linguistically relevant assessment tools. This study aims to address some of these challenges and fill existing knowledge gaps using parental report to gain insights into Xitsonga-speaking toddlers' language development. The toddler form of the MB-CDI is a parent-report questionnaire designed to assess language development in children between ages of 16 and 30 months (Fenson et al., 1994). The age range has been extended to 32 months for this study to further explore Xitsonga early lexical and grammatical developmental trends as there is limited research conducted in Xitsonga language acquisition.

Chigonda (2017) found a correlation between professional and parent reports about children. Parents and professionals agreed significantly on observed language behaviour (Camaioni et al., 1991; Dale et al., 1989). Further correlations were seen in studies where parents assisted with the initial screening of children (Duyme et al.,

2011; Guo & Eisenberg, 2015). Even though parent reports have proved cost-effective and efficient for describing early lexical and grammatical development in a typically developing child, there are some limitations. Parents can be biased observers either overestimating or underestimating their child's language development. Some biases link to demographic factors such as SES, maternal education and language exposure (Feldman et al., 2000; Fenson et al., 2000a). Even though there are some limitations, the validity and reliability of parent-report tools have been widely researched and generally found to be effective in characterising children's language abilities (Bleses et al., 2018; Bleses et al., 2008; Heilmann et al., 2005). In this study, the researcher uses the word 'parent' to represent all the caregivers who participated in the study within our South African context (for example the primary caregiver may have been a grandparent or aunt, rather than biological/traditional parent).

The MB-CDI is a widely used questionnaire created by Bates et al. (1975) and then standardised by Fenson et al. (1994). It is a normed parent-report checklist that describes semantic and grammatical development in typically developing children and was initially designed to document the language of American English-speaking children aged 8 to 30 months (Bates et al., 1994; Dale et al., 1989; Dale & Penfold, 2011). The MB-CDI assesses children's verbal and non-verbal communicative abilities. It focuses on assessing linguistic skills such as gesture development, vocabulary and grammar in infants and toddlers. Its primary use is to determine children's language levels (identify children at risk of developmental language delay or language difficulties), monitor the effectiveness of an intervention, establish the readiness of young children to participate in educational programmes and assess the language skills of children above the intended age limit (30 months). The MB-CDI proves to be beneficial as it records the score range for each month and the development pattern throughout the months. It documents rapid growth in language development but can also identify the floor and ceiling. In addition, it can identify children with typical and atypical language development (Bleses et al., 2018; Bleses et al., 2008; Heilmann et al., 2005; Skarakis-Doyle et al., 2009). The present study selected the MB-CDI both for adaptation and then as a subsequent data collection tool because of its widespread

global use across languages and its reported reliability and validity. Translation and adaptation of the MB-CDI was the first step towards developing resources to distinguish typical or atypical Xitsonga language development.

1.5. Cultural adaptation of a language assessment tool

The translation of assessment or research tools can often present overwhelming practical and methodological difficulties that threaten the validity of the cross-cultural research projects that use them. The cross-cultural adaptation of any tool for use in a new country, culture, and language necessitates the use of methods to reach equivalence between the novel source and target versions of the tool as outlined by Beaton et al. (2000). The International Test Commission (2018) drafted Guidelines for the Large-Scale Assessment of Linguistically and Culturally Diverse Populations that inform test developers, users and administrators about fairness issues when assessing linguistically or culturally diverse individuals and also support Beaton et al.'s (2000) stages (Alcock et al., 2015; Bornman et al., 2010; Dale & Penfold, 2011; Hernández et al., 2020; Pascoe & McLeod, 2016; Sousa & Rojjanasrirat, 2011; Steele & Edwards, 2008; Vogt et al., 2015).

Pascoe and McLeod (2016) agree with Carter et al. (2005), arguing that adaptation of a tool for other cultures requires structured modifications informed by members of the target culture and subsequent testing with the target culture. Developing new assessment tools can be time-consuming, expensive, and challenging. Thus, it is not recommended if adequate instruments already exist (Bornman et al., 2010). In addition, it is a complex process to translate an existing assessment tool into a different language for a new context and expect the tool to yield the exact results as the initial test (Bornman et al., 2010; Peña, 2007). The use of observations, naturalistic language samples and parent-report tools such as the MB-CDI are examples of assessment tools that SLPs have widely used to assess the language skills of infants and toddlers (Bello et al., 2012; Bleses et al., 2008; Skarakis-Doyle et al., 2009).

Peña (2007) identified four conceptual and methodological issues needed to maintain content validity when translating a tool. These issues are the linguistic equivalence of the instrument, linguistic translation, cultural equivalence, and metric equivalence (see section 2.3.1 for a detailed discussion of these conceptual and methodological issues). Authors such as Peña (2007) and Carter et al. (2005) disagree with the empiricist conceptual frameworks that lay behind early assessment tools, arguing that there can be no such thing as culture-free assessments that operate in “context-free clinical settings” (Carter et al., 2005, p. 386). Parent-report tools that have been developed by, and in partnership with, first language speakers of the language/s in question and piloted in the settings in which they will be used routinely, hold the most promise of being culturally inclusive and clinically effective.

1.6. The theoretical framework underpinning the study

A robust theoretical framework is a crucial aspect of conducting research in the field of early language development. As language plays a fundamental role in cognitive, social, and emotional development, understanding the factors that influence language acquisition in early childhood is of paramount importance. This introduction outlines the process of adapting Kivunja (2018) theoretical framework for this study, which focused on exploring early language development in Xitsonga - speaking children aged 16 to 32 months.

Ngulube et al. (2015) argue that even though research methods play a significant role in how a study is conceptualised, and in its data gathering and analysis processes, it is the theoretical framework that informs the methodological approach. According to Borgatti (1996, p. 8), “a theoretical framework is a collection of interrelated concepts, influenced by one or more theories, such as pragmatism or social constructivism. A theoretical framework guides your research, determining what things you will measure, and what statistical relationships you will look for.” Theory is a way to explain relationships or connections between or among phenomena. It addresses a wider and more profound issue or situation, proposing the specifics of what could be more universal, going beyond individual or specific contexts (Kivunja, 2018). Figure 3 outlines the theoretical framework employed in this study.

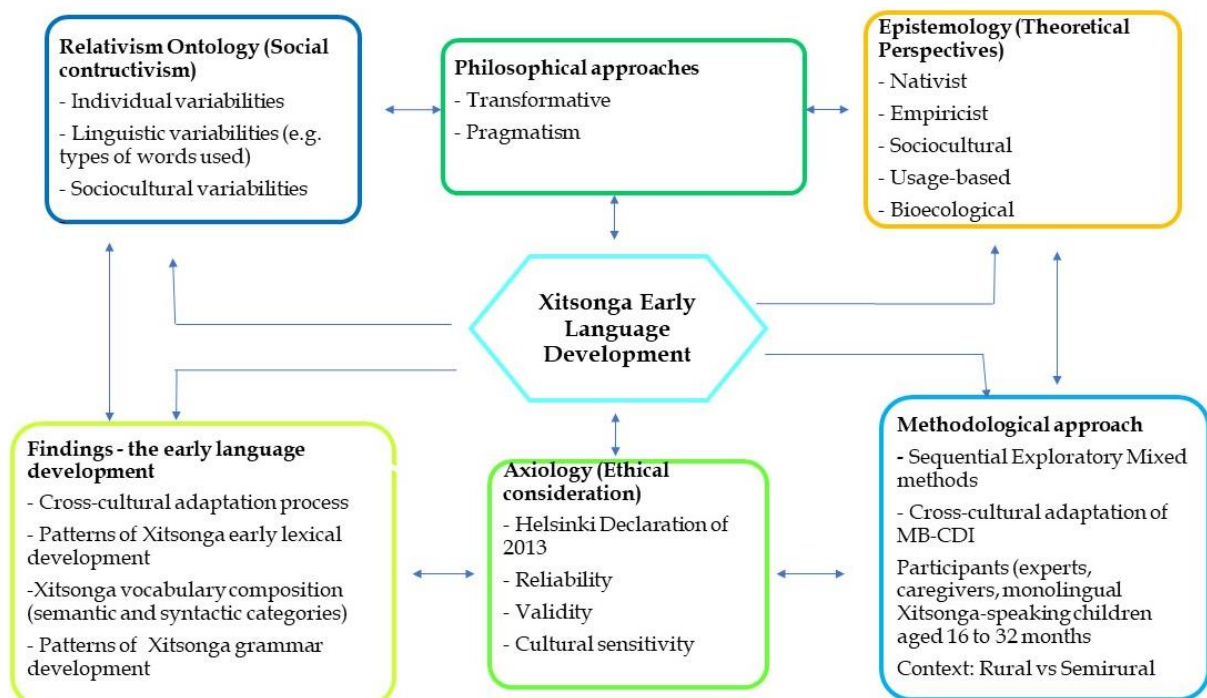


Figure 3: Theoretical framework used in this study (adapted from Kivunja, 2018)

Kivunja’s (2018) theoretical framework has been adapted for this research study to provide a comprehensive and integrated understanding of the adaptation of a language assessment tool and early language development of Xitsonga. It further assists in gaining a comprehensive and integrated understanding of language development within the bioecological systems theory and mixed methods research.

The theoretical framework involved the integration of several existing theories and frameworks, as well as the identification of new constructs and relationships.

The theoretical framework of this study is underpinned by the Bronfenbrenner bioecological theory perspective. This perspective highlights the correlation between an individual's development and the social systems within the broader context. It proposes that human development is shaped by a series of interacting systems. It also recognises the importance of considering multiple levels of influence when adapting a language assessment tool and analysing a child's language development (Bronfenbrenner, 1992). The multiple levels can be accommodated in the different phases of this research study (see section 1.7.2.). Furthermore, Onwuegbuzie et al. (2013) hypothesise that the traditional research methods in the social, behavioural, and health sectors may be represented within the four levels of Bronfenbrenner's (1992) ecological systems model, which could be mapped onto the research process.

Early child language development is a complex and multifaceted process. While quantitative and qualitative research methods have traditionally been used to study this phenomena, mixed methods research designs offer a more comprehensive approach that allows researchers to collect and analyse both quantitative and qualitative data. Where the Bronfenbrenner ecological model emphasises the importance of examining the complex relationships between individuals and their environment, mixed methods research is well-suited to investigating complex phenomena. A detailed description of the framework can be seen in section 2.2.

It is challenging to render culturally and linguistically responsive and culturally competent speech and language assessments, interventions and clinical training services, when working as an SLP in clinical practice or academia. As a Xitsonga home language speaker, the researcher seized the opportunity to respond to Khoza-Shangase and Mophosho's (2018, 2021) challenge to contribute studies that interrogate the African contextual relevance and creation of more responsive resources. The overarching research question for this study was: "What is the typical development of early lexical and grammatical development of Xitsonga-speaking children between

the ages of 16 to 32 months?" Though other CDI studies investigated children in the 16 to 30 months age range (Fenson et al., 1994; Fenson et al., 2007), the researcher in this current study uses the term 'toddler' to refer to children between 16 to 30 months. To ensure reliability and validity, this study recruited children between 16 and 32 months, aligned with the recommended age range for the MB-CDI Toddler form. Xitsonga has limited resources and is an under-researched language with few documented speech and language assessment tools. This study aimed to contribute to what Kunene and Ahmed (2016) reported as the scarcity of academic studies on the comprehension and production of African languages, by adapting an assessment tool to describe children's language development in Xitsonga.

1.7. Dimensions in research design

Research design encompasses several critical dimensions that collectively shape the structure and methodology of a study. These dimensions provide the framework for how research questions are addressed, data is collected, and conclusions are drawn.

1.7.1 The aim of the study

This study aimed to describe the early lexical and grammatical development of Xitsonga-speaking toddlers between the ages 16 to 32 months. To achieve this aim, the researcher asked the following research questions:

- (i) What are caregivers' and language experts' perceptions of MB-CDI and words commonly used by Xitsonga-speaking toddlers?
- (ii) What is the relationship between age and vocabulary size among Xitsonga-speaking children aged 16 to 32 months?
- (iii) What are the frequently used words by Xitsonga-speaking children aged 16 to 32 months in early language development?
- (iv) What are the vocabulary compositions (semantic and syntactic categories) in Xitsonga-speaking children aged 16 to 32 months?

- (v) How do Xitsonga-speaking children age 16 to 32 months use complex morphology, and what is the correlation with vocabulary size?
- (vi) How does MLU develop in Xitsonga-speaking children aged 16 to 32 months?
- (vii) What is the relationship between MLU and other language development areas, such as vocabulary size and grammar complexity?

In response to the questions above, this preliminary study described the typical early vocabulary acquisition of Xitsonga-speaking children between 16 to 32 months using an adapted Xitsonga MB-CDI toddler form.

1.7.2 Research methodology

Any methodological approach should consider cultural and linguistic sensitivity. It provides a detailed account of the procedures and techniques used to ensure the validity and reliability of the findings. Three distinct phases following a set sequence were employed to address the questions mentioned in section 1.7.1. Hence, the researcher used the sequential exploratory mixed methods design for this study. Leedy and Ormrod (2015, p. 386) describe the exploratory design as a “two-phase mixed methods design in which qualitative data are collected to inform the planning and implementation of subsequent quantitative data collection”. Creswell and Plano Clark (2018) also support the description by Leedy and Ormrod (2015). However, they add a third phase, a connecting phase during which the researcher develops the instrument, as seen in Figure 4. They define an exploratory sequential mixed methods design as one in which the researcher first collects qualitative data and conducts analysis before applying the findings in the quantitative phase. Creswell and Plano Clark (2018) describe a three-phase approach comprising an exploratory phase, development of the instrument, and administration of the instrument to a sample of a population.

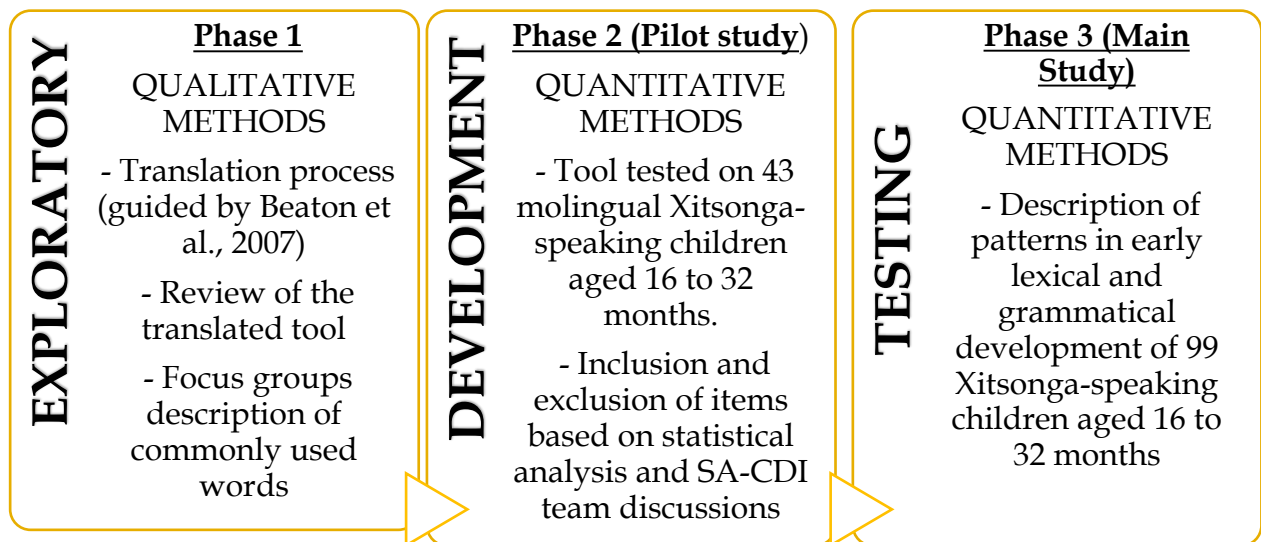


Figure 4: The data collection phases of the study (based on Creswell and Plano Clark, 2018)

This study started with:

Phase one: Collection and analysis of qualitative data from the translation process and adaptation process using four bilingual translators, two focus groups with the panel of experts and one focus group with caregivers.

Phase two: The researcher employed descriptive statistics to calculate the frequency distributions of each lexical and grammatical items across the ages, leading to decisions about whether to include or exclude words in the final version of the Xitsonga MB-CDI to be used in the subsequent main study.

Phase three: In this main study, the researcher administered the newly developed Xitsonga MB-CDI to 44 semi-urban and 55 rural participants. The data were then analysed and synthesised to describe variabilities in early lexical and grammatical development of Xitsonga-speaking children between the ages of 16 to 32 months.

To understand language development in Xitsonga, cultural and linguistic sensitivity is required. Culturally sensitive research should address specific

knowledge, language, and world views. This study primarily adopted a pragmatic stance underpinned by the transformative approach. The tool used was culturally and linguistically adapted before it was used to document children's Xitsonga language development. The study adopted the bioecological systems theory of language development, considering children as embedded in their context. Three distinctive phases were employed to address the research questions. This type of sequential exploratory mixed methods design has been shown to be useful when designing and validating measurement instruments and evaluation criteria, such as language tests, rating scales, surveys, and questionnaires, for tools to be culturally sensitive (Creswell & Plano Clark, 2018).

1.8. The significance of the study

The primary objective of this study was to examine the early lexical and grammatical development of Xitsonga-speaking toddlers. Additionally, the research explored the process of cross-cultural adaptation to assist SLPs in South Africa in developing responsive and relevant resources. SLPs in South Africa are in urgent need of valid, reliable, and culturally relevant tools to assess the language development of Xitsonga-speaking children. The findings of this study will assist SLPs in developing culturally sensitive resources that can effectively differentiate between typical and atypical language development in South Africa. These resources will be valuable for intervention planning and student training. For instance, SLPs can develop resources tailored to specific language needs of different cultural groups, incorporating local language and cultural references. They can also establish training programmes that foster collaboration among professionals from diverse cultures, enhancing their understanding of how culture influences language development. The study's outcomes hold significant potential to positively impact the lives of individuals with language disorders in South Africa by ensuring equitable access to necessary services.

Furthermore, this study contributes to cross-linguistic and cross-cultural research, expanding current understanding of early lexical and grammatical

development in young children and the influence of contextual factors. It serves as a preliminary investigation, providing the initial dataset for typical Xitsonga language development, serving as a foundation for the development of additional assessment tools, intervention strategies, and future research with larger sample sizes. Understanding the patterns of normal language development is essential to differentiate between typical and atypical language development.

This research forms part of a broader project that involves adapting the MB-CDI for eleven South African languages: Afrikaans, isiNdebele, isiXhosa, isiZulu, Sesotho, Sesotho sa Leboa, Setswana, siSwati, South African English, Tshivenda, and Xitsonga. It contributes to the body of evidence regarding child language development, particularly within the context of cross-cultural and cross-linguistic research in Southern Africa. The theoretical implications of this work contribute to ongoing debates and comparisons regarding language acquisition in an under-researched population and setting. Moreover, the practical value of this research lies in developing a culturally responsive and ecologically valid clinical assessment tool for Xitsonga, which can be utilised in future research and clinical settings.

The following chapter will review the literature on a parent reporting tool, cross-cultural adaptations of tools, early language development and Xitsonga lexicon and grammar.

CHAPTER 2: EARLY LANGUAGE DEVELOPMENT AND THE THEORETICAL FRAMEWORK

“Rihlampfu rinthswa ri tiyisiwa hi ra khale”

-A Xitsonga proverb

The proverb that opens this chapter can be directly translated as “a new branch is made strong by an old one”. Webster and Watson (2002) stated that irrespective of how one looks at the world and tries to make sense of it, the work done does not occur in a vacuum, but builds on the ideas of other people who have studied the field before. This section will review the literature on early language development and develop a theoretical framework for the study. As mentioned in section 1.7.2, the study employs a model of pragmatism and transformative approaches. Here, the researcher discusses how these approaches, together with the bioecological system theories of language acquisition, were used as the theoretical framework for this study to understand early language development. The chapter provides a rationale for the selection of this framework, both for responding to research questions about language development in Xitsonga as well as for developing contextually relevant and culturally responsive resources.

2.1. Introduction

According to Cockcroft et al. (2015), normative data in cognitive ability testing is still primarily based on monolingual, moderately affluent English first language individuals. These standards are nevertheless frequently applied to individuals from other demographic groups, e.g., who come from other cultures, speak languages other than English and have a different SES. Even language development evaluations for non-mainstream English speakers, such as Xitsonga speakers, can underestimate development results if the assessment has not been adjusted to reflect their cultural and linguistic background. As a result, these assessments run the risk of misdiagnosis

or underdiagnosis (Campbell et al., 1997, p. 519). Thus, a clear theoretical framework should be applied to assist the researcher to understand the context of the research, to identify gaps and limitations and, in this case, to develop a language assessment tool that will be valid and reliable.

This chapter will give a detailed description of the theoretical framework underpinning this study. Understanding the theoretical foundations provides a basis for comprehending the complexities involved in language acquisition. The chapter discusses dominant theories and models that have guided research and how they shape the understanding of cognitive, social, and linguistic factors that impact language development. It will further explore the challenges and strategies involved in adapting a language assessment tool for a different linguistic and cultural context. The MB-CDI is a widely used tool that will be discussed in more detail, including the issue of its reliability in various contexts. Furthermore, the chapter explores the patterns of language development to gain a comprehensive understanding of the typical trajectory of language acquisition. Finally, it focuses on Xitsonga and provides a comparison to English.

2.2. Theoretical framework

A theoretical framework was essential for this study because it provided a foundation for the research, situated it within the existing literature, and guided the interpretation of the findings. It helped to define and operationalise key concepts and constructs (research paradigm), which are necessary for understanding the theoretical perspective, hypotheses, research methods and analytical techniques commonly used in the field of study. Theoretical frameworks guide the questions that researchers ask, the types of data that they collect, and the ways in which they analyse and interpret their findings (Creswell & Plano Clark, 2018). A clear theoretical framework also enables the researcher to make logical and coherent connections between different components of the research, leading to a more systematic and robust investigation. The theoretical framework of this study maps the research within Bronfenbrenner's

ecological model. It identifies relevant literature on adaptation of language assessment tools and theories that helped the researcher to understand the context of the research, identify gaps or limitations in the existing knowledge, and make a unique contribution to the field (Kivunja, 2018).

2.2.1. Embracing cultural sensitivity in research: philosophical approaches shaping the study

Culturally sensitive research should address specific knowledge, language, and world views. It should also address philosophical perspectives based on cultural, historical, and political experiences, and particular behaviours that determine cultural distinctiveness (Denzin & Lincoln, 2018). Philosophical approaches of research provide the foundation and direction for conducting research, guiding researchers in their decision-making processes and shaping the questions they ask. These approaches are based on different philosophical perspectives and assumptions about the nature of reality, knowledge, and truth. This study supports a shift from having a singular worldview to hybrid paradigms, as shown in Table 1.

Table 1: Dimensions of the research framework

RESEARCH DESIGN	Research question	What is the typical language acquisition of Xitsonga-speaking children aged 16 to 32 months?		
	Paradigm	Pragmatism & Transformative		
	Ontology	Relativism		
	Epistemology	Practicality: use several tools (focus groups, questionnaire, language samples) to achieve the goal		
	Axiology	Ethical considerations guided by the Helsinki Declaration of 2013		
	Methodology	Mixed methods		
	Context	- Rural – 4 villages around Giyani and Malamulele - Semi-urban – Malamulele and Giyani Area		
	Techniques	Phase 1	Phase 2	Phase 3
	Sampling	Convenience	Snowball	Snowball
	Sample and sample size	Panel of experts – 7 Caregivers – 7 Toddlers for language sample – 6	Caregivers Rural -29 Semi-urban -26	Caregivers Rural -55 Semi-urban - 44
	Research method	Qualitative	Quantitative	Mixed
	Data collection	Questionnaire translation and focus groups, spontaneous language sample	Correlate findings from focus groups and Pilot-1 to test the Xitsonga MB-CDI	Administer the adapted MB-CDI
	Data analysis	Content analysis	Descriptive and correlation	Descriptive, inferential and correlation

2.2.1.1. Transformative and pragmatic paradigms in research: framing the study on Xitsonga early language development.

Many scholars (Baugh & Guion, 2006; Bhattacharjee, 2020; Creswell & Plano Clark, 2018; Higginbottom & Lauridsen, 2014) mention four paradigms that help inform philosophical perspectives of research. These paradigms differ in what is

considered fundamental in the world (ontology), how we gain knowledge of what we know (epistemology), the role values play in research (axiology), the process of conducting research (methodology), and the language of research (rhetoric) (Boucher, 2014; Creswell & Creswell, 2018; Creswell & Plano Clark, 2018; Tashakkori & Teddlie, 2015).

This study primarily adopted a pragmatic stance underpinned by the transformative approach. The study sought to create new knowledge and understanding in Xitsonga early language development using a mixed methods and different data sources. The pragmatic approach responds to the research questions (presented in section 1.7.2) using qualitative and quantitative methods to obtain data. A comprehensive exploration of the methodological approaches is presented in CHAPTER 3: RESEARCH DESIGN AND METHODS. The transformative approach advocates for improved service delivery to marginalised languages such as Xitsonga. In fact, researchers are morally obliged to focus their work on marginalised, oppressed and disempowered groups (Barnes & Bloch, 2019; Denzin & Lincoln, 2018). Hybrid paradigms, also called the “models of pluralism”, emerge alongside new topographies of knowledge and new decolonising epistemologies (Denzin & Lincoln, 2018). This research framework followed the theoretical framework outlined in Figure 3. This perspective of embracing alternative yet equally correct views of looking at the same fact is called the pragmatic paradigm (Boucher, 2014; Denzin & Lincoln, 2018; Tashakkori & Teddlie, 2015).

2.2.1.2. Relativist ontology and early language development

Relativist ontology, also referred to as social constructivism or social constructionism, is a philosophical school of thought that contends reality is a product of social and cultural settings rather than an objective reality (Gentner & Boroditsky, 2001; Killam, 2013). It suggests that a person’s subjective interpretations and interactions within particular cultural and social frameworks impact how they perceive the world. In the context of early language development research, a relativist ontology acknowledges that a variety of factors, including cultural norms, social

interactions, and linguistic settings, have an impact on language acquisition (Gentner & Boroditsky, 2001; Tomasello, 2000; Tomasello et al., 1986). Relativist ontology recognises that language development can differ among various linguistic traits and cultural settings. The individual linguistic traits, dialects, and words used within a certain cultural setting are all taken into consideration by researchers looking at early language development. In order to acknowledge the impact of cultural and linguistic variety, a study can, for instance, look at how language acquisition patterns differ between monolingual and bilingual children (Gentner & Boroditsky, 2001; Killam, 2013; Tomasello et al., 1986).

2.2.1.3. Axiology and cultural sensitivity in early language development research

Axiology takes an explicitly value-oriented approach underpinned by cultural values. Cultural competence is important in adapting and developing a culturally and linguistically relevant assessment tool (Bornman et al., 2010; Dale & Penfold, 2011; Kim, 1988). Ethical considerations for this study were guided by the Helsinki Declaration of 2013, which requires researchers to uphold ethical principles when conducting research involving humans (World Medical Association, 2013). First, participants were treated fairly. Regardless of social and economic background, respect was shown to the participants and their families. The researchers upheld principles of distributive justice, which, according to Li et al. (2015), are concerned with fairness in terms of benefits and burdens of the research. Xitsonga-speaking children and their families were the main research participants and constitute the population that will benefit most from the ultimate outcomes of the research. Caregivers of children identified as being at risk of delayed language development based on their case history information may be emotionally distressed by that fact. In this case, the researcher provided counselling to them and referred them to relevant health professionals for an assessment. This was beneficial because early identification can help prevent or minimise later language delays and learning difficulties.

Researchers should also consider the following:

Cultural sensitivity: Early language development is influenced by culture. Researchers should be mindful of the cultural context of their study and take steps to ensure that the study is culturally sensitive.

Language assessment: Language assessment tools can be biased. Researchers should carefully select language assessment tools that are appropriate for the population they are studying.

Reporting of results: Researchers should be careful in how they report the results of their studies. They should avoid making claims that are not supported by the data (Bornman et al., 2010; Dale & Penfold, 2011; Kim, 1988).

2.2.1.4. Practical epistemology in early language development research

Epistemology, as a branch of philosophy, is concerned with the nature of knowledge, how knowledge is acquired, and the justification and limits of knowledge. In the context of early language development, epistemology plays a crucial role in understanding how children acquire language skills, the mechanisms involved in language learning, and the ways in which knowledge about language is constructed. Epistemology in early language development can address questions such as: How do children learn the sounds, words and grammar of their language? How do they use language to make sense of their experiences and the world around them? How do they interact with others through language? How do they develop their linguistic identities and competencies? Different theoretical perspectives can offer various answers to these questions depending on the assumptions about the nature of language, learning and development (Bates & Carnevale, 1993; Berk & Winsler, 1995; Bloom et al., 1993; Bruner, 2004; Robinson & Mervis, 1998).

Epistemology in early language development is a complex and dynamic field that involves multiple dimensions and perspectives. Table 2 shows the different theoretical perspectives in early language development.

Table 2: Theoretical perspectives in early language development

Theoretical perspective	Explained	Influenced by
Nativist perspective	Children are born with a universal grammar, which is a set of abstract principles that underlie all human languages. This universal grammar allows children to learn any language they are exposed to, even if it is very different from their native language.	Noam Chomsky
Empiricist perspective	The mind is a blank slate at birth. Locke believed that children learn everything through their experiences, including language. Children learn language by observing the language that is used around them, and by imitating the sounds and words that they hear.	John Locke
Sociocultural perspective	Children learn through social interaction. Vygotsky believed that children learn language through interactions with more knowledgeable others, such as parents, caregivers, and peers. These interactions provide children with scaffolding, which is support that helps them to learn new things	Lev Vygotsky
Usage-based perspective	Children learn language by analysing the statistical regularities of the language to which they are exposed. Children learn the frequency and distributional patterns of words and phrases, and they use this information to build their linguistic knowledge.	Michael Tomasello
Bronfenbrenner's bioecological perspective	Emphasis is on the importance of considering the multiple levels of influence and ecological systems that shape children's language. The framework has several nested levels (microsystem, mesosystem, exosystem, and macrosystem)	Urie Bronfenbrenner

The evolutionary or practical epistemology in this paradigm acknowledges the importance of culture in the studied context. Hence the tool used in this study was culturally and linguistically adapted before it was applied to observe patterns of Xitsonga language development. The paradigm further concedes that culture and theories evolve with time. This study is framed within Bronfenbrenner's bioecological systems theory. The theory acknowledges variability in children's development and how different predictors, such as age, sex, SES, and context or environment, influence early language development (Bronfenbrenner & Morris, 2007). This theory grounds the study and fits with Xitsonga culture's subscription to the values of Ubuntu. Ubuntu is an African philosophy directly interpreted as "I am because of who we all are" (Mugumbate & Nyanguru, 2013). This phenomenon resonated with the various phases of the study using different participants who brought their particular expertise to the adaptation of the MB-CDI and the understanding of Xitsonga early language acquisition.

The development of the theoretical framework used in this study supports the belief that exposure to a particular language, activities, and education influences a child's culture. This fits with Vygotsky's theory that children learn through direct experiences in their surroundings as they observe people's actions. In addition, these theories drove this study to hypothesise that a child's development is based mainly on social constructivism, in which social interaction with a more competent role model determines development (Berk, 2015; Bronfenbrenner & Morris, 2007; Jaramillo, 1996; Rosa & Tudge, 2013). Theories that underpin the theoretical framework guiding this study are discussed in greater detail below.

2.2.2. Theoretical perspectives of language acquisition

Theories on early language development have been extensively studied by researchers from various disciplines. These theories aim to explain how children learn language, including the cognitive, social, and biological factors that contribute to the process. The theories of language acquisition provide a way for recognising the importance of individual factors (such as age and sex) and environmental factors

(such as where the child learns the language) in the acquisition of a language (Mustafa et al., 2018; Pace et al., 2017; Southwood et al., 2021). Explaining the process of language acquisition in a child's repertoire of communicative skills requires the close observation of simultaneously developing skills that usually come together effortlessly (Bates & Carnevale, 1993; Berk & Winsler, 1995; Bloom et al., 1993; Bruner, 2004; Robinson & Mervis, 1998). Endayani (2019) states that acquiring language is a storyline children pass along to understand the meaning of words and sentences and use them in communication.

Some definitions suggest that the acquisition of language is a process of achieving skills in the mother tongue, where children will acquire their first language because of their innate abilities and the strong influence of the surrounding environment (Chomsky, 2000; Christiansen & Chater, 2016; Rahimpour, 2004). Others consider that language acquisition gradually starts arising from pre-linguistic cognitive achievements (Lyons, 1981). Meanwhile, Clark and Casillas (2015) define language acquisition as a process of language mastery performed by the child naturally when they learn their mother's language. According to Bowerman et al. (2001), pre-linguistic children are busy building up concepts for understanding and interpreting their experiences. Then, as they begin to communicate, they look for linguistic devices (words, inflections, word order patterns, etc.) to express their ideas. In this approach, the initial stages of language acquisition are seen as learning how to translate from one representational system to another.

There is no clear definition of children's language acquisition. Thus, child development theories influence the various practices of enhancing children's development, including language acquisition (Bruner, 2004; John-Steiner & Mahn, 1996; Stuebing et al., 2015). Understanding the mechanisms underlying typical language development is paramount to interrogating the variation within and across early language development (Bates, 2014). The value of linguistic theories rests on the extent to which these theories can accurately describe and explain language use in various contexts (De Bot et al., 2007; Lowie, 2017). Equally, the value of a language acquisition theory focuses on its power to describe and explain language acquisition,

multilingual language use, and language attrition across the lifespan (Ambridge & Lieven, 2011; Dryer, 2008).

2.2.2.1. Generativist and emergentist perspectives in language acquisition

There are two main opposing viewpoints of language acquisition that have traditionally emerged: the generativist and emergentist approaches. The *generativist approach* includes the nativist/universal grammar (UG) approach, and the *emergentist approach* consists of the constructivist approach/socio-pragmatic approach/functionalist approach/usage-based approach (Ambridge & Lieven, 2011; Peccei, 2006; Spelke & Kinzler, 2009; Spencer et al., 2009). Language acquisition is complex; thus, all the theories emphasise different factors that contribute to the acquisition of language.

The generativist approach proposes a substantial amount of inborn capacity for mechanisms in the child's brain to internalise linguistic structures. That is, one is born with an innate ability to internalise the general rules of language from the input. Generativist scholars argue that a child passes through a predetermined sequence of stages at a standard rate dependent on maturational factors and that language acquisition happens within a specific period (Chomsky, 1956; Crain, 2015; De Vos & Pfau, 2015; Grisham-Brown et al., 2009). To support this, Fenson et al. (1994) observed that an average child shows the first signs of word comprehension at around nine months and starts saying their first words at approximately 12 to 13 months. Huttenlocher et al. (1991) considered variation in this process of language acquisition. They found that, in addition to the individual or maturational factors, environmental factors play an important role in vocabulary size and the rate at which a child will acquire language. This approach supports the ecosystem model of learning, described by Bronfenbrenner (Bang & Trampe, 2014; Bronfenbrenner et al., 1986; Lacerda et al., 2004).

The emergentist approach acknowledges that biological factors play a role in the child's language development. However, these theorists view language development

as the result of the child's striving to make sense of the world and extract meaningful patterns, not just about language, but about all aspects of their environment. Language is viewed as a system that emerges through interactions at all levels, from the brain to society. They argue that the emergence of complex language representations develops from exposure to language in various social environments (Ambridge & Lieven, 2011; Bates et al., 1994; Lowie, 2017).

2.2.2.2. Exploring emergentist perspectives in language acquisition

There are five theoretical perspectives that are central to language acquisition. These include behaviourism, nativist/innateness theory, cognitive-development theory, sociocultural/interactionist theory, and ecological systems theory.

This study takes the stance that language acquisition happens in complex relationships and considers the child's interaction with the surrounding environment. There is evidence that daily social interactions and communication with others allow the child to learn a system of language rules that supports the communicative use of language (Bruner, 2004; Guimarães et al., 2013; Smith et al., 2003). To become proficient speakers of a language, children need communicative opportunities and proficient language models (Hoff-Ginsberg, 1994). Longitudinal studies show marked differences in children's rate of vocabulary and grammar acquisition as early as the first year of life. These individual differences are strongly related to children's language environments (Fenson et al., 2000a; Kidd et al., 2018).

MacWhinney (1998) observed that language acquisition research has shown how linguistic form emerges from the operation of self-organising systems. He agreed with Cook and Seidlhofer (1995) and Ellis (1998) and viewed the emergentist framework as an illustration of how the formal structures of language emerge from interacting social patterns, patterns understood in the input, and pressures arising from general aspects of the cognitive system. Emphasis is on the observation of language emergence as gradual, systematic, evolving from gestural/motor roots, showing the biological

evolution of the language acquisition process, and progressing to language use (Bruner, 2004; Ellis, 1998; Lowie, 2017; MacWhinney, 1998; Nelson, 2006).

Interactionists on the other hand stress the importance of the language input children receive from their parents. Interactionism refers to the central role of social interaction in the development of language. Language exists for communication and is learned in interaction with people who want to communicate (John-Steiner & Mahn, 1996). Interactionists such as Jerome Bruner suggest that the language behaviour of adults when talking to children is specially adapted to support the acquisition process. This behaviour is known by several names but most commonly referred to as child-directed speech (CDS). Bruner does not deny a possible biological substratum to language, as suggested by Chomsky's (2014) concept of a Language Acquisition Device (LAD). However, he emphasises an interaction between the LAD and the scaffolding for the child's language learning. Bruner coined the term Language Acquisition Support System, or LASS, in response to Chomsky's LAD (Bruner, 2004; Chomsky, 2015; John-Steiner & Mahn, 1996; Mustafa et al., 2018).

Trevarthen (2015) studied the interaction between parents and their babies who were too young to speak. He concluded that the turn-taking structure of conversation is developed through games and non-verbal communication long before uttering actual words (Feldman, 2007; Reddy, 2009; Trevarthen, 2017). These theories serve as a valuable addition to Chomsky's earlier position, and it seems likely that a child will learn language more quickly with frequent interaction. However, children from all cultures pass through the same stages in acquiring language, even in cultures where adults do not adopt these particular ways of talking to children. Thus, CDS may be helpful but not essential (John-Steiner & Mahn, 1996; Mustafa et al., 2018; Reddy et al., 1997; Trevarthen, 2015).

Vygotsky (1896-1934) believed that child development is based mainly on social constructivism, in which development begins from social interaction with a more competent role model (Amineh & Asl, 2015). This perspective results from the belief that children's exposure to various activities, languages and education influence their

culture. Children learn through direct experiences in their surrounding environment, and they observe the actions of people around them (Berk & Winsler, 1995; Jaramillo, 1996; John-Steiner & Mahn, 1996; Reddy et al., 1997; Winsler, 2003). This theory highlights the notion that the social context strongly influences language learning. Vygotsky regarded language as a critical bridge between the sociocultural world and individual mental functioning. Furthermore, he viewed language acquisition as the most significant milestone in children's cognitive development (Berk & Winsler, 1995; Dunn & Lantolf, 1998; Sarem & Shirzadi, 2014). However, this theory failed to show the different levels of interaction, which led to the bioecological systems theory.

Tomasello (2009) is one of many researchers who believes that the usage-based theory of language acquisition best describes the process of language learning. He supports the perspective that language serves human cognitive and social functions. These usage-based theorists argue that properties related to the form and meaning of language input influence language development (Bybee, 2008; Ellis et al., 2015; Ellis & Wulff, 2020; Nelson, 2006). Many factors contribute to the considerable variation in lexical acquisition among typically developing children. Fenson et al. (1994) and Simonsen et al. (2014) stated that some of these factors are biological, such as sex, whilst Paradis et al. (2011) and Gathercole et al. (2005) consider short-term phonological memory as a factor. In addition, the presence of cross-linguistic and cross-cultural differences in the pace of children's lexical development, and the composition of their lexicons, suggest that linguistic properties and cultural practices impact lexical development (Bassano et al., 2005; Bleses et al., 2018; Eadie et al., 2021; Kuvač-Kraljević et al., 2021; Southwood et al., 2021).

MacWhinney (1998) links the learning of word meaning to more general emerging cognitive abilities rather than postulating a nativist or an empiricist theory. He also supports the notion that grammar emerges from the lexicon. Concurring with Bates and Goodman (1999) and Conboy and Thal (2006), he believes that children's grammatical skills will develop in proportion to their lexical skills. However, Bates et al. (2017), Bleses et al. (2008), and Fenson et al. (1994) do acknowledge that language development is subject to considerable individual variation. Of course, the theories

summarised in this section should not be seen as simple alternatives but rather as each offering a partial explanation of the complex process of language acquisition.

2.2.2.3. Bronfenbrenner's bioecological systems theory and language development

Bronfenbrenner's bioecological system theory supports this belief that language development is subject to individual variations; thus, there should be culturally and linguistically relevant assessment tools appropriate for the child's context. This theory states that children develop "within a complex system of relationships affected by multiple levels of the environment" (Berk, 2022, p. 24; Bronfenbrenner & Morris, 2007). Bronfenbrenner (1999) referred to this as the first period of his theoretical contribution. The second period refers to the bioecological model (Bronfenbrenner & Morris, 2007). However, there is criticism of this model for not emphasising the individual's active role in development. Sometimes, the individual's biological and identifying characteristics, such as age, health, sex, or SES, are considered the unofficial first layer of the nested systems (Berk, 2022; Bronfenbrenner, 1999; Wong, 2001). Figure 5 shows Bronfenbrenner's four systems that influence child development: the microsystem, mesosystem, exosystem, and macrosystem.

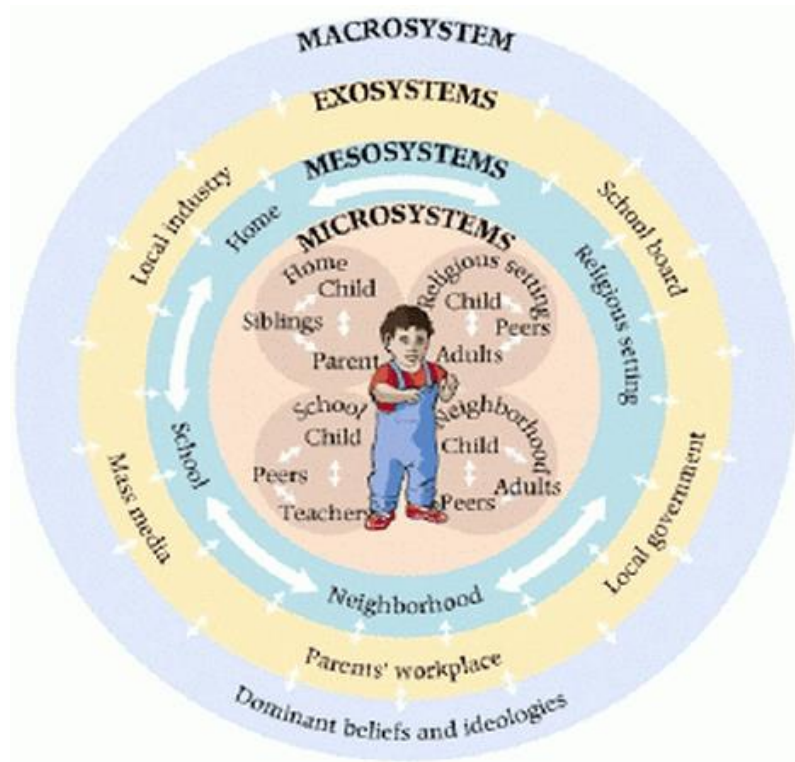


Figure 5: Applying Bronfenbrenner's bioecological model to language learning (Mthimunya, 2019, p. 35)

Roth and Worthington (2019) hypothesised that children are biologically predisposed to learn. This ecosystem model believes the child is at the centre of the learning process. The model argues that biological factors impacting language development include sex, age, and birth order (Bronfenbrenner & Morris, 2007; Rosa & Tudge, 2013). The **microsystem** advocates interaction with the child's immediate environment, including close family members with whom the child spends the most time. It argues that the child's parents, other primary caregivers, and siblings can impact their development. This system suggests that socio-geographic and environmental factors influence language development. These factors include maternal education, rural/urban setting, and even household income (Mustafa et al., 2018; Southwood et al., 2021; Sperry et al., 2019; Vogt et al., 2015). The type of language a child hears in their microsystem is essential because it could affect their language skills. Huttenlocher et al. (2002) found that children who hear more complex language

structures understand and produce more complex structures than those exposed to more superficial structures. Households with more talkers to provide language input may benefit the child's language development (Guimarães et al., 2013; Stolarova et al., 2016).

The **mesosystem** extends the context or setting for language learning to include interactions with other caregivers, childcare programmes, and schools. For example, Hamilton et al. (2000) found that British infants aged 1;0 to 2;1 have lower vocabulary comprehension and production scores than American infants of the same age assessed with a similar instrument (MB-CDI). Similarly, Bornstein and Cote (2005) found that Italian-speaking children in rural Italy had larger vocabularies than Spanish-speaking children in rural Argentina. Hamilton et al. (2000) speculated that the reason for American infants' higher vocabulary scores is because of subtle cultural differences between the UK and US, such as differences between the two populations in the number of children who attend day-care. In this regard, the duration of 2-year-olds' day-care experience correlates positively with their vocabulary size (Stolarova et al., 2016). Hamilton et al. (2000) also suggested that there may be differences regarding the frequency with which British and American parents use the words on the assessment instruments during child-directed speech. This would influence the rate at which children learn these words.

Exosystems are environments that children spend relatively little time in, but which impact their development nonetheless, e.g., parents' workplaces (Bang & Trampe, 2014). Geographic area is a factor influencing the exosystem, outside of the individual's microsystems. Where a child grows up influences the words they are exposed to and the number of words they know (Bornstein et al., 2004a). Finally, the **macrosystem** influences children's development through the values, laws, customs, and resources available for a particular culture (Berk, 2022; Bronfenbrenner et al., 1986; Grisham-Brown et al., 2009). The bioecological system argues that external or independent variables influence language development. However, Whitelaw (2018) mentions that there is no single theory that can fully account for language development. She argues that separate theories may have different roles, such as social

interactionism accounting for children's lexical acquisition and vocabulary production, whilst linguistic determinants influence grammatical acquisition.

Language acquisition theories are a centre from which one can describe and explain language acquisition, language use, and diminishing languages (Lowie, 2017), such as marginalised and diminishing languages like Xitsonga (Nkhwashu, 2010). Cook and Seidlhofer (1995, p. 4) effectively summarise the complexity of language and its influences:

“A genetic inheritance, a mathematical system, a social fact, the expression of individual identity, the expression of cultural identity, the outcome of a dialogic interaction, a social semiotic, the intuitions of native speakers, the sum of attested data, a collection of memorised chunks, a rule-governed discrete combinatory system, or electrical activation in a distributed network.”

The present study looked at vocabulary and grammar development in Xitsonga children between 16 and 32 months. It observed and described the trends and trajectories of early language development in this population. The bioecological system theory of child development acknowledges the role of the individual (age and sex) and environmental factors (SES and geographic area) in language acquisition. However, it adds that children also learn through direct experiences in their environment and observing people's actions. The MB-CDI is based on this view as it uses parental observations to document children's language development and further acknowledges the importance of environmental factors. For example, the parents are requested to give information about the geographic context of the child, the SES and family structures. The recommendation, therefore, is that a cross-cultural adaptation is required before use in a different context.

2.3. Cross-cultural adaptations of language assessment tools

Lack of contextually relevant and culturally appropriate resources when assessing children acquiring indigenous languages of South African, such as Xitsonga, leads to unresponsive clinical training and service delivery in the profession (Khoza-Shangase & Mophosho, 2018, 2021; Mdladlo et al., 2016; Pascoe & Norman, 2011; Pascoe et al., 2013). In addition, the use of directly translated measurement tools may lead to unreliable or misleading results, which could limit the exchange of information in research and clinical practice (Bornman et al., 2010; Hambleton & Zenisky, 2011; Peña, 2007; Rodilla, 2014). Cultural differences, even between individuals speaking the same language in other contexts (e.g., American English vs British English), mean that instruments developed in various languages or cultures should be systematically translated, adapted, and validated for use in the different settings (Boateng et al., 2020; Bornman & Louw, 2021; Guillemin et al., 1993; Hambleton & Zenisky, 2011; Peña, 2007).

An appropriate methodology must be adopted in order to systematically translate, adapt and validate an instrument to reach equivalence between the original and newly adapted versions of a tool (Bornman & Louw, 2021; Cheung et al., 2020; Hambleton & Lee, 2013; Hambleton & Li, 2005; Lenz et al., 2017; Peña, 2007; Sireci et al., 2006). Cross-cultural adaptation has been investigated by social scientists for many decades, but there is still controversy about the optimal scientific approach to achieve effective and valid outcomes (Kim, 1988, 2017). Epstein et al. (2015), Kim (2017) and Guillemin (1995) used a model of cross-cultural adaptation focused on socio-psychological adjustment theory that is cyclical and repetitive, with a range of activities that brings balance in the environment or context. Many studies have examined cross-cultural adaptation from sociological and anthropological views, but the methodologies behind them are like those of adapting any health, psychology or language assessment tool (Hambleton & Lee, 2013; Kim, 2017; Peña, 2007; Ramada-Rodilla et al., 2013). This study adopted the cross-cultural model of adaptation, as explained by Peña (2007), in the following section.

2.3.1. Model of cross-cultural adaptation of a language assessment tool

Language assessment is a critical aspect of SLP research and practice. Thus, it is important to access quality assessment tools that consider the cultural, economic and political context in which they will be used (Ronski et al., 2018; Stobart, 2005). Further, the design and content of assessments must be appropriate for measuring exactly what it claims to measure (Camilli, 2006, 2013; Wilkinson et al., 2018). Internationally, increasing numbers of SLPs have started to share their work of developing speech and language assessment tools that are appropriate for their countries, languages, and dialects (Bornman & Louw, 2021; Bornman et al., 2010; Kunene & Ahmed, 2016; Pascoe & McLeod, 2016; Ronski et al., 2018).

In her review of speech assessments, McLeod (2020) viewed cross-cultural adaptations of instruments as a step toward making assessments in languages other than English more visible to SLPs. The review was motivated by a need: (a) to inform SLPs of resources that may be appropriate for the assessment of children with suspected speech sound disorder who do not speak English or are multilingual, and (b) to answer the call for initiatives to increase the visibility of scientific publications in languages other than English. These were also motivated by the fact that English is not the first language of much of the world's population (Guiberson & Atkins, 2012; McLeod, 2020). In addition, there has been recent criticism that much of the research in human psychology and behaviour comes from Western, Educated, Industrialized, Rich, and Democratic (so called 'WEIRD') societies that are not representative of diverse cultures (Henrich et al., 2010).

Africa is considered the most multilingual region globally, with between 1,250 and 2,100 languages spoken (Heine & Nurse, 2000). Some authors even count over 3 000 languages spoken (Epstein et al., 2015). South Africa registers 12 official languages (Posel & Zeller, 2016), and many more unofficial ones are spoken. As a multilingual, multicultural country, South Africa provides a unique set of challenges for language assessment (Kathard et al., 2011; Khoza-Shangase & Mophosho, 2021; Ronski et al., 2018). First, limited assessment tools are available for the official

languages (Pascoe & Norman, 2011). Second, the number of SLPs in South Africa is estimated at a ratio of 1:25000 (SLPs: SA population) compared with a ratio of approximately 1:2500–2700 in the US, the UK, Canada, and Australia. Third, the number of SLPs who speak multiple languages and assess and provide intervention in two or more languages is even smaller (Kathard & Pillay, 2013; Kathard et al., 2011), although this is changing as the universities make increasingly more concerted efforts to attract students from linguistically diverse groups.

Several reports have appeared in the literature on South African SLPs addressing the challenges presented by language barriers in the clinical context (Kathard et al., 2011; Khoza-Shangase & Mophosho, 2021; Pascoe & Norman, 2011). The translation, adaptation, and development of assessment instruments is critical. Although several authors reported some success in test translation and adaptation (e.g., Barratt et al., 2012; Carter et al., 2005; Pascoe & McLeod, 2016; Ronski et al., 2018; Whitelaw, 2018), it is a complex process with many challenges. Test item translation is not straightforward because of syntactic, semantic, pragmatic, and phonological differences between any two languages. Direct translation may result in items that do not target the same structure or skill as the original language or an item that is not of the same level of difficulty as the original item (McLeod & Verdon, 2014; McLeod et al., 2017; Southwood & Van Dulm, 2015). It is complex to translate an existing assessment tool into a different language for a new context and expect it to yield the same results as the original test (Bornman & Louw, 2021; Bornman et al., 2010; Ronski et al., 2018).

Developing new assessment tools can be time-consuming, expensive, and challenging. Thus, this approach may not be needed if adequate instruments already exist and cross-cultural methods can be used to allow researchers to test, modify, and extend their current development theories (Peña, 2007). In the field of speech-language pathology, rigorous measurement of children's speech and language requires assessment tools to make accurate diagnostic and intervention decisions (Ronski et al., 2018). Tanzer (2005) mentioned two stages of development needed to design an assessment: conceptualisation and operationalisation.

The conceptualisation stage of an assessment tool is the establishment of its purpose and scope. It is the process of stating what the assessment is trying to measure and using this to design the tool's properties and features. Considerations when conceptualising assessments include the purpose, intended population, item content, and scope (McCauley & Strand, 2008; Streiner et al., 2016; Williams & McLeod, 2012). The scope of an assessment includes the type of words included and methods used to elicit target words (Bachman & Palmer, 2022). SLPs must read an assessment manual to determine whether an assessment's original purpose and scope match their intended use (Dubasik & Valdivia, 2021). One should be cautious when using assessments for purposes for which they have not been designed (Peña et al., 2014), for example, assessing a multilingual child using a test designed for monolingual children.

Operationalisation refers to the stage of evaluating and validating the assessment tool to ensure its diagnostic accuracy in meeting its objectives and that these results are stable when used by different people over time (Bachman & Palmer, 2022; Ronski et al., 2018). This measure is apparent in many commercially available standardised assessment tools that provide consistent test materials, procedures for test administration, and scoring rules (Duran et al., 2006). Ronski et al. (2018) explain that an essential stage in the design or development of an assessment tool is to determine validity (concurrent, construct, predictive, content) and reliability (internal consistency, test-retest reliability, intra- and interrater reliability). There are several approaches to validating a measuring instrument (Bornman & Louw, 2021; Bornman et al., 2010; Guillemin et al., 1993; Hambleton & Lee, 2013; Kim, 1988; Peña, 2007; Ramada-Rodilla et al., 2013). Therefore, it is crucial to carefully conceptualise and operationalise an assessment tool in order to ensure its reliability and validity as a diagnostic tool.

2.3.2. Validity and reliability of assessments

Validating an assessment tool is a complex process, in which there is a need to construct a base of evidence to support the instrument's reliability. Evidence about

the presence or absence of these criteria will enable understanding of the degree of quality of the tool for a specific purpose. Hence, the methodology used to carry out validation is critical in determining whether a measurement instrument be accepted or rejected (Dubasik & Valdivia, 2021; McLeod & Verdon, 2014; Ramada-Rodilla et al., 2013; Ronski et al., 2018). Bornman et al. (2010) and Peña (2007) reported that conceptualisation and operationalisation are not the only critical issues in translation and validation of an assessment tool. Bias is also a distinct threat to validity in cross-cultural research. The literature on bias in test development provides a valuable framework for discussion of linguistically appropriate research methods. An important principle for such a discussion is the notion of fairness in test development (Bornman et al., 2010; Camilli, 2013). Fairness in testing is closely related to testing validity. The test should measure its target (e.g., children's language comprehension) with appropriate testing conditions and content, avoiding stereotypes, culturally offensive material, and other negative implications. The evaluation of fairness requires a broad range of evidence that includes empirical data that may consist of legal, ethical, political, philosophical, and economic reasoning (Camilli, 2006, 2013).

There are two categories of fairness: individual and group fairness. Individual fairness requires standardised conditions of testing in which the treatment of clients is comparable. 'Comparable' in this case means that conditions should be adjusted to allow all individuals taking the test to show their full capability in their performance (Kunnan, 2000; Wilkinson et al., 2018). In an educational setting, for example, one learner may have dyslexia and another may be a second language learner. The learner with dyslexia may need additional time to complete the assessment, while the student learning in their non-native language may need an interpreter to understand the assessment fully. Thus, in this case, no individual student is favoured over another in demonstrating what they know or understand. Instead, test takers are treated with dignity. Furthermore, the review of the test (i.e., the process of screening items for negative social content) is sensitively managed. The screening avoids problems that potentially can lead to statistical bias and faulty interpretation of test scores (Camilli, 2006, 2013; Duran et al., 2006; Kunnan, 2000).

What is considered fair in one community may be quite different from fairness in another community. The diverse community norms, standards, and practices make this inevitable (Wilkinson et al., 2018). Group fairness is challenging to define clearly because the term ‘group’ can be applied in many different ways. Thus, specific definitions of groups are needed for the situation in which two groups are to be compared (Camilli, 2006, 2013; Millsap & Everson, 1993; Stobart, 2005). In typical fairness analysis, the first step is defining groups and then identifying and listing the differences between the groups. Next, there is a need to identify the impact of the assessment and avoid bias of the tool used to measure the group’s ability to perform the task at hand (Camilli, 2006, 2013; Reynolds et al., 2021). Ultimately, it is crucial to consider bias when making cross-cultural adaptations of instruments used for different groups.

Various forms of bias merit our attention and consideration in any research endeavor. Item bias occurs when the meaning of one or more items differs across cultures. Cultural bias is when, for example, tests designed to assess communicative progress in a specific language examine how much the speaker knows about objects only experienced by English speakers living in a well-resourced culture (Djiwandono, 2006). Assessments that uncover “differences in background and experience, rather than basic psycholinguistic deficiencies” may be the consequence (Campbell et al., 1997, p. 523). Bias exists in all research designs and is challenging to eliminate. It may occur at any stage of the research process and impact the validity and reliability of a study. When looking at test bias, there are three approaches to research: predictive validity on selection, investigating external biasing factors, and construct or content validity (Harzing et al., 2009; Reynolds et al., 2021; Shepard et al., 1984; Smith & Noble, 2014). These approaches are useful when looking at item-bias methods and statistical procedures intended to test whether items function equivalently in two groups (Harzing et al., 2009; Reynolds et al., 2021; Shepard et al., 1984; Smith & Noble, 2014).

The World Health Organisation (WHO) Guidelines on Translation (2022) suggest that the method used to translate test instruments into a language other than English need to be detailed. Nevertheless, the mere translation of elicitation

procedures and instrumentation is insufficient to guard against potential cultural bias and, therefore, poses validity threats (Bornman et al., 2010; Peña, 2007). Principles of equal treatment and comparable opportunity should be applied to the development of cross-cultural methods. Instructions and tests used across languages need to be equivalent to provide equal opportunity to demonstrate the skill under study (Bornman et al., 2010; Peña, 2007; Shepard et al., 1984).

Baker (2005) cites translation and interpretation as tools for addressing narrative difficulties. Given that this subject is concerned with building a social reality, translation plays an essential role in social identity. She also claims that the unavailability of specific phrases forces participants to limit their linguistic ability. These limitations lead to a compromise and hence deviate from the intended meaning. Mdlalo et al. (2019) argue that in translation, an interpretation of a concept or a word is influenced by factors such as the speaker's frame of reference, worldview, and even culture. They gave an example of using and adapting the Renfrew Action Picture Test to isiZulu. Picture card 8 provides an example where the term [ladder] is utilised. Despite its literal meaning being '*ileli*', in everyday usage, it is frequently used interchangeably with '*amastepisi*' [steps]. An SLP without knowledge of this context might consider the use of "steps" incorrect.

Cronin (2006, p. 97) defines zero equivalence as "the refusal to translate", where translation would force target languages to conform to the source language's culture and aesthetic values. For example, Pascoe and McLeod (2016) reported that cultural differences were one of the conceptual challenges in translating the Intelligibility in Context Scale. They found that the concept of varying degrees of closeness in the family circle ('immediate family' and 'extended family') differed in the South African indigenous cultures making it difficult to translate in an equivalent way. A critical methodological goal is to aim for equivalence at the contextual level and give equal opportunities when designing cross-cultural research studies of child development. Equivalence may be at the level of the item used to explore similarities and differences in the response, or at the level of the outcome for understanding differences in circumstances bringing specific developmental results (Arnold & Matus, 2000;

American Educational Research Association, 2014; Bracken & Barona, 1991; Geisinger, 1994; Rogers et al., 2003). In Figure 6, four conceptual and methodological issues are considered for maintaining content validity in translations.

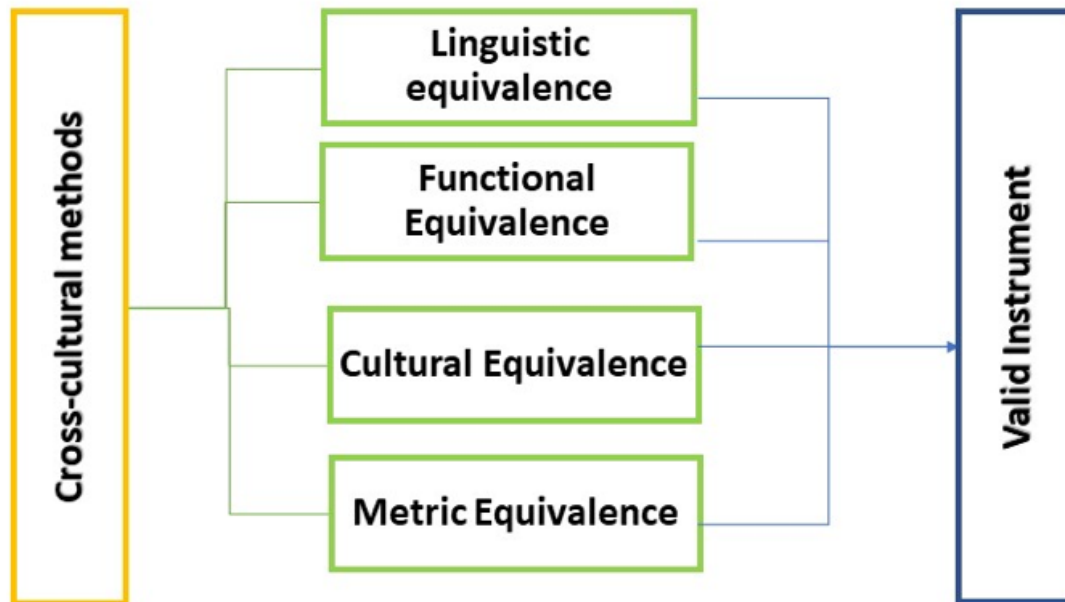


Figure 6: Cross-cultural methods in instrument development (based on Peña, 2007)

Peña (2007) refers to linguistic equivalence as translating instructions and instruments; and checking the translation with methods such as back-translation. This is translation from the first language to the second, and then back to the first by another person (American Educational Research Association, 2014) or expert reviewer (Bornman et al., 2010; Hambleton & Lee, 2013). This process ensures that both versions' words and linguistic meaning are the same (Grisay, 2003; Sireci et al., 2006). Even though the words may be the same across two sets of methods, potential differences may result in varied patterns of reactions, i.e., even the identical stimulus may result in different outcomes (Mabunda, 2013). Noting that Xitsonga is a tonal language, some words may be written the same but pronounced differently and mean different things. For example, the term "*mangwa*" found in the MB-CDI, can mean a [zebra] (animal) or a [mango] (fruit).

Jacobson in Weissbort and Eysteinsson (2006, p.330) argued that some terms are “untranslatable”, yet he believes in the certainty of “creative transposition”. He highlights that the impact of translation depends on how the audience interprets the words. A person may interpret a word using another word from the same language (intralingual translation) or interpret a word using words from another language (interlingual and intersemiotic translation). He argues that there is a lack of complete equivalence between code-switching. For example, English terms, such as “*skirt*” and “*samp*”, are not entirely synonymous with Xitsonga terms “*ndhindani*” and “*xiendlahivomu*” (Mabunda, 2013; Weissbort & Eysteinsson, 2006). The effect of substituting synonyms or circumlocution for equivalent words is highly noticeable in both Xitsonga and English. This lack of complete equivalence is a problem with linguistic equivalence. According to Beaton et al. (2000), discrepancies in response patterns may be attributable to differences in cultural interpretation, familiarity, or frequency of occurrence (Bornman & Louw, 2021; Bornman et al., 2010; Peña, 2007). For example, if the goal of a translated instrument is to assess a child’s developmental status, linguistic equivalence may cause bias if functional, cultural, and metric equivalence are not taken into account (Peña, 2007).

Functional equivalence means that the instructions and instrument will elicit the same target behaviour (Greenfield et al., 2006). Rogler (1999) and Peña (2007) argued that preserving the language used in the original language version, or linguistic equivalence, is a potential source of cultural insensitivity if the translation yields functional differences. In other words, translation from one language to another can result in incongruity in meaning, threatening the content validity of a study’s methods. For example, in Xitsonga, the word ‘vagina’ is vulgar and will not be used by a child, so different communities and families will use another, more polite term. Functional equivalence addresses some of these threats by ensuring that the instrument and elicitation method examines the same construct.

There are two known translation methods to equalise concepts or function over linguistic equivalence: the decentering and dual-focus methods. Professional translators often use decentering to obtain equivalence in meaning and salience

concerning the respondent, combined with the translation/back-translation approach. This procedure may yield an instrument with translated items that have shifted away from the source instrument's wording to represent the concept in a linguistically familiar way in the target language (Beaton et al., 2000; Bornman et al., 2010; Peña, 2007). In dual focussing, the research team is drawn from both cultural and linguistic groups under study. The instrumentation and instructions used in the research study are developed simultaneously in the two languages. Linguistically appropriate methods for each target group focus on equality in clarity (rather than linguistic equivalence). Thus, instruments are parallel concerning the behaviour or concepts tested but with different stimuli (Peña, 2007).

Attention to functional equivalence allows children to demonstrate their knowledge in an elicitation context familiar in each language. For example, statistical analysis in a study by Fagundes and colleagues indicated similar performance in each language for monolingual and bilingual children (Fagundes et al., 1998; Peña, 2001; Peña, 2007). A bilingual child can respond, for instance, to a word in either of the languages spoken. If the target word is donkey, a child may say "*mbhongolo*", which means donkey in Xitsonga, or "*donki*", the borrowed word from English. Either response is correct. Therefore, the word is functionally equivalent, though linguistically different.

Cultural equivalence considers how respondents interpret a given direction or test item and develops items that tap the same cultural meaning for each cultural-linguistic group (Alonso et al., 1998; Boateng et al., 2020; Peña, 2007). In their study, Van Der Veer et al. (2003) pointed out that items may have different salience for different cultural and linguistic groups, even if they meet linguistic and functional equivalence criteria. Disparities in salience may be due to the distinct cultural and historical ways in which respondents interpret concepts (Boateng et al., 2020; Bornman & Louw, 2021; Pascoe & McLeod, 2016). Therefore, cultural equivalence regarding respondents' interpretations and responses to given items needs to be explored when developing methods and procedures. Cultural equivalence is related to functional equivalence (Alonso et al., 1998; Arnold & Matus, 2000; Peña, 2007).

When it comes to cultural equivalence, the emphasis is mainly on how people of different cultural and linguistic groups perceive or interpret the underlying meaning of a particular word (Pascoe & McLeod, 2016). It is possible that cultural interpretations will influence how individuals respond to research instruments, such as standardised and non-standardised tests, even when given instructions (Bornman & Louw, 2021; Canino & Guarnaccia, 1997).

For ability tests, metric equivalence is concerned with the difficulty of a specific item expressed in two languages (Boateng et al., 2020; Caselli et al., 1999; Kim, 2017). According to Peña (2007), metric equivalence is when an item or question is equally difficult for the two items or questions. If one wants to make cross-cultural modifications of instruments in more than one language or translate from one language to another, this equivalence is essential. An overview of the strategies used to adapt and develop vocabulary tests from English to other languages demonstrates the methodological challenges that have been faced in the field (Bornman & Louw, 2021; Caselli et al., 1999; Caselli et al., 1995; Fenson et al., 1994).

Linguistic equivalence can lead to cultural insensitivity if the translation yields functional disparities. Differences in response patterns may be due to cultural interpretation, familiarity, or frequency of use (Pascoe & McLeod, 2016). For the same behaviour or concept, multiple stimuli are used (Cheung et al., 2020; Peña, 2007). The concept of functional equivalence ensures that the instrument and elicitation procedure study the same construct. Using cultural equivalence, researchers create items that tap the same cultural meaning for each cultural-linguistic group. Even items that match linguistic and functional equivalence criteria can have varied salience for different cultural and linguistic groups. Disparities in salience may be attributable to respondents' cultural and historical interpretations of concepts.

2.4. A comprehensive tool for assessing early language development across languages and cultures

To effectively study and understand language development in young children, researchers and clinicians depend on reliable assessment tools. A tool that has gained widespread recognition and usage is the MB-CDI.

2.4.1. MacArthur-Bates Communicative Development Inventory

MacArthur-Bates Communicative Development Inventories (MB-CDIs) are widely researched parent-report tools used in this study. MB-CDIs capture essential information about children's developing abilities in early language, including vocabulary comprehension, production, gestures, and grammar (Fenson et al., 1994; Fenson et al., 2007). For example, Skarakis-Doyle et al. (2009) conducted a study to test the level of accuracy with which the MB-CDI can determine whether American English-speaking children present with language impairment. They found that the MB-CDI could classify English-speaking children into language status groups with an overall accuracy level of 96.6%. Bleses et al. (2018) noted that the differences in age of language acquisition across words could serve as a natural laboratory for studying various factors' influence, including the nature of linguistic input and features inherent in the words. The use of the MB-CDI in language development research has proved reliable across many languages (Fenson, 2002; Fenson et al., 1994; Fenson et al., 2007) and it is considered a robust measure for research and clinical practice with young children and their families (Bates et al., 2017; Bates et al., 1994).

The MB-CDI was created by Bates and colleagues in 1977, then standardised by Fenson and colleagues in 1994 (Fenson et al., 1994). It is a normed parent-report checklist that describes semantic and grammatical development in typically developing children and was initially designed for American English-speaking children aged 8 to 30 months (Bates et al., 1994; Dale et al., 1989; Dale & Penfold, 2011). It evaluates children's verbal and non-verbal communicative abilities. In addition, it focuses on assessing linguistic skills such as gesture development, vocabulary and grammar in infants (8 to 18 months) and toddlers (16 to 30 months) (Camaioni et al.,

1991; Duyme et al., 2011; Fenson et al., 2007). Its purpose is to identify children who are at risk of developmental language delay or difficulties, monitor the effectiveness of intervention, establish the readiness of young children to participate in educational programmes, and assess the language skills of children above the age limit for which the MB-CDI was intended (Bleses et al., 2018; Fenson et al., 1994; Heilmann et al., 2005; Skarakis-Doyle et al., 2009).

2.4.2. Addressing linguistic diversity: challenges and opportunities in adapting the MB-CDI for language assessment in underrepresented contexts

The MB-CDI web page lists approximately 109 languages, including separate versions for sufficiently different dialects to merit alternate instruments (CDI Advisory Board, 2015). Typically, these adaptations are developed for languages spoken in large, industrialised communities, such as American English (Fenson et al., 1994), German (Szagun et al., 2006), Cantonese and Mandarin (Tardif et al., 2009), Mexican Spanish (Jackson-Maldonado et al., 1993), European Portuguese (Frota et al., 2016) and Swedish (Eriksson & Berglund, 1999). Out of approximately three thousand languages spoken on the African continent, there are few documented adaptations of the MB-CDI. These include adaptations for Changana, Rhonga and Portuguese spoken in Mozambique (Vogt et al., 2015), Kiswahili and Kigirima in Kenya (Alcock et al., 2015), Chichewa/Nyanja and Chiyao in Malawi; Krobo, Ewe and Twi in Ghana (Prado et al., 2018), and isiXhosa in South Africa (Whitelaw, 2018). These studies acknowledge that adapting the English version by translating culturally appropriate words and replacing culturally inappropriate words is the most effective and relatively cost-effective alternative of developing an instrument to assess early language development (Alcock et al., 2015; Prado et al., 2018; Vogt et al., 2015; Whitelaw, 2018). Table 3 summarises some of the recent African CDI studies.

Table 3: Examples of MB-CDI adaptations for African languages

Author(s)	Topic	Language	Findings	Country where study was done
Alcock et al., 2015	Developmental inventories using illiterate parents as informants: Communicative development inventories (CDI) adaptation for two Kenyan languages.	Kiswahili and Kigirima	Reliability and validity ranged from acceptable to excellent, supporting the use of CDIs when direct language testing is impractical, even when children have parents from different backgrounds and where respondents have low literacy levels.	Kenya
Vogt et al., 2015	Early vocabulary development in rural and urban Mozambique	Changana, Rhonga, and Portuguese (Mozambique)	The adapted CDI short form has proven to be a useful instrument to assess vocabulary among Mozambican children between 12 and 25 months of age.	Mozambique
Prado et al., 2018	A method to develop vocabulary checklists in new languages and their validity to assess early language development.	Chichewa and Chiyao (Malawi) and Krobo, Ewe, Twi, and English (in Ghana).	The findings show that adapting the CDI to a new context using the cross-linguistic and cross-cultural adaptation method resulted in a tool that was comparable in validity to the tool in its original context.	Malawi
Weber et al., 2018	Validity of caregiver-report measures of language skill for Wolof-learning infants	Wolof-speaking villages in rural Senegal	The caregiver-report method offers a valid alternative to more costly tools, such as direct behavioural assessments or language sampling, for measuring early language	Senegal

	and toddlers living in rural African villages.		development in illiterate, rural African communities.	
Whitelaw, 2018	Towards the development of an isiXhosa adaptation of the MB-CDI for toddlers.	isiXhosa	Findings suggest that grammatical acquisition in isiXhosa is likely to occur earlier than other African languages	South Africa
Yalala, 2021	Language acquisition in Setswana-speaking infants aged 8 to 18 months.	Setswana	The findings show that language acquisition in Setswana follows similar trends to other languages. However, Setswana-speaking children have different early vocabulary word types.	Botswana

Vogt et al. (2015) acknowledge that their study had limitations due to time and financial constraints. In their research, the adaptation was developed using the short version of the MB-CDI rather than the more extended version. In addition, they did not consider the list of words provided by caregivers after the interviews. Therefore, their word list may not have fully reflected typical children's vocabulary in the Mozambican context. Prado et al. (2018), guided by the categories of items in the English MB-CDI, included the words from the caregivers' interviews (and children's use of them), arguing that this approach reduced item bias. Alcock and colleagues (2015) used the more extended version of the Kigirama and Kiswahili MB-CDIs to generate the shorter forms. They also found that asking mothers to create a list of words understood or said by their child was challenging. These findings agree with Fenson et al. (1994) who state that parent recognition of what the child can say or understand is more accurate than when the parent recalls or generates the list (Alcock et al., 2015).

2.4.3. Exploring the reliability and limitation of MB-CDI: adapting an international standardised test for language assessment in the South African context

Frank et al. (2016) concur with other scholars that standardisation of parent reports using the MB-CDI contributes to the availability of large databases in a similar format. However, the parent-report approach has considerable limitations (Feldman et al., 2000; Tomasello & Mervis, 1994). They reported that parents might be biased observers, i.e., some may overestimate their children's abilities, while others are more likely to underestimate them. Some variability may be related to reporting biases associated with factors such as SES (Fenson et al., 2000a, Fenson et al., 2000b). Parent reports of comprehension for younger children are likely to be biased and will usually be significantly more accurate when it comes to content terms than function words. Fenson et al. (1994) stated that the items on the original MB-CDI were chosen to be a representative sample of lexical items for the appropriate age and language, not to be a complete set of words that could be compared across instruments. Although the length (630 items) of the MB-CDI may create the impression that it produces an

estimate of the child's complete vocabulary, in reality, it is likely to underestimate the size of a child's vocabulary significantly, particularly for older children (Mayor & Plunkett, 2011).

Despite these limitations, MB-CDIs are valuable tools when used correctly. A growing body of research demonstrates that individual item-level answers can reveal fascinating new insights, for example, about the growth patterns of semantic networks (Ciaglia et al., 2023; Hills et al., 2010), and effectively identify children needing language support or intervention. However, there has been relatively little research in the field of speech and language therapy on adapting international standardised tests for the South African context. There is a great need to develop the knowledge of children's typical and atypical development in the South African context. Having normative data allows both for planning interventions for children with delayed or impaired language and for effective language teaching and learning (Kathard et al., 2011; Pascoe & Smouse, 2012; Scholtz et al., 2021).

2.5. Stages, trajectories and predictors of language development: understanding the pathway of language acquisition

The importance of early identification of language impairments was introduced in Chapter 1. This study employed the pragmatic paradigm, arguing that language arises because there is a need to communicate in the world. Craig (2016) argues that the pragmatic and social constructionist perspective acknowledges the role of social context, cultural influence and interpersonal relationships. It emphasises the importance of understanding communicative interaction with others. Sending and receiving messages are two aspects of communication. Though communication is not confined to humans, the fact that humans employ it in the form of a language is a considerable difference between humans and other creatures. According to Bloom (1998, p. 2), language is "a code in which thoughts about the world are represented through a standard system of arbitrary signals for communicating ideas about the world." This definition suggests that the traditional system of arbitrary signals

(sometimes referred to as coded symbols) is used to refer to real things, concepts or ideas. If the code is meaningful, the referents and symbols that represent them must be agreed upon mutually by the community members using it (Bloom, 2000; Reed, 1995; Tomasello, 2009).

Coded symbols are governed by rules that control the combination of symbols, the diversity of methods or sequences in which symbols are employed, the symbols used, and the conditions in which they are used. These principles or regularities are predictable and can be used to distinguish between what is and is not acceptable usage of language in certain situations (Reed, 2005). These coded symbols include language, speech, and nonverbal such as hand gestures, changes in loudness and pitch, and other extralinguistic communication. As indicated in Figure 7, these zones are interconnected and comprise what is referred to as communication.

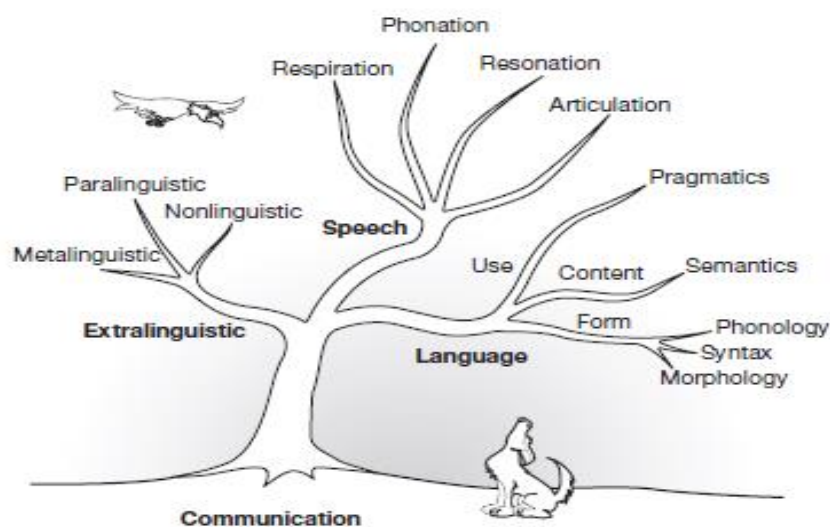


Figure 7: Components of communication (adapted from Reed, 2005, p. 7)

2.5.1. Stages of language development

Infants have an accelerated drive to learn a language. By age three or four, a child has essentially become competent in their native language (MacWhinney, 2005). While refining linguistic abilities continues, the acquisition of all the requirements for processing and performing speech skills can be observed (Brandt et al., 2012;

Łuniewska et al., 2019; MacWhinney, 1998). In most cases, language is effectively mastered with ease and speed, despite the complexity of the task. To date, the available literature on early language acquisition has confirmed, through the study of many languages from different language typologies, that certain stages of language acquisition are universal (Caselli et al., 2012; Demuth, 2003; Fenson et al., 1994). Table 4 outlines these stages.

Table 4: Stages of language development

Age	Language development stages	References
0-3 months	Crying, cooing, and gurgling sounds	Gleason & Ratner, 2022
4-6 months	Babbling, repeating sounds and using intonation	Gleason & Ratner, 2022; Paul & Norbury, 2012
7-12 months	First words, using gestures, and understanding simple instructions	Gleason & Ratner, 2022; Paul & Norbury, 2012
1-2 years	Vocabulary growth, two-word phrases, and beginning to form sentences	Fenson et al., 1994; Gleason & Ratner, 2022; Paul & Norbury, 2012
2-3 years	Sentence formation, use of plurals, pronouns, and asking questions	Paul & Norbury, 2012
3-4 years	Storytelling, use of prepositions, and understanding complex sentences	Paul & Norbury, 2012; Snow et al., 2021.
4-5 years	Advanced grammar, using conjunctions and adverbs, and reading skills	Gleason & Ratner, 2022; Tomblin et al., 1997

The stages listed in Table 4 make no mention of tone acquisition, which is important in the African indigenous languages. Hence, Alcock and Alibhai (2013) argued that children's learning of their native language is radically different depending on the language itself. Many African languages are tonal languages; thus, tone acquisition is crucial when looking at language acquisition. The tone indicates lexical or grammatical distinctions (Alcock & Alibhai, 2013; Demuth, 2003). Thus, even though tone is not crucial to languages such as English, a child needs to understand the different tones in a language such as Xitsonga.

Lerner and Damon (2006) believe that all developmental theorists acknowledge that humans and other living beings have a neural network guiding their development. These can be described over many levels of organisation, from the molecular and cellular, through the complex level of neural activity and behaviour, and extending to nested relationships with the social and physical environments (Bronfenbrenner et al., 1986). The theoretical framework in this study highlights that no single theory can fully explain language development. This is why Bavin (2009) argued that an extensive portion of what is known about language acquisition has been built on specific structures renowned in well-studied and documented European languages. However, well-documented information about how other languages, such as Xitsonga, are acquired does not exist. The findings of this study will assist in understanding the language development of Xitsonga and the differences and similarities with already well-documented languages.

2.5.2. Trajectories of language development

MacWhinney (1998) documented that the early stage of language development begins with the emergence of auditory patterns and the perceptual and motor phase. At this stage, children start to recognise different sounds and visuals, and respond in expected ways, e.g., beginning to smile when seeing a familiar face, cooing in response to child-directed speech (CDS), and even trying to imitate speech sounds through babbling (DeCasper & Fifer, 1980; Lowie, 2017; MacWhinney, 1998; Moon et al., 1993). For babbling to occur, MacWhinney (1998, p. 203) introduced what he termed “the emergence of articulatory patterns”. The emergence of articulatory patterns is developing in this phase and does not necessarily precede or have any association with the emergence of auditory patterns. The child starts vocalizing immediately after birth, including crying to communicate their emotional state (MacWhinney, 1998).

Some researchers have argued for a disconnection between auditory input and motor output because Deaf children are believed to start babbling even when their auditory pattern has not developed. Other studies have observed that Deaf babies lack canonical babbling patterns at an average of seven months compared with their

hearing peers; instead, they are observed to ‘babble’ with their hands by making rhythmic hand movements. Producing canonical syllables is a foundation for creating meaningful speech sounds (Eilers et al., 1993; Lee et al., 2018; Petitto & Marentette, 1991). At this stage, typically developing infants will start using the phonemes from their native languages selectively. Consonants and vowels are introduced, and a child now correlates words with objects or people, starting to use words with repetitive sounds like “dada” and “mama”.

Lexical development concerns children’s first steps in building a vocabulary, how children of different ages assign meanings to words, and how they change in response to various experiences (Merriman, 1986). Stoel-Gammon (2011) reported that, for English-speaking children, the first words typically consist primarily of common nouns and short consonant-vowel words that are acquired in the earlier stages of phonological development, such as ‘hi’, ‘no’, or ‘dada’. The critical stages of early language development form the foundation of further language acquisition and communicative functioning (Merriman et al., 1989). The studies reviewed for this chapter focused on the quantitative growth of early receptive and expressive vocabulary. Łuniewska et al. (2016) reported that the order of word learning was similar across the 25 languages in their study. They found some differences in the age of acquisition of words; however, their findings support the statement by Clark and Casillas (2015) regarding a universal pattern in early language development across languages.

2.5.2.1. Word comprehension

MacWhinney (1998) then introduced the emergence of the first words or early lexicon development. He argued that in some languages, nominal words have to be in all clauses. Therefore, nouns are more prominent in the speech stream. In other languages, it is possible to use clauses that consist of verbs only. He agreed with Reed (2005) that word learning depends on the child’s ability to understand what constitutes a possible word and that words do not change over time. To explain this word-learning process, Golinkoff et al. (1994) stated that the child’s understanding of

word meaning depends on lexical principles, i.e., emergent properties of a cognitive system. This word learning does not happen in isolation but is facilitated by mother-child interaction or adult-child interaction (explained in section 2.5.3.5) (Ambridge & Lieven, 2011; Tomasello, 1995). Urm and Tulviste (2016) also noted that the richness of a language's morphology will impact the rate of language development. Research has proved that aspects of word meaning are acquired from individual words without a syntactic context. Other elements of definition require close attention to how words are combined (Caselli et al., 2012; Darinka et al., 2017; Urm & Tulviste, 2016).

Stolarova et al. (2016) state that complex interactions of biological, socioeconomic, and learning factors influence word learning and affect the quantity and quality of the child's language input. Ebert and Greenberg (2013) and Rodriguez and Tamis-LeMonda (2011) agree that environmental characteristics influence early vocabulary development. The factors may include SES, sex, and type and duration of day care. Tomasello (2003) argued that children acquire words belonging to different semantic categories of adult language from early on. However, some authors believe that nouns are acquired more readily than verbs or other word types in different languages (Bornstein et al., 2004b; Gentner & Boroditsky, 2001; Yurovsky, 2018). Children from different cultural and linguistic backgrounds show the first signs of word comprehension at the end of their first year, and receptive lexicon is acquired rapidly after that (Alcock et al., 2015; Bates & Carnevale, 1993; Nelson, 1973; Vogt et al., 2015).

Languages differ in the way nouns and verbs are used. In some languages, nominal words must be in all clauses, and therefore nouns are more prominent in the speech stream. In contrast, in other languages, it is possible to use clauses that consist of verbs only (Alcock et al., 2015; Bates et al., 1994; Bleses et al., 2008). Gentner and Boroditsky (2001) explained noun dominance in early lexical acquisition by hypothesising that nouns are acquired earlier than verbs because they refer to concrete objects. Thus, the mapping between language and the conceptual world is more transparent in nouns than in verbs which refer to more abstract actions and events. Gentner and Boroditsky (2001) put forth a hypothesis that different words have

different ways of acquiring meaning from context. More specifically, they proposed that some words tend to refer to entities in the physical world, while others refer to the linguistic relationships between those entities. To put it another way, certain words primarily convey concrete referential meaning, while others mainly convey abstract relational meaning. For instance, words like [table,] [dog,] and [tree] are used typically to refer to physical entities in the world, whereas words like [because,] [although,] and [before] indicate relationships between entities or events in a sentence. These relational words are less tied to specific referents in the world and instead convey information about how parts of a sentence relate to each other.

While some theories propose that the early development of nouns is linked to significant cognitive changes and advancements in object concepts, a critical analysis of the available literature suggests that the evidence supporting these claims is not entirely conclusive. According to Gentner and Boroditsky's (2001) hypothesis, this difference in the way that words take their meaning from context has implications for how people understand language and how they use it in communication. For example, people may rely more on relational words when constructing complex sentences or when discussing abstract concepts while relying more on referential words when discussing concrete objects and events in the world. Overall, the hypothesis suggests that the way that words acquire meaning from context is an important aspect of language comprehension and production (Alcock, 2017; Bassano, 2000; Caselli et al., 2012; Gentner & Boroditsky, 2001). The primary function of nouns and other open-class words (e.g., nouns, verbs, adjectives) is to represent perceived objects in the world.

In contrast, relational words such as closed-class words (e.g., pronouns, prepositions and determiners) take their meaning from the linguistic connections among the referential words. They are thus described as more linguistically dominant than nouns (Gentner & Boroditsky, 2001). Verbs are in the middle of this continuum. Although they refer to the context, they also rely on their arguments to denote their meaning (Alcock, 2017; Bassano, 2000; Gonasillan et al., 2013; Jørgensen et al., 2010). Fenson et al. (1994) found that in their study on American English, most of the items

in the MB-CDI “*games and routines*” category appear on the list of the first 50 words comprehended by at least 50% of the infants, making this category the most frequent contributor to early vocabulary. There were also 5 items in the “*people*” category, including the three words claimed to be the most frequently recognised at 8 months (‘mommy’, ‘daddy’, and the child’s own name), likewise the most widely known at 12 months. Bates et al. (1994) remarked that vocabulary composition has stylistic and developmental aspects. Research on vocabulary composition has identified various word types, including common nouns, verbs, adjectives, adverbs, function words, and other linguistic elements.

The majority of the other early appearing words in infants’ receptive vocabularies refer to well-known objects, such as minor household items, toys, articles of clothing, animals, and body parts. Researchers analysed data from over 1800 children acquiring English between 8 and 30 months using the MB-CDI (Fenson et al., 1994). They reported the mean size of the receptive lexicon was 36 (median 17) words at 8 months, 67 (median 41) words at 10 months, and 191 (median 169) words at 16 months. Vogt et al. (2015) found that at 12 months, children comprehended around 45 words and that, in contrast to receptive vocabulary, expressive vocabulary developed gradually from 14 months onwards, reaching 80 words at 25 months. The results of this study done in Ronga, Changana and Mozambican Portuguese show that the reported receptive vocabulary tends to be larger in the rural population than in the urban community.

An alternative hypothesis in the critical discussion of the vocabulary ‘spurt’ was introduced by McMurray (2007). McMurray argued that a vocabulary ‘spurt’ is inevitable based on two reasonable assumptions: (i) words are learned in parallel, and (ii) some words are easier to learn than others. He suggested that the distribution of word difficulty arises from various factors such as frequency, phonology, syntax, the child’s capabilities, and contextual cues. This hypothesis by McMurray offers a different perspective on the vocabulary ‘spurt’, emphasising the role of statistical learning and word difficulty rather than specific cognitive changes or object concepts.

2.5.2.2. Word production

Production of first ‘proper’ words typically begins between 11-13 months (Barrett, 1995; Bates et al., 1994). Authors concur that word production starts at a slow pace and rapidly increases so that, on average, children can produce 300 words by the time they are twenty-four months of age (Caselli et al., 2012; Fenson et al., 1994; Fenson et al., 2007). Early productive vocabulary often consists mostly of nouns, a finding true for many of the languages investigated so far (Bornstein et al., 2004b). However, Childers et al. (2007) discovered that in Ngas-speaking children (Nigeria), verbs predominated in early vocabulary, and hypothesised that this finding might be influenced by linguistic characteristics or cultural factors of child upbringing. Alcock (2017) discovered that nouns largely dominated vocabulary production, whereas verb and noun comprehension were similar in the Kigirama and Swahili-speaking cultural context in Kenya. The use of a different vocabulary checklist by Childers et al. (2007) may be a possible cause of the discrepancy: the checklist lacked sound effects (usually counted as nouns by researchers). Therefore, Alcock (2017) noted that it might be challenging to ascertain Childers and colleagues’ claim demonstrating a different pattern of vocabulary acquisition in Ngas compared to other languages.

The initial biases in children’s early word learning have the potential to provide insights into their inherent conceptual and perceptual predispositions during language acquisition. Exploring the variations in these biases can help us understand how formal language features and sociocultural factors influence early vocabulary development (Tardif et al., 1999). The claim that young children have a greater propensity for learning nouns compared to verbs has been a significant focus of research (Gentner, 1982) as cited in Tardif et al., (1999). This observation, commonly referred to as the “noun bias,” implies that children possess an inherent conceptual predisposition to associate words with objects during the early stages of language acquisition. This argument becomes particularly compelling if the bias cannot be solely attributed to input factors, such as word frequency (Bloom et al., 1993; Caselli et al., 1999; Tardif et al., 1999).

Verbs play a crucial role in expressing actions, events, and relationships, contributing to the richness and complexity of language. Studies have examined the developmental trajectory of verb acquisition, verb argument structure, and the role of verbs in sentence comprehension and production. Previous studies have explored the comparison between verb acquisition and noun acquisition, revealing that verbs tend to enter the lexicon at a later stage and at a slower rate than nouns (Tardif et al., 1997). The development of the verb lexicon and verb concepts in early language acquisition has been an area of interest and investigation within the field of developmental psychology. While there is a small body of research dedicated to understanding the acquisition of action words and descriptive words, some gaps and inconsistencies remain (Tomasello & Merriman, 2014).

2.5.2.3. Word combinations

Children vary in their style, rate, and sequence of grammatical development within and across languages (Bates et al., 1994; Fenson et al., 1994; Huttenlocher et al., 1991; Vogt et al., 2015). According to Bates et al. (1994), typical word combinations are observed between 18 to 20 months, but it is difficult to link the emergence of word combinations to chronological development. The correlation between word combinations and vocabulary size tends to be considerably more significant than the correlation between word combinations and age. Most children begin to combine words when their collective word knowledge is between 50-100 words (Bates & Goodman, 1999; Fenson et al., 2007; Rescorla et al., 2005). According to Fenson et al. (1994), children's speech at this age lacks inflectional, tense, plural, and agreement marking but is rich in content. A typically developing 18 to 20 month old child is expected to say few words but recognises the names of many everyday objects. By the age of 36 months, a child should produce multiword utterances, understand prepositions, and use basic inflections and function words in their sentences to describe scenes or events experienced (Caselli et al., 2012; Fenson et al., 1994; Yurovsky, 2018).

Several research studies conducted in different languages have focused on the form and content of first-word combinations (Frota et al., 2016; Rescorla et al., 2005; Schults & Tulviste, 2016; Taxitari et al., 2017). Although there are variations in how children combine and use words based on their meaning, studies show that the same basic stock of relational meanings is learned by 20 month olds globally. According to Bates et al. (2017) those meanings revolve around existence (e.g., appearance, disappearance and reappearance of interesting objects or events), desires (refusal, denial, requests), basic event relations (agent-action object, possession, change of state or change of area), and attribution (hot, pretty). There are also differences noted from the grammatical function word categories. English and Italian studies reflected the structural differences of the two languages in the types of words and the number of each type. Specifically, Italian includes adverbials, but English does not. The English version of the MB-CDI consists of 27 prepositions and the Italian version includes 17. In addition, a section was added in the Italian version to examine verb conjugation and noun declension (Caselli et al., 2012; Fenson et al., 1994; Yurovsky, 2018).

The MB-CDI has also been found to incorporate MLU measures to assess language development within the grammar section. The MLU is calculated by dividing the total number of morphemes in a child's language sample by the total number of utterances (Otwindowska et al., 2022). MLU has been found to be a reliable predictor of later language development, making it a valuable tool in clinical and research settings. A study by Feldman et al. (2000) found that MLU predicted later language development in typically developing children between 1 and 3 years of age. The study showed that children with higher MLU scores at 2 years of age had better language outcomes at 3 years of age. Similarly, a study by Hewitt et al. (2005) found that MLU was a significant predictor of later language development in children with specific language impairment (SLI). The study showed that children with lower MLU scores at 3 years of age had poorer language outcomes at 5 years of age.

However, some studies have questioned the reliability of MLU as a predictor of language development. A study by Rollins et al. (1996) argued that MLU is a useful predictor of later language development when used in conjunction with other

measures of language development. The study showed that while MLU was able to identify children with Specific Language Impairment (SLI), it was not useful in predicting language outcomes in typically developing children. Another limitation of MLU as a predictor of language development is that it does not consider other aspects of language, such as vocabulary and syntax. They also noted that MLU is a measure of syntactic complexity, but it does not reflect a child's ability to use a variety of vocabulary or to use more complex grammatical structures.

2.5.3. Predictors of language development

The predictors of language are linked to Bronfenbrenner's bioecological model. Several studies have argued that individual/biological and environmental factors could influence the trajectories of language development (Babatsouli et al., 2017; Cadime et al., 2018; Dryer, 2008; Eadie et al., 2021; Geiger & Alant, 2005). This study focussed on individual factors (e.g., age and sex), microsystem factors (e.g., parents' education, birth order, caregiver language input and SES), exosystem factors (e.g., rural/urban setting and home language), and macrosystem factors (e.g., Vatsonga cultural values and customs) (Bronfenbrenner & Morris, 2007; Eadie et al., 2021; Rosa & Tudge, 2013). Table 5 shows the factors investigated in this study.

Table 5: Summary of literature regarding key factors influencing language acquisition

Factor	Summary of findings from the literature	Examples of studies
Age	Vocabulary size increases with age. Children start acquiring their language at around 8 months. A growth spurt follows, and a significant increase is observed by the age of 24 months.	Bleses et al., 2018; Fenson et al., 1994; Ma et al., 2020; Simonsen et al., 2014; Thurm et al., 2007.
Sex	Some studies show that girls have larger vocabularies than boys at the age range of 16 to 30 months; however, this difference tends to disappear as the children get older. Stolarova et al. (2016) did not find this difference in vocabulary size although the type of words used differed.	Frota et al., 2016; Huttenlocher et al., 1991; Simonsen et al., 2014.
SES	Children from families with higher SES tend to have larger vocabularies than those from lower SES families. This is believed to be due to differences in the quantity and quality of language input, and access to educational resources.	Fernald et al., 2013; Hart & Risley, 1995; Pace et al., 2017; Pungello et al., 2009.
Maternal factors	Maternal factors play a significant role in early language development of infants and young children. Research suggests that the quality and quantity of maternal language input, and the mother's SES, education level, age and mental health, can have a significant impact on a child's language development.	Eadie et al., 2021; Feldman et al., 2009; Sentenac et al., 2020; Tomblin et al., 1991; Zambrana et al., 2012.
Paternal level of education	Fathers who show supportive parenting behaviour during parent-child interactions tend to have children with better language development when they are older. Fathers have an impact on the development of their children's languages through proximal processes such as linguistic interactions between the father and the child.	Bronfenbrenner & Morris, 1998, 2007; Pancsofar et al., 2010; Tamis-LeMonda et al., 2004.

Caregiver input	The quality of caregiver input, such as the use of diverse vocabulary and responsive communication, positively impacts vocabulary growth. Children who receive more language input from their caregivers tend to have larger vocabularies than those who receive less input.	Hart & Risley, 1995; Soderstrom et al., 2018; Tamis-LeMonda et al., 2014; Weisleder & Fernald, 2013.
Birth order	Studies have shown that children who are firstborn tend to have larger vocabularies because they are reported to receive more attention and interaction from their parents. This provides them with more opportunities for language learning.	Hoff-Ginsberg, 1998; Márquez-Caraveo et al., 2021; Zambrana et al., 2012.
Geographic area	Geographic area can have an impact on early vocabulary development in children aged 8 to 24 months. Studies have found that children growing up in different regions with varying linguistic environments may have different experiences and exposure to language, which can affect their language development.	Alcock & Alibhai, 2013; Caselli et al., 1995; Fernald et al., 2013; Geiger & Alant, 2005; Soderstrom et al., 2018; Zhukova et al., 2020.

Tardif et al. (2008b) agree with research pointing to individual and environmental factors influencing vocabulary development, including cultural aspects of the child's environment. Overall, early vocabulary development is influenced by a complex interplay of environmental, cognitive, and neurological factors (Stuebing et al., 2015; Tardif et al., 2009; Vogt et al., 2015; Wallentin & Trecca, 2023). Parents and caregivers can play a crucial role in fostering language development by providing rich, responsive language input to children.

2.5.3.1. Age

An important factor in language acquisition is the age of the child. Research has found that vocabulary size increases with age (Barrett, 1995; Bates et al., 2017; Bleses et al., 2008; Fenson et al., 1994; Simonsen et al., 2014; Southwood et al., 2021). In the MB-CDI standardisation studies of the different languages (Table 3), evidence shows that children start producing words of their language at around 8 months. A growth spurt follows, and a significant increase is observed by the age of 24 months (Caselli et al., 2012; Fenson et al., 1994; Tardif et al., 2009; Vogt et al., 2015).

2.5.3.2. Sex

Research findings report that girls demonstrate larger vocabularies than boys of the same age (Schults & Tulviste, 2016; Stolarova et al., 2016; Wehberg et al., 2008). Schults and Tulviste (2016) and Bornstein and Cote (2005) argued that there are sex differences in expressive vocabulary size between 20 month old speakers. Southwood et al. (2021), in their study of four South African languages, also found a difference in vocabulary size between boys and girls aged 16 to 32 months. Barbu et al. (2015) reported sex differences in low-income families in French cities. They also argued that because girls show earlier and greater social responsiveness, they may benefit more from parental language input than boys. Nylund et al. (2021) observed an impressive feat in a Finnish study: girls excelled in vocabulary growth across all categories except sound effects and animal sounds. Another study conducted with Cantonese-speaking

children aged 3 to 5 years found that girls used more complex syntactic structures than boys, particularly in the mean length of utterances (Tse et al., 2002).

Meanwhile, Jackson-Maldonado et al. (1993) found no sex differences in expressive vocabulary for Spanish-speaking children of Mexican descent living in the US. These authors also found that 24 month old girls who did not attend day-care regularly had a slightly more extensive vocabulary than boys. However, some research did not find differences between the vocabulary size of male and female children. For example, Stolarova et al. (2016) reported no difference between German-speaking boys and girls of 24 months of age, even though there was a difference in the type of words or content of the vocabulary used. Thus, findings regarding sex remain inconclusive.

2.5.3.3. Socioeconomic status (SES)

Language development in early life is one of the best indicators of future academic success and preparation for school. SES can have a significant impact on early language development in children. Research has shown that children from low SES backgrounds tend to have smaller vocabularies, lower language proficiency, and poorer cognitive and academic outcomes than their peers from higher SES backgrounds (Fernald et al., 2013; Hart & Risley, 1995; Hoff, 2013a). Recent studies support the idea that SES-related discrepancies in early language environments extend beyond differences in input quantity and include differences in interaction quality and opportunities for language learning (Eadie et al., 2021; Pace et al., 2017; Pungello et al., 2009; Sperry et al., 2019). For example, children who attend day-care centres with low teacher-child ratios show more rapid development of grammatical skills than those where the ratios are less favourable (Burchinal et al., 2000). Adults and children in higher SES homes more frequently engage in joint book reading than those in lower SES homes (Attig & Weinert, 2020; Brown et al., 2018). Joint book reading and storytelling have been shown to accelerate language development in various settings, both well-resourced and more poorly resourced (Brown et al., 2018; Fernald et al., 2017; Knauer et al., 2020).

However, there is currently no evidence showing that SES directly affects language outcomes, such as vocabulary size. Instead, its effect is observed in children's physical and psychological environments. For example, a study by Rowe (2012) found that parenting behaviours, such as responsiveness and cognitive stimulation, were stronger predictors of children's language development than SES. The study found that children who received high levels of cognitive stimulation from their parents had better language development, regardless of their family's SES. Similarly, Southwood et al. (2021) reported that SES did not play a significant role in predicting vocabulary scores from their study of four languages in South Africa. In contrast of this, Attig and Weinert (2020) argued that SES influences children's home learning environment and the language input they receive, influencing their opportunities for vocabulary learning.

Language development is a complex process that involves multiple factors, including genetics, brain development, and environmental experiences. While SES can certainly impact the language environment in which a child grows up, it is not the only factor that contributes to language development. It is also important to note that there is a great deal of variability within SES groups. For instance, there may be low-SES families who prioritise language development and provide their children with rich language experiences, just as there may be high-SES families who do not prioritise language development. SES can, thus, indirectly affect the child's language experience.

2.5.3.4. Parental factors

Maternal language input: Soderstrom et al. (2018) argue that early word learning is faster and more efficient when children engage in joint-attention activities with their caregivers. The rapid growth is faster where caregivers are responsive to the attention and vocalisations of their young children. Studies have shown that the amount and quality of maternal language input, particularly during the first three years of life, are strong predictors of children's vocabulary size and grammatical

complexity later in life (Hart & Risley, 1995; Hoff-Ginsberg, 1994; Tamis-LeMonda et al., 2004).

Maternal age: Maternal age has been found to be a significant factor in early language development in infants and young children (Eadie et al., 2021). Research suggests that both younger and older maternal age can have negative effects on children's language outcomes, with the optimal age range for mothers being between 25 and 34 years old (Nan et al., 2013; Rahkonen et al., 2014). One argument for the impact of maternal age on early language development is that younger mothers may have less life experience and education, and therefore may have more difficulty providing stimulating language input to their infants. Younger mothers may also be less likely to engage in high-quality interactions with their infants, which can have negative effects on language development (Bornstein & Putnick, 2022; Sun et al., 2016).

On the other hand, older maternal age has also been linked to negative effects on language development. Advanced maternal age has been associated with an increased risk of prenatal complications, such as gestational diabetes and hypertension, which can impact foetal development and ultimately affect language outcomes (Bornstein & Putnick, 2022; Rahkonen et al., 2014). Additionally, older mothers may be more likely to experience cognitive decline or chronic health conditions, which can impact their ability to provide high-quality language input to their infants (Bornstein et al., 2004b; Prado et al., 2012).

Maternal level of education: Tomblin et al. (1991) reported that maternal level of education influences the language input children receive. Children of mothers with higher levels of education demonstrate better language skills than their peers whose mothers have lower levels of education (Eadie et al., 2021; Sentenac et al., 2020; Short et al., 2017). According to Hoff-Ginsberg (1994), college-educated mothers used significantly more words, different word types, and longer sentences than high school-educated mothers. Mothers with a higher education level expanded their children's utterances more during a conversation with them, used more partial self-repetitions and expansions, and asked more questions. Such linguistic behaviour is

reported to benefit child language development (McNally et al., 2019; Vogt et al., 2015). Vogt et al. (2015) argued that children whose mothers had secondary education or higher produced significantly more words than children whose mothers only had primary education. However, Southwood et al. (2021) reported that in their South African study, maternal level of education accounted for just 2.6% of the variance in expressive vocabulary and did not account for differences in receptive vocabulary. This is supported by Cadime et al. (2018) who reported that a significant difference was noted with children older than 24 months, but maternal level of education effect was only observed on the number of common nouns produced.

Father's level of education: There is a well-established body of research indicating that a father's level of education can have a significant impact on their child's early language development. Children whose fathers have higher levels of education tend to have larger vocabularies, better comprehension skills, and higher academic achievement than children whose fathers have lower levels of education (Pancsofar et al., 2010; Tamis-LeMonda et al., 2004). Hart and Risley (1995) found that fathers' education levels were significantly related to children's vocabulary size, even after controlling for maternal education levels and other demographic factors. Children whose fathers had a professional degree had vocabularies that were over 1.5 times larger than children whose fathers had not completed high school.

Tomblin et al. (1997) looked into factors like maternal age, parental education, and parental histories of speech and learning disorders. These studies suggest the need to be cautious when interpreting the association of these factors with language disorders. (Conway et al., 2018; Pungello et al., 2009; Sentenac et al., 2020).

2.5.3.5. Household or family characteristics

Caregiver input: Soderstrom et al. (2018) support the view that the quantity of language a child hears is directly related to the number of adults in the child's environment who provide the child with language input. More adults in a child's environment may mean more speakers and, thus, more language input. Weisleder and Fernald (2013) found that the quantity of language infants hear is correlated with

vocabulary size at 24 months. The frequency with which words are listened to also affects their acquisition order (Kim et al., 2000). For instance, Goodman et al. (2008) observed that within lexical categories, a higher frequency of occurrence in parental, child-directed speech is related to an earlier age of acquisition when considering production data. Therefore, one can predict that the quantity of language a child hears is directly related to the number of adults in the child's environment who provide the child with language input (Soderstrom et al., 2018). Thus, more adults mean more speakers and more language input. When young children have safe, positive interactions with enlightened people who promote their growth and learning, and are sensitive to their unique developments, they flourish and learn best (Soderstrom et al., 2018; Tardif et al., 2008a).

The context in which adult-child interaction occurs can influence the child's quantity of language input. The relationship between number of people in the home and language outcomes is not straightforward. For example, Oshima-Takane and Robbins (2003) reported that a sibling in the home might cause a single adult to direct less language to the child. Soderstrom et al. (2018) reported that an additional adult in the home could result in the child receiving less instead of more language input, as the adults may talk more to each other than to the child. Also, more people present could mean more talk not directed at the child and more people speaking simultaneously, thereby negatively affecting the amount of language the child can process.

Birth order: One study found that firstborn children had larger vocabularies and produced more complex sentences than their younger siblings at 24 months of age (Hoff-Ginsberg, 1998). Another study found that firstborn children scored higher on measures of receptive and expressive language than their younger siblings at 18 and 36 months of age. However, the study noted that the differences were small and tended to disappear by age 5 (Bornstein et al., 2004a). A longitudinal study of over 3,000 children found that firstborn children had larger vocabularies than their younger siblings at age 4. However, the study also found that these differences were no longer present by age 7 (Reznick et al., 2007).

2.5.3.6. Geographic area

Bornstein and Cote (2005) found that Spanish-speaking urban children in Argentina and American English-speaking urban children in the US have larger expressive vocabularies than their peers in rural areas. The same was reported in a study with isiXhosa, Setswana, Xitsonga, South African English and Afrikaans (Southwood et al., 2021). Bornstein and Cote (2005) and Fernald et al. (2013) discuss how rural life differs from urban life, and that some of these differences might affect language learning. For example, mothers in urban areas in Bali expect their children to acquire verbal assertiveness at a younger age than rural mothers (Williams et al., 2000), which could influence socialisation and other parenting practices, in turn influencing language exposure. Geiger and Alant (2005) conducted a study in Botswana, examining child-rearing practices and communicative interactions. They observed little verbal interaction between mothers and children under the age of 5 years, especially infants under one year. The reason mothers provided for not conversing with the child during care activities (such as washing, dressing and feeding) was that the child could not yet speak. Thus, talking with such young children was viewed as unusual and even unacceptable. Furthermore, most of the verbal interaction between caregivers in the village in Botswana and young children was instructional (often consisting of short behaviour-directing commands from the adult's side) with little verbal response required (or encouraged) from the child (Geiger & Alant, 2005).

Chapman (2000) reported several factors influencing the trajectories of language development, focusing on child (age, sex, birth order), family (SES, household and family characteristics, and geographic area) and maternal aspects (education, age, maternal age). Hoff (2013) stated that children from more affluent backgrounds demonstrate better language skills than those from less well-resourced backgrounds. However, there is conflicting evidence that SES directly affects language outcomes, such as vocabulary size (Geiger & Alant, 2005). Instead, one can see its effect on children's physical and psychological environments. There is an indication that the quantity of language a child hears is directly related to the number of adults in the

child's environment (Geiger & Alant, 2005; Hoff, 2013). Positive, enriching verbal interactions appear to promote children's growth and learning.

2.6. Xitsonga: A comparative analysis

English is primarily an analytic, stress-timed language with a complex orthography. It is different from the Southern African indigenous languages because they are agglutinating, syllabic languages with transparent orthography. Xitsonga is one of these African language families of Southern Africa (Figure 8).

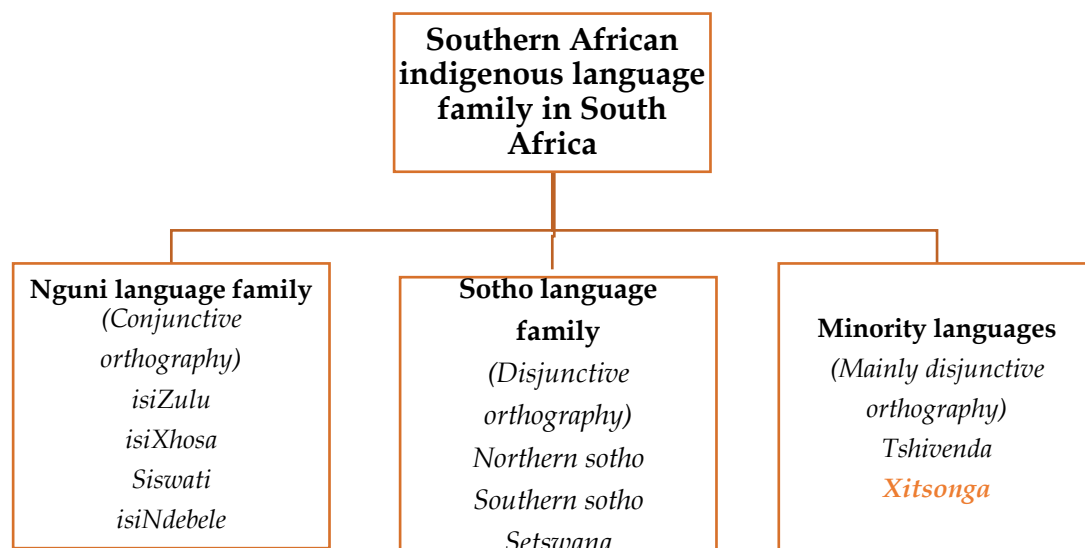


Figure 8: The Southern African indigenous language families in South Africa, (adapted from Pretorius et al. 2020, p. 3)

The indigenous languages of Southern Africa all have a rich and complicated morphology in which noun (N) and verb (V) roots are modified with prefixes, infixes, and suffixes. The verbal aspects of a sentence are particularly complex, as they distinguish between subject (SUBJ) and object (OBJ) NCs, but do so in slightly different ways across language family clusters (Demuth, 2000; Lee, 2014). For example,

“vana va ambala tintanghu ta vona”

NC2-SUBJ - NC2-SM - VERB- NC10-OBJ - NC10-OM - NC10- pronoun (PRON)

[children are wearing their shoes]

There is not much written about Xitsonga grammar, and the segmental and prosodic phonology have not been studied in depth within the current phonological theory. The rich morphology, complicated syntax, and tonomorphology of Xitsonga are often the focus of studies on the language (Mushwana, 2021). Structurally, Xitsonga shares the common properties of Southern African languages, like the agglutinative structure, the rich NC system, Subject Verb Object (SVO) word order, and tone. Xitsonga has a two-way tonal contrast: high tone and toneless. Its Tone Bearing Unit (TBU) is the syllable. For example, the high tone is mobile and can spread rightward over multiple syllables. The tone is used both for lexical and grammatical distinctions, as per the example below (Lee & Gjersøe, 2014). Beuchat (1962), as cited in Zerbian (2007), reported that surface tone patterns in Xitsonga depend on the word's position in the sentence, the context used for the sentence, the presence of modifiers, and the tone of the preceding verb only. The significance of tone is shown in homographs, i.e., words written the same but pronounced differently (Baloyi, 2012; Zerbian, 2007).

For example:

<i>e.g. 1 Tiva</i> (know)	vs	<i>Tiva</i> (lake)
High tone and low tone		All low tone
<i>e.g. 2 Matimba</i> (strength)	vs	<i>Matimba</i> (sugar cane)
Low and high tone		All low tone

Another significant feature in the identification of African languages is the NC system. This is a linguistic concept that refers to a particular category of nouns characterised by the prefix and the concomitant concord system within the classes

(Baumbach, 1985; Craig, 1986; Demuth, 2000). English and the Southern African indigenous languages are very different in terms of their linguistic features.

2.6.1. NC systems

The morphological system, particularly nominal morphology, has received much attention in studies of African language acquisition. Demuth (2003, p. 209), for example, asked, “What transpires in a language where both plurals and singulars are morphologically marked?” Nouns are morphologically identified by a nominal prefix (NPx) as belonging to a given class and are lexically specified for class and sex (Schadeberg & Bostoen, 2019). However, Tsonope (1988) argued that African languages do not have a sex representation. The nominal prefixes represent animacy, number, concreteness and even area. Several studies have highlighted the presence of NCs in African indigenous languages. As cited by Ngcobo (2010), early scholars like Bleek (1869), Torrend (1891), Meinhof (1906), Johnston (1919), Doke (1927), and Guthrie (1948) extensively investigated and contributed to the understanding of ‘Bantu’ noun classification. Initially, the classification system of languages like isiZulu was considered a straightforward and arbitrary morphological system based on NCs. However, in recent times, there has been a growing recognition of the semantic criteria in noun classification.

Meinhof (1906) introduced a classification system that paired noun prefixes into singular/plural combinations, such as NC 1/2, 3/4, and so on (Ngcobo, 2010; Zawada & Ngcobo, 2008). Nonetheless, as Guthrie (1956, 1967, 1970) in Ngcobo (2010) pointed out, the so-called token stem is a dependent noun that can be accommodated in multiple NCs. Xitsonga employs prefixes and suffixes as a form of bound morphemes. These prefixes are attached to the root or stem of a word to indicate various grammatical features such as plurals, locatives, mood or demonstratives, and subject agreement (Du Plessis, 2016b; Kubayi, 2022; Zeller, 2004). Suffixes are attached to the end of a word or stem and serve different functions such as marking tense forms, indicating possession, or denoting verb derivations (Nurse, 2019; Nurse & Philippson, 2006). It is observed that children between the ages of 24 to 30 months begin to produce

derivational affixes, predominantly suffixes, although their usage may still be infrequent before the age of three (McBride-Chang et al., 2008; Tania & Sibarani, 2019). In English, children start using the suffix “-er” to indicate an agent or instrument around the age of four (Clark, 2017).

Each noun in Xitsonga falls into classes ranging from class one to class twenty-one, meaning that there is no noun in Xitsonga that does not have a NC or can be categorised into two or more NCs (Mushwana, 2021). Table 6 outlines the classification of nouns into NCs in Xitsonga.

Table 6: NC prefixes of Xitsonga (adapted from Baumbach, 1987)

Class		Allomorphs	Class		Allomorphs
1	mu-	m-,n-,n'w-, n'-, zero	2	va-	v-, van-
1a	mu-	ma-, nya-, na-, n'wa-, zero	2a	vá-	vá-, plus all 1a allomorphs
3	mu-	m-,n-,n'w-, n'-, zero	4	mi-	mim-, min-, min'w-, min'
5	ri-	t-, dy-, dz-, zero	6	ma-	ma-, plus all five allomorphs
5a	dya-		6a	madyi-	
7	xi-,	x-, c-,	8	swi-,	sw-
9	ny-	n-,m-, n', yin-, zero	10	tiny-,	tin-, tim-, tin'-, tiyin-
11	ri-		10	tim-	tin-
14	vu-	by-, v-,	6	ma-	maby-, mav-
16	ha-,	h-,			
17	ku-				
18	mu-	n-			
21	dya	dy-			

NC 1 and 2 refer to people; 7 and 8 refer to tools, specialists, and languages; NC14 refers to abstract nouns; and NCs 16, 17, and 18 refer to locatives (Demuth, 2000). NC1a is an innovation of pre-prefixing *mu-* to already existing nouns. For example, “*Afurika*” [Africa] will become “*muAfurika*” [African]. Nouns of another class with a zero prefix, such as “*kokwana*” [grandfather or grandmother], become “*vakokwana*”

[grandfathers or grandmothers] and are also included in NC1a. NC prefixes like *n'wa-* are used to indicate 'feminine' [Miss] included in 1a. NC2a prefixes are always pre-prefixed to this singular form. An example is "*n'waNdhambi*" [Miss Ndhambi] – changing the prefix into NC2a, "*van'waNdhambi*" [more than one Miss Ndhambi]. This rule is probably an individual innovation in Xitsonga. Baumbach (1985) made an interesting observation that the Southern Xitsonga dialects do not use the NC5a augmentative prefix. This is noted in the northern dialects, which border on areas where Tshivenda and Shona are spoken. Baumbach (1985) shows how in the plural the NC21 prefix (also a demonstrative marker) was pre-prefixed, e.g., *dyi-* used to show a larger object ("*dyintanghu*" [a very big shoe]) became NC6 *madyi-* ("*madyintanghu*" [many very big shoes]).

According to Demuth (2000), NC systems are part of a prevalent broad preposition agreement system. This involvement means that each NC has its own set of agreement markers (AGREE) concerning prepositions (PREPs), pronouns (PRONs), and adjectives (ADJ), which are all listed below. The exception is found in NCs 4 and 9, and 15, 16 and 17, which all share the prepositions *yi* and *ku*. Due to class 5 and 11's shared prefix, their prepositions, pronouns, and adjective forms are also identical. Both NCs are justified in sharing pronouns because they share the same demonstrative, personal, and possessive pronouns.

Examples are given below, where prepositions show some relationships.

- (1) *tafula lerikulu ri tshovek-ile.*

NC5_{zero}-door NC11PRON-ADJ-big NC11-AGREE V-break-(PSTmarker)

[The big door is broken.]

- (2) *matafula lamakulu ma tshovek-ile.*

NC6-door NC6PRON-ADJbig NC6-AGREE V-break (PSTmarker)

[The big doors are broken.]

- (3) Ribye ri le henhla ka tafula.

NC5-stone NC5PRON-it-is PREP-ontop DEF-the NC5-table

[The feather is on top of the table.]

- (4) Maribye mai le henhla ka tafula.

NC6-feather NC6PRON(they)-are PREPontop N-table

[The feather is on top of the table.]

Three characteristics distinguish NCs 5 and 6 in Xitsonga. Firstly, the prefix *ri-* is used in NC5, while the prefix *ma-* is used in NC6. In the case of NC5, “*rihlanganisi*” [conjunction] is used, and “*mahlanganisi*” [conjunctions] is used for NC6. Secondly, some terms do not have singular or plural forms. These things cannot be counted, such as liquids, for example “*mati*” [water] and “*masi*” [milk]. Thirdly, some words do not have the singular prefix *ri-*. These words only take the *ma-* prefix when they are in the plural form. For example, “*khehele*” [armpit] becomes “*makhehele*” [armpits], and “*singita*” [miracle] becomes “*masingita*” [miracles]. Additionally, Baumbach (1985) emphasises that a noun may be associated with a particular NC of the defining characteristics of its referent, such as sex. Rialland and Aborobongui (2016) support the view that NC prefixes occur in nouns and are also seen with verbs.

Zawada and Ngcobo (2008) noted that the conceptual re-analysis of the morphological classes (previously believed to be arbitrary within the larger context of cognitive semantics) might provide answers for previously inexplicable linguistic phenomena. For example, the isiZulu NC system indicates how and in what sequence isiZulu children learn nouns and may explain whether or not this order of acquisition is arbitrary for the isiZulu NC system or if there is a cognitive reason behind it. The issue is also whether the facts of language acquisition support the conceptual reinterpretation of the African languages’ NC structure (Kunene & Ahmed, 2016).

Suzman (1996) noted that in isiZulu, children acquire the NCs in a specific order. She claimed that before the age of two, singular NCs are acquired before plural NCs. Yet, she did not assign these NCs a preferential order. Furthermore, Demuth (2003) noted that all studies on African NC prefixes yielded similar findings. First, both the singular and plural NC prefixes are segmented as different morphemes early on, in that neither plural morphemes nor wrongly appended NC prefixes to nouns without prefixes are observed (Demuth & Ellis, 2009). Phonological rather than morpho-syntactic limitations are likely responsible for the early omission of NCs or the formation of a filler syllable in some languages (Herbert, 1992). However, a more systematic analysis of children's use of nominal agreement is required to conduct a reliable test of this hypothesis. Most common agreement forms, like possessives and demonstratives, occur as part of a disyllabic foot; thus, phonological constraints should not be applied to them (Demuth & Weschler, 2012).

Gaining knowledge of word formation can be crucial for acquiring and comprehending new vocabulary. Additionally, as children expand their vocabulary, they can develop a deeper understanding of the morphological patterns and mechanisms inherent in their spoken languages (McBride-Chang et al., 2008). The acquisition of bound morphemes is an essential building block for word formation. Bound morphemes, unlike free morphemes, cannot stand alone as independent words but must be attached to other morphemes to convey specific grammatical or semantic information (McBride-Chang et al., 2008; Tania & Sibarani, 2019). These authors noted that, initially, children tend to learn the earliest inflections as integral components of words, without explicitly analysing their forms and meanings. However, as they progress in their language development, they demonstrate the ability to dissect these inflections and apply affixes in a rule-based manner to new instances. During this process, they also tend to regularise irregular forms until they acquire the ability to produce the appropriate irregular forms (McBride-Chang et al., 2008; Tania & Sibarani, 2019).

2.6.2. Agreement markers

Each NC has its own concordial agreement markers, which are phonologically linked to the noun prefix. The NCs have agreement markers concerning prepositions, pronouns, and adjectives. Verbs also have agreement markers corresponding to each NC. Tsonope (1993) and Mata (2015) gave examples in a table to demonstrate the correspondence between some agreement markers with NCs. Table 7 shows some Xitsonga agreement markers.

Table 7: Some agreement markers in Xitsonga (adapted from Gowlett, 2003)

	Subj M 1		Subj M 2		Obj M		Adjective		Poss	
	<i>sg</i>	<i>pl</i>	<i>sg</i>	<i>pl</i>	<i>sg</i>	<i>pl</i>	<i>sg</i>	<i>pl</i>	<i>sg</i>	<i>pl</i>
1st pers	ndzi	hi	ndz-	h-						
2nd pers	u	mi	w-	m-	-ku-					
3rd pers										
1/2	u	va	w-	v-	n'wi-		N-	va-	w-a-	v-a-
3/4	wu-	yi-	w-	y-			wu-	yi-	w-a-	y-a-
5/6	ri-	ma-	r-	m-			ri-	ma-	r-a-	y-a-
7/8	xi-	swi-	x-	sw-			xi-	swi-	x-a-	sw-a-
9/10	yi-	ti-	y-	t-			yi-	t-	y-a-	t-a-

Studies of African language acquisition require some knowledge of the grammatical systems to understand the patterns of language development. Few scholars investigating language acquisition in African languages reported that NC systems are significant traits in classifying a language as African (Demuth, 2003; Herbert & Bailey, 2002; Tsonope, 1993). African languages can be categorised as null subject languages, and therefore the subject can be omitted and replaced by the SM representing the subject's NC (Demuth & Weschler, 2012). For example,

"tafula ra wa" [the table is falling],

SUBJ – SM – OM-PRStenseAGR- VERB

Could be changed to:

“ra wa”

SM – OM-PRStenseAGR- VERB

Smouse et al. (2012) reported that SMs were not acquired through any sequential process. Instead, it seemed as though they were acquired simultaneously. They further noted that the last ending of the verb (also referred to as the final vowel), signifies not only tense but also aspect, modality, and even negation. Furthermore, because of the SM and the object marker (OM), repositioning of the lexical component of the verb into several different positions in relation to the verb and the other verb components is allowed. As a result, the probability of correctly identifying the subject NC on the verb increased unpredictably across a wide range of verb roots and NCs. They agreed with Demuth (2003) that errors in using an incorrect SM were remarkably uncommon.

2.6.3. Verb morphology

African indigenous languages are known for their rich and complex verbal morphology. Scholars have extensively studied the intricate systems of prefixes, infixes, and suffixes that mark tense, aspect, mood, negation, subject agreement, and other grammatical features on the verb (Demuth, 2003; Doke, 2017). African indigenous languages often exhibit stem alternations or consonant mutations that signal grammatical distinctions. These alternations can be triggered by tense, aspect, or other morphological features, and their analysis has been a topic of investigation. They are typically composed of a root, a stem, and a set of affixes that indicate tense, aspect, mood, and other grammatical features (Kiso, 2012; Nurse & Devos, 2019; Zeller, 2004).

2.6.3.1. The use of affixes

The root is the most basic element of an African indigenous language verb. It carries the core meaning of the verb, such as [eat,] [drink,] or [go.] The root is typically

a monosyllabic or disyllabic word. The stem is formed by adding a set of prefixes and suffixes to the root. The prefixes indicate the grammatical class of the verb, as well as the tense, aspect, mood, and other grammatical features. The suffixes typically indicate the person and number of the subject and object of the verb (Lee & Hlungwani, 2015; Matsinhe, 1994; Zeller, 2004).

The affixes are the most variable part of an African indigenous language verb. The number and type of affixes that can be added to a verb root varies depending on the language (Nurse & Devos, 2019). However, some of the most common affixes in a language such as Xitsonga are represented by suffixes *-a*, *-e*, *-i*, *-ile* and *-anga* (Kiso, 2012; Matsinhe, 1994; Nurse, 2008; Nurse & Devos, 2019). For example, [eat] is “*dya*” in Xitsonga. An example of how the suffix changes the word “*dya*” is illustrated below.

Tense affixes: These prefixes indicate the time of the action, such as past (*-e-*), present (*-a-*), or future (*-ta-*).

Ndzi dye [I ate]

Ndza dya [I am eating]

Ndzi ta dya [I will eat]

Aspect affixes: These prefixes indicate the way in which the action is taking place (*-ha-*), such as completed (*-ile-*), ongoing (*-eni-*), or habitual (*-etela-*).

Ndza ha dya [I am eating]

Ndzi dyile [I have eaten]

Ndzi le ku dyeni [I am eating]

Ndza dyetetela [I eat always]

Mood affixes: These prefixes indicate the mood of the verb, such as indicative (*-nga-*), subjunctive (*-tava-*), or imperative (*-ana-*).

Ndzi nga dya – [I should eat]

A ndzi tava ndzi dyile [I could have eaten]

Dyana [eat!]

Person and number affixes: These suffixes indicate the person and number of the subject and object of the verb.

Wa dya [he/she eats]

Nurse (2008) and Nurse and Philippson (2006) have investigated the tense and aspect systems across African languages. The lack of credible grammatical descriptions from which a contextual inquiry like it can draw its data is a universal problem with such an investigation. Nurse's first sample from 2003 included 120 languages, although he believed that only 20–25 had reliable data. Nurse (2008) remarked that 78% of the languages in his survey used the most prevalent past tense marker. Alcock and Alibhai (2013) note that the acquisition of tense and agreement markers on verbs has been heavily debated in the field of language acquisition. A study by Deen (2002) on the acquisition of Nairobi Kiswahili found that prefixes are used to mark verb subjects and tense morphemes.

2.6.3.2. Use of prepositions

According to Demuth (2003), African indigenous languages often exhibit a limited number of prepositions, which raises the question of determining the actual object of the verb. They exhibit a system of prepositions almost entirely based on the representation of each noun by a pronoun identical in its origin with the derivative prefix of the nouns. 'In', 'on', and 'by' are generally equivalent to the English prepositions 'in,' 'on top of', 'at', and 'by', though not exactly. The prepositions used in the instances above are also used as locatives, and the reverse is also true. Zeller (2004, p. 1) reported "the most common method of deriving a locative from a non-locative noun in the African languages is through the employment of the class markers." NC markers are used to distinguish between nouns that are located and those that are not located. Locative classes are common in African languages. In Xitsonga, NCs 16 (*ha-*, *h-*), 17 (*ku-*), and 18 (*mu-*, *n-*) are limited to the following lexical

items: (“*hansi*” [under], “*hase*” [across], “*henhla*” [above], and “*haleno*” [here]; “*kusuhi*” [near], “*kule*” [far], and “*kona*” [there]; and “*ndzhaku*” [behind] (Du Plessis, 2016b; Kubayi, 2013; Mushwana, 2021).

NCs 16, 17, and 18 have two parallel forms: one that starts with the corresponding NC prefix and the other that begins with the prefix *e-*. When prefixes and suffixes are added to a noun, the result is a locative. For example, the prefix *e-* and the suffix *-eni* can be added to the noun “*taful*” [table] to make the locative ‘*etafuleni*’ [on the table] and ‘*endleleni*’, which translates as [on the road] (Du Plessis, 2016a). However, the use of the prefix *e-* is not always necessary, according to Du Plessis (2016a), as shown in the following example:

Tatana udy a etafuleni [Father eats at the table].

The word “*tafuleni*” [at the table] already designates an area or a place without using the locative prefix *e-*. As a result, the prefix *e-* is not necessary when used as a word but necessary when used as a phrase (Du Plessis, 2016a). Despite the reported relationship between prepositions and locatives, Kubayi (2022) argues that this relationship needs further investigation. He argued that NCs 16, 17 and 18 (previously categorised as nouns or locatives) are equivalent to lexical categories representing prepositions and adverbs. Furthermore, he reported that in terms of syntactic distribution, these lexical items were observed to be unable to function as either subjects or objects of sentences and do not have unique concords under their command, which should be a normal feature of nouns. As a result, Kubayi (2022) argues that it is possible to deduce that NCs 16, 17, and 18 do not exist in Xitsonga.

Authors have observed that by the age of 30 to 32 months, speakers of Siswati and Sesotho had generally adopted the correct form of the NC prefixes (Demuth, 1989; Kunene & Ahmed, 2016; Ziesler & Demuth, 1995). According to Suzman (1996), NC prefixes appear in isiZulu a little earlier than in other languages, suggesting that the pre-prefix may be responsible for the earlier emergence of NC prefixes. However, by age 3 years, children producing NC prefixes in isiXhosa, a language that also has pre-prefixes, were only doing so in 70% of contexts (Gxilishe et al., 2007). Furthermore, it

was hypothesised that the filler syllable could be an overgeneralisation of the NC9 *e*- in Sesotho and Setswana and either the 'human class' 1a *u*- or 'default' NC5 *i*- in isiZulu (Suzman, 1996; Tsonope, 1988).

2.7. Summary

This study aimed to create a linguistically and culturally relevant tool for use with Xitsonga-speaking toddlers and their families as limited information exists about how Xitsonga is acquired. The findings will assist in understanding the language development of Xitsonga and the differences and similarities in relation to the trajectories already documented for other languages. This chapter introduced the theoretical framework employed to respond to the aim of the study. The framework emphasises how the language, activities, and education children are exposed to are all influenced by their culture. It explains how children gain knowledge by engaging in real-life activities in their immediate environment and watching other people's behaviour. The chapter discussed the MB-CDI as a normed parent-report checklist that describes semantic and grammatical development in typically developing children. Adaptations of English versions of the MB-CDI were found to be an effective and relatively cost-effective alternative to developing a new instrument to assess early language development. The adaptation process was introduced, involving translating culturally appropriate words and replacing culturally inappropriate words. The chapter further introduced Xitsonga's lexical and grammatical structure to familiarise readers with the language. The following chapter discusses the methodological approach in more detail, the process of formulating the research aims and questions, ethical considerations and how data was collected and analysed.

CHAPTER 3: RESEARCH DESIGN AND METHODS

“All you need is the plan, the road map and the courage to press on to your destination”.

-Earl Nightingale

To reason effectively about a phenomenon and understand it, strategies are needed, such as critical thinking, deductive logic, inductive reasoning, scientific method, theory building, and collaboration with other minds (Leedy & Ormrod, 2015). The previous chapter outlined strategies to identify the problem, located the research question, and reviewed the literature to build the theoretical framework. This chapter will discuss the methodological approaches implemented in the data collection and analysis of the study. The section begins with the introduction of the research design, followed by a detailed discussion of the three phases of the study.

3.1. Introduction

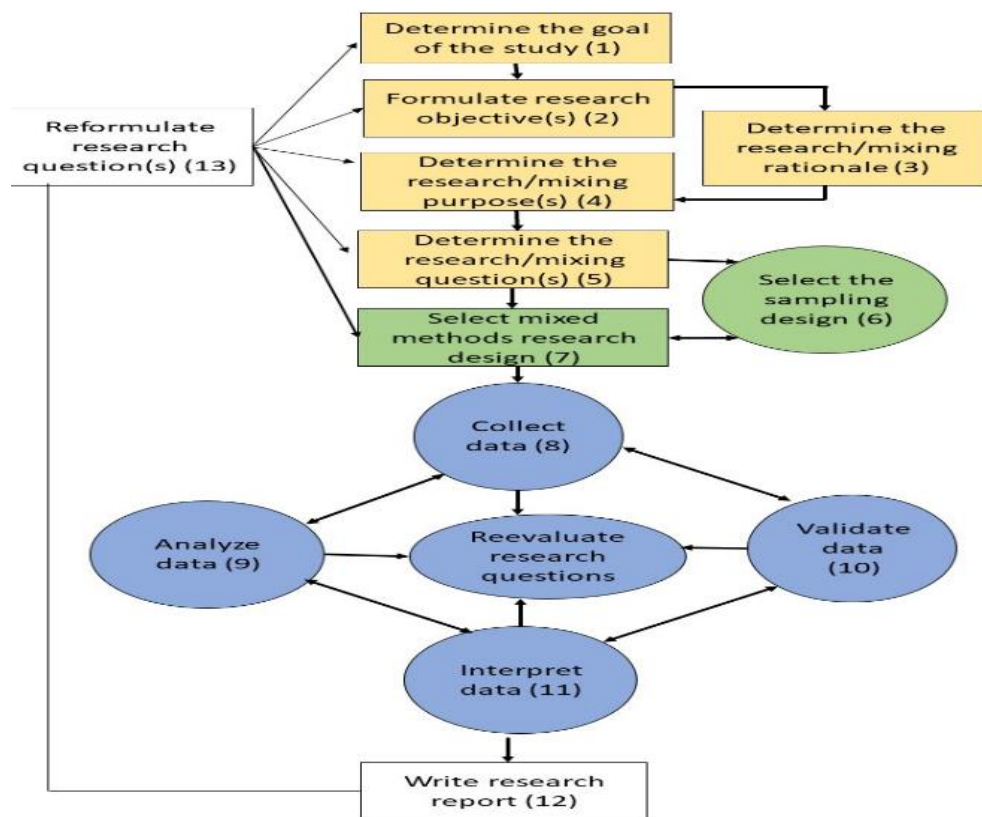
This chapter describes the scientific methods employed in collecting and analysing data to respond to the research question. This study followed a pragmatic paradigm, which focused on the context in which the work was undertaken and where the tool would need to be used. The paradigm supports mixed or multiple methods of social science inquiry.

The purpose of this study was to describe early language development in Xitsonga-speaking toddlers. Given that there are no available Xitsonga assessments or tools for this purpose, the first step of the research was to develop such a tool. Children’s culture influences the language, activities, and education they are exposed to. Children learn through direct experiences in their environment as they observe people’s actions (John-Steiner & Mahn, 1996; Rosa & Tudge, 2013; Tudge et al., 2009). Bronfenbrenner’s theory of human development agrees with Vygotsky’s theory that child development is based mainly on social constructivism. Development is

determined by social interaction with a more competent role model (Rosa & Tudge, 2013). These theories imply that assessment tools used by SLPs must be suitable for the cultural and linguistic context in which they will be used.

In developing these tools, mixed methods are highly recommended (McCrudden et al., 2021). The rationale for selecting mixed methods was to access appropriate data that “fit the purpose of the study (develop a tool), the resources available (economic constraints), the questions asked (on equivalence), and the constraints faced (cultural and linguistic differences)” [qualitative] (Reybold et al., 2013, p. 700) and measuring one or more variables of the phenomena [quantitative] (Leedy & Ormrod, 2015). Collins et al. (2006) propose that a research process for mixed methods research is conceptualised with thirteen distinct steps, shown in Figure 9.

Figure 9: Steps in the mixed methods research process (adapted from Collins et al., 2006, p. 71)



Collins et al. (2006) outline this process in three stages: formulation, planning and implementation. The implementation stage ends at the report writing step (12) because this is a single study. This provided the framework that guides this research process.

3.2. Formulation of the research

The formulation phase refers to the conceptualisation of the design and method of the research. In this mixed methods approach that was taken, qualitative aspects aim to explore, obtain insights, and comprehend underlying issues by asking “what?” and “how?”, while quantitative elements measure quantitative elements measure, predict, and correlate by asking “how many?” and “how strong?” Common qualitative and quantitative goals are to identify, explore correlations, and investigate links between the studied variables (Collins et al., 2006; Johnson & Onwuegbuzie, 2007).

This section comprises the first five steps, shown in Figure 9, which are (1) determining the goal of the study, (2) formulating the research objective(s), (3) determining the research/mixing rationale(s), (4) determining the research/mixing purpose(s), and (5) determining the research questions (Collins et al., 2006).

3.2.1. Determining the aim of the study

The primary aim was to describe the typical course and extent of the variability in early lexical and grammatical development of Xitsonga by children between the ages of 16 to 32 months. The study achieved this aim in three phases: cross-cultural adaptation of the MB-CDI (phase 1: pre-pilot), development of the Xitsonga MB-CDI (phase 2: pilot study), and early lexical and grammatical development of Xitsonga-speaking toddlers aged 16 to 32 months (phase 3: main study). The researcher formulated objectives for each of the three phases.

3.2.2. Formulation of the research objectives

The research objectives provide a clear and concise statement of the research aims. The objectives of this study provide a framework for organising the research, selecting appropriate methods and interpreting the results. These were:

- (i) To describe the translation outcome and the caregivers' and language experts' perceptions of MB-CDI words commonly used by Xitsonga-speaking children aged 16 to 32 months.
- (ii) To describe the relationship between age and vocabulary size among Xitsonga-speaking children aged 16 to 32 months, and to identify the most frequently used words by these children in early language development.
- (iii) To describe the early lexical development of Xitsonga-speaking children, including the rate of vocabulary acquisition, the semantic and syntactic categories of words, and the relationship between vocabulary size and other factors such as age, sex and geographic location.
- (iv) To describe the patterns of grammar development in Xitsonga-speaking children, including the types of grammatical constructions used, the order in which they are acquired, and the relationship between grammatical development and vocabulary size.
- (v) To describe the development of MLU in Xitsonga-speaking children, including the average MLU at different ages and the correlation between MLU and other language development areas such as vocabulary size and grammar.

3.2.3. Determining the significance of the study

This step discusses why this study is needed. Lack of normative data in language development in languages such as Xitsonga leads to challenges in developing culturally and linguistically relevant assessment tools. Currently, speech and language assessments in South Africa rely on tools developed mainly for an affluent, monolingual English population, grounded on different cultural, linguistic, and even socio-economic backgrounds (Gxilishe, 2008; Khoza-Shangase & Mophosho, 2018;

Mdlalo et al., 2019; Pascoe et al., 2018). Professionals in language fields such as linguistics and speech-language pathology face challenges in differentiating language differences related to environmental context and language impairments. Thus, contextual relevance and responsiveness are crucial in a multilingual and multicultural country like South Africa (Engel de Abreu et al., 2013; International Test Commission, 2018; Khoza-Shangase & Mophosho, 2018; Mdlalo et al., 2019; Pascoe et al., 2018).

The researcher acknowledges that the principal aim of an assessment is for professionals to determine if a child's language reflects age-expected performance in their home language or a language delay (Mdlalo et al., 2016; Reed, 2017). Thus, there is a need to develop tools that will be contextually relevant and responsive, as well as reliable and valid. The study adopted the mixed methods design because it is recommended in designing and validating measurement instruments and evaluation criteria such as language tests, rating scales, surveys, and questionnaires (Creswell & Plano Clark, 2018; Hashemi & Babaii, 2013).

3.2.4. Determining the research/mixing purpose

Different types of research activities were undertaken in this study. Due to language and cultural variations, a simple translation of a questionnaire may result in misinterpretation. When using questionnaires established in different nations and languages, cross-cultural adaptation and validation are required in addition to translation. The pre-pilot or initial phase employed qualitative methods that guided the first step in developing a Xitsonga MB-CDI. The study began with translating the English MB-CDI to Xitsonga, followed by qualitative data gathering from interviews and discussions from focus groups and workshops held with the SA CDI team. Emphasis was on avoiding items and cultural bias and thus enhancing structural equivalence before testing the tool.

Fenson et al. (1994) had to choose a relevant methodology for adapting the MB-CDI. Their study clearly illustrates the use of several methods together to develop the MB-CDI instrument for various languages. The typology of each target language was

well-considered, together with word frequencies and word class. For example, the Italian version differs from the American English version, the Swahili version and the Changanana version in the specific content words included. However, all versions use an approximately equal number of words from different categories (e.g., “*animal*”, “*food*”, and “*clothing*” have the same number of items but consist of different words). Semantic constructs may be expressed simply in one language but in an overly complex way, or not at all, in another language. Additionally, grammar development can take different paths in separate languages (Alcock et al., 2015; Bleses et al., 2018; Dale & Penfold, 2011; Frank et al., 2016; Vogt et al., 2015).

The second and final phases (quantitative) were the development of the tool and the main study. They responded to the study’s primary aim by quantifying the identified variables of early language development. Caregivers of toddlers in a predominantly monolingual Xitsonga-speaking area in Giyani, Malamulele and surrounding villages completed the translated and adapted MB-CDI. Data collected were used to document early lexical and grammatical development trajectories of toddlers aged 16 to 32 months. These phases quantified the patterns of early lexical and grammatical development of Xitsonga using the adapted tool. The rationale for this approach lies in first exploring a topic before deciding what variables need to be measured (Creswell & Creswell, 2018; Hashemi & Babaii, 2013).

3.2.5. Determining the research questions

The researcher formulated a research question to describe early Xitsonga language development, asking: “What are the patterns of early lexical development and the emergence of grammar in Xitsonga-speaking children between the age of 16 and 32 months?” The mixed approach sequentially followed interactive phases that responded to the research objectives. The researcher asked the following sub-questions:

Phase one: This pre-pilot phase employed qualitative data collection. According to Korstjens and Moser (2017, p. 275), for most qualitative researchers, “the ‘reality’ we perceive is constructed by our social, cultural, historical and individual contexts.”

RQ 1: What is the translation outcome and what are caregivers' and language experts' perceptions of MB-CDI words commonly used by Xitsonga-speaking children between the ages of 16 and 32 months?

Phase two: Onwuegbuzie and Leech (2006, p. 480) stated that descriptive questions "simply seek to quantify responses on one or more variables". To collect data that informed the adaptation of the MB-CDI, the following questions were asked:

RQ 2: What is the relationship between age and vocabulary size among Xitsonga-speaking children aged 16 to 32 months?

RQ 3: What are the frequently used words by Xitsonga-speaking children aged 16 to 32 months in early language development?

Phase three: This phase also used descriptive and correlational questions to describe the trajectories of language development in Xitsonga-speaking children between the ages of 16 and 32 months from in Giyani, Limpopo. As this was the study's primary aim, the following sub-questions were asked:

RQ 4: What are the vocabulary compositions (semantic and syntactic categories) in Xitsonga-speaking children aged 16 to 32 months?

RQ 5: How do Xitsonga-speaking children aged 16 to 32 months acquire complex morphology, and what is the correlation with vocabulary size?

RQ 6: How do MLUs develop in Xitsonga-speaking children aged 16 to 32 months?

RQ 7: What is the relationship between MLU and other language development areas, such as vocabulary size and grammar complexity?

3.2.6. Planning and the design of the research

Steps 6 and 7 (see Figure 9) represent the planning stage. These steps are for selecting the study design and sampling design. Several authors mentioned different types of cross-cultural studies that are either exploratory or hypothesis testing. For example, Creswell and Plano Clark (2018) noted three approaches to the research process: qualitative, quantitative and mixed methods. Researchers believe that mixed methods research is critical in social research (Barnes & Bloch, 2019; Creswell & Plano Clark, 2018). For example, Wium and Louw (2018, p. 1) mentioned that mixed methods research focuses on “research questions that call for real-life contextual understanding, multilevel perspectives and cultural influences in their report”. They argued that mixed methods research involves both quantitative and qualitative methods that complement each other, with the former measuring constructs numerically and the latter exploring their meaning. The integration of these methods is done intentionally to draw on their strengths, and it helps align the investigation with philosophical and theoretical positions.

The MB-CDI had to be as particular to Xitsonga-speaking toddlers and Vatsonga culture as feasible. The researcher therefore chose the exploratory sequential mixed methods approach to address the objectives (see Figure 10). This design is a three-phase mixed methods design. The researcher started with collecting and analysing qualitative data, followed by a development phase of translating the qualitative findings into a tool to be tested quantitatively. In the translation process phase, the study employed a qualitative data collection process. The selection logic was grounded in the value of developing an in-depth understanding of the accurate translation of the MB-CDI. The strategy was to access appropriate data that ‘fit the purpose of the study, the resources available, the questions asked, and the constraints faced’ (Reybold et al., 2013, p. 700). As such, this adapted MB-CDI tool was grounded in the views of the participants. The emphasis was on exploring before the development phase. Finally, the researcher developed an instrument as an intermediate step between the phases. This phase built on the qualitative results of the quantitative data collection that followed in order to respond to the study’s objectives.

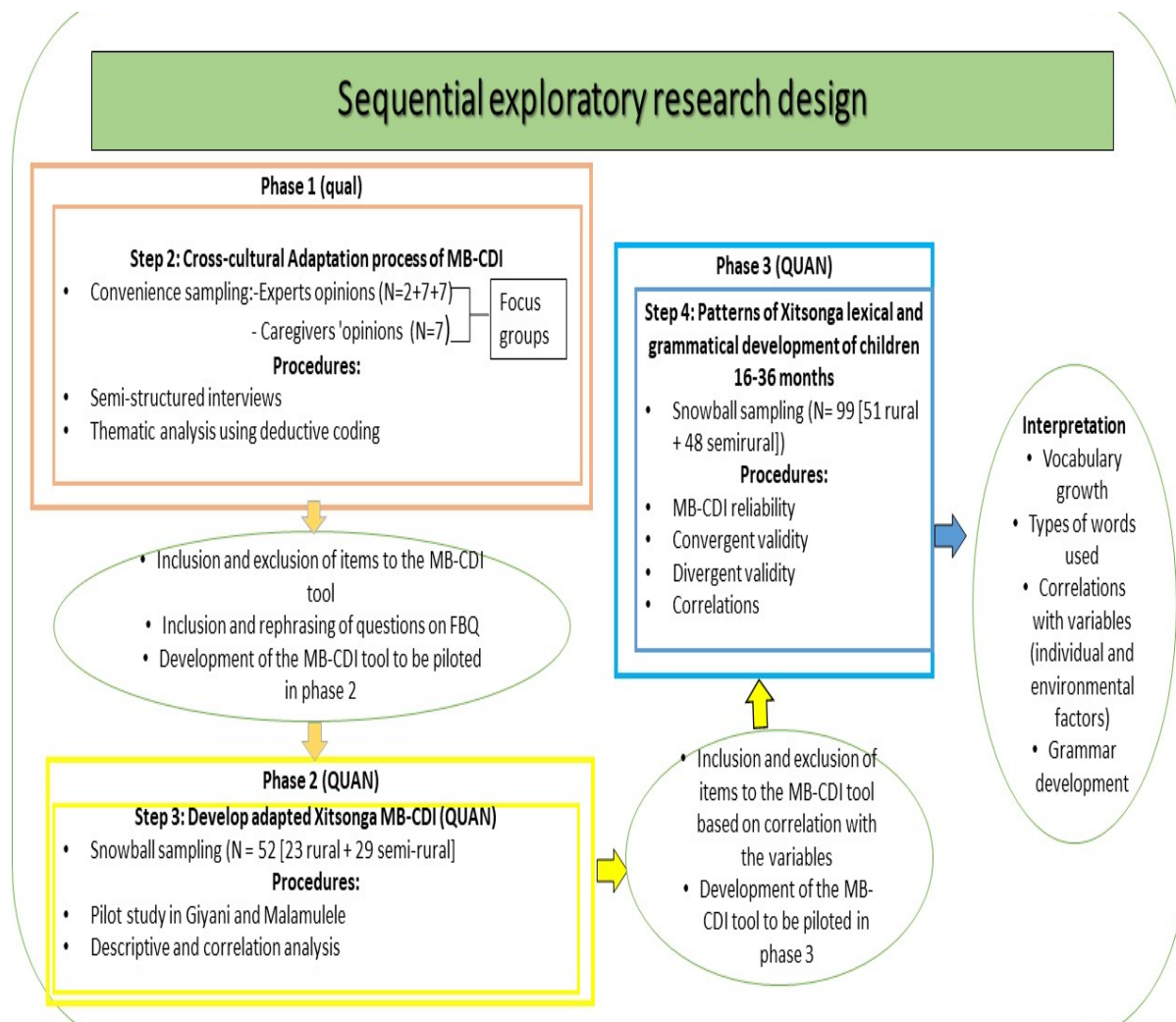


Figure 10: Sequential exploratory mixed method

This method allowed the researcher to implement the two strands in a sequence. The qualitative method occurred first – to explore a phenomenon and emphasise addressing the study’s purpose. Then, the quantitative methods followed to assess how the initial qualitative findings generalise to a population. In most cases, emphasis is on the second, quantitative strand, notated as qual → QUAN (Creswell & Plano Clark, 2018). Such designs are useful in designing and validating measurement instruments and evaluation criteria such as language tests, rating scales, surveys, and questionnaires.

There were three distinct interactive phases to the design (Creswell & Plano Clark, 2018; Hashemi & Babaii, 2013). These interactive phases looked at the real-life

context of language development by conducting interviews with experts and caregivers to develop the Xitsonga MB-CDI. The researcher expanded themes guided by Peña's (2007) cross-cultural methodologies of instrument development to include or exclude items that might result in cultural bias, or compromise validity and equivalence. In addition, these themes informed the development of the Family Background Questionnaire (FBQ) that followed the bioecological model of language acquisition and integrated the different systems' impact on early language development in Xitsonga (see Appendix C1). Many studies have included contextual information about the participants (Dowling & Whitelaw, 2018; Engel de Abreu et al., 2013; Naudé, 2012; Sousa & Rojjanasrirat, 2011). Furthermore, the researcher took into account the six class variables, which are: age (a rough index of maturational status), sex (reflecting a combination of biological and cultural factors), and six family and social class variables (birth order, SES, mother's education, father's education, mother's occupation, and father's occupation) (Alcock et al., 2015; Guillemin et al., 1993; Vogt et al., 2015). Finally, she used the developed MB-CDI form and the FBQ to collect the quantitative data. All these methods were integrated and used to describe the patterns of language development in Xitsonga.

Creswell and Plano Clark (2018) suggest that the exploratory design's primary intent is to develop and apply a quantitative measure, survey, intervention, digital tool, or new variables grounded in the qualitative data. For this study, the inclusion or exclusion of items in the MB-CDI relied on input from participants rather than just translating the tool developed for a different context (Boateng et al., 2020; Hernández et al., 2020). The context-specific development of the MB-CDI is likely to be relevant to the targeted group (Mdlalo et al., 2019; Pascoe & McLeod, 2016). This design, therefore, was invaluable for developing and testing the MB-CDI because there is not yet one available for Xitsonga. It is also appropriate when assessing the generalisability of qualitative results to different groups (Darinka et al., 2017) or testing aspects of an emergent theory or classification (Hernández et al., 2020), in this case, the cross-cultural and cross-linguistic adaptation of the MB-CDI.

3.2.7. Implementation of the research process

The third and last stage of the mixed methods research process is steps 9 to 12 (see Figure 9), according to Collins et al. (2006). These steps are the four phases outlined as data gathering, data analysis, data validation, and interpretation. They are interactive and cyclical, and the mixed methods researcher must be aware of the intentional and emergent link between quantitative and qualitative data throughout all four approaches. After data from at least one phase has been acquired, the information is either evaluated or validated. The outcomes of these studies are validated/legitimised if data analysis is the next step in the process (Collins et al., 2006; Creswell & Plano Clark, 2018).

3.3. Participants

3.3.1. Recruitment of participants

All participants were recruited based on their accessibility, geographical proximity, and availability at a given time or willingness to participate. Those who met the selection criteria were given invitation letters to participate in the study (see Appendix B4: Letter 3). Except for the panel of experts, participants were recruited from the Greater Giyani municipality in Limpopo Province, South Africa. Greater Giyani is one of five local municipalities falling within the Mopani District in Limpopo Province. Participants were recruited from the district clinics or health centres and NGO's operating in the surrounding villages. These areas were visited with the permission letter from the provincial and district health and social development offices. The letter (see Appendix B1: Information Sheet) explicitly explained the purpose of the study and the target age group for the study. In addition, the researcher liaised with the nursing staff in the identified clinics, put up posters around the clinics and provided handouts to attract potential participants.

The home-based care workers were also recruited to assist with their local communities' recruitment and data collection. All of them were trained as

fieldworkers for the recruitment process as well as data completion of the consent form and the questionnaire, both face-to-face and using Qualtrics. The initial phases used paper-based questionnaires. These were migrated to Qualtrics software to cater for COVID-19 regulations. The research assistants were trained in accessing and using Qualtrics on tablets provided by the researcher. They visited the participants' homes or called them via WhatsApp and went through the questionnaire on their tablets.

The nursing staff and the home-based care workers allowed the researcher to talk to caregivers whenever the researcher was available. The researcher, therefore, worked closely with the clinic manager and NGO directors to provide educational sessions about the research study and invited caregivers of children between 16 and 32 months to participate in the study. The educational sessions included discussing the purpose of the research study, the importance of caregivers' participation and the benefits. Refreshments were provided for the participants and their toddlers during the data collection period. Four research assistants familiar with the communities were recruited and remunerated. Research assistant training was done to familiarise them with the study and data collection procedures and outcomes. Due to the COVID-19 pandemic, online surveys were conducted for phase three data collection. Participants were given tokens of appreciation in data worth R30 and R150 food vouchers from local supermarkets.

3.3.2. Selection criteria

Translation phase: All translators needed to understand the culture and the developmental phases of Xitsonga-speaking toddlers (Chávez & Canino, 2005). In addition, the translators were fluent in English and Xitsonga, and had knowledge of the Xitsonga dialect spoken in Giyani. They needed to be available for this process.

Review phase: The same criteria were used for the team of experts and caregivers for the thinking-aloud sessions. However, they also needed to be in contact with children between the ages of 16 and 32 months.

For the pilot and main study, the researcher recruited participants in Giyani (semi-urban) and the neighbouring villages (rural) who were in contact with children aged 16 to 32 months daily. They needed to speak to these children predominantly in Xitsonga. It was important that the children had no history of developmental delays. With children from multiple births, only one child was included in the study.

Pilot study: Fourteen toddlers were excluded from the pilot study. Two participants' caregivers did not submit fully completed consent forms even though the questionnaires were completed. From the fourteen, the researcher excluded 12 participants because the children were out of the required age range of 16 to 32 months. This group included eight participants who completed the form and were below the age of 15 months and four above 32 months.

Main study: Two toddlers were excluded from the main study because the mothers spoke another language with the children at home, i.e., these children were exposed to a different language for more than 10 hours. MacLeod et al. (2013) reported that the extent to which a child is exposed to languages significantly impacts their ability to understand them. Therefore, the bilingual participants were children spoken to predominantly in Xitsonga. Of a set of triplets, only one of the children was included and the other two were excluded. Two children were excluded from the study because they had speech and language delays. These children were referred for a comprehensive speech and language assessment. Eight of the children were outside the 16 to 32 months range, and two cases were excluded from the final analysis as they were used by fieldworkers for training and practice.

Factors outlined in Table 8 are known to put children at a high risk of developing a primary language delay. These factors include preterm births ($n=3$), recurring ear infections ($n=4$), birth order (41% firstborns), speech and language problems ($n=4$) and day-care attendance ($n=10$).

Table 8: Factors affecting language development

Risk factors	Number of participants
<i>Mother's pregnancy</i>	
Less than eight months (less than 33 weeks)	3
Unknown	1
<i>Ear infection</i>	
History of ear infections	4
<i>Speech and language development</i>	
Delays in speech and language development (excluded from the study)	2
Exposed to languages other than Xitsonga (excluded from the study)	2
<i>Birth order</i>	
Firstborn child	41
One older sibling	30
Two older siblings	22
Three or more older siblings	6
<i>Multiple births</i>	
Twin/Triplet	2
<i>Day-care attendance</i>	
Attending	10
<i>Number of days per week</i>	
Number of days <5 days	9
Number of days >5 days	1
<i>Number of hours per day</i>	
Number of hours <9 hours	7
Number of hours >9 hours	3
<i>Other language (English)</i>	1

Even though several studies have suggested that delaying the diagnosis of ear infections may have an impact on language development (Badran et al., 2013; Mukara et al., 2017; Torre III et al., 2016), other researchers have found that the association between ear infections in infancy and early language development is dependent on the age of the otitis media episode and the frequency of these episodes (Binoy Shany

et al., 2014; Dale et al., 2003; Wang et al., 2021). As a result, the researcher included four children with a history of ear infections. She also included three preterm babies because there was no report of developmental delay.

3.4. Sampling size and description of participants

The three phases of the study involved three different sets of participants. The study used a purposeful sampling method for the initial qualitative phase. Participants who met specific practical criteria, such as easy accessibility, geographical proximity, availability at a given time, and willingness to participate, were included. The method of choice was convenience sampling. In phases two and three, quantitative data were collected using snowball sampling methods. Participants who met the inclusion criteria and consented to participate in the study were included in the study (Creswell & Plano Clark, 2018; Etikan, 2016; Leedy & Ormrod, 2015).

The Southern African CDI team² held several workshops and consultations with Dr Alcock, who has undertaken similar work in Kenya and Malawi. The World Health Organization (2019) document on the process of translation and adaptation of instruments states that researchers should use one translator for the forward translation and another translator for the back translation. Beaton et al. (2000) recommend two translators for the forward translation and two for the backwards translation.

The translation phase: The researcher recruited four translators to translate the MB-CDI and the FBQ from English to Xitsonga and back to English. The principal researcher is an experienced speech-language pathologist whose first language is Xitsonga. Fluent in Xitsonga and English, she was the first translator (T1). A Xitsonga Grade 12 teacher recruited to be the second translator (T2) is fluent in Xitsonga and

² Information about the Southern African CDI team including team members' profiles can be accessed at <https://sa-cdi.org/>

English and has over 20 years' experience teaching Xitsonga in high school. For back translating to English, the researcher recruited a mother of a 4 year-old fluent in English and Xitsonga to be the first back-translator (BT1). She worked as a childminder and reported speaking to her child predominantly in Xitsonga. The second back translator (BT2) was a practising speech-language pathologist, also fluent in English and Xitsonga, who had a 12 month old daughter at the time of the translations (Chávez & Canino, 2005).

The review phase: Several studies recommend between three and ten participants when deciding on the number of participants to form focus groups, including the researcher as a facilitator (Creswell & Plano Clark, 2018; Etikan, 2016; Leedy & Ormrod, 2015; World Health Organization, 2019). The initial expert focus group had six participants, outlined in Table 9.

Table 9: Expert focus group one

Participant	Age	Sex	Occupation
1	62 years	Female	Former Xitsonga teacher
2	56 years	Female	Current Xitsonga teacher
3	76 Years	Male	Anthropologist
4	44 Years	Female	Speech-Language Pathologist
5	35 Years	Female	Social Worker
6	53 years	Female	Grandmother

The familiarity of some members with each other and the cultural values of respect meant this first focus group of the expert committee was challenging. One member held a higher rank due to age and mentorship. This member dominated the discussion and disputed other members' contributions if they did not align with the member's own views. Hennink (2017) stated that applying principles of focus group research while embracing the cultural norms in a given research context may pose a challenge, as observed with this group. This situation required flexibility in managing the group's tasks and relied on the researcher's skills to facilitate focus groups. After the first group's challenges and a clear need for richer data, the researcher recruited

another expert focus group. The second expert focus group details are outlined in Table 10.

Table 10: Expert focus group two

Participants	Age	Sex	Occupation
1	56 years	Male	Community, director of an NGO
2	48 years	Female	Social Worker
3	49 years	Male	Xitsonga teacher
4	28 years	Female	Speech-Language Pathologist
5	34 years	Female	Social Work student
6	26 years	Female	Mother
7	43 years	Female	ECD centre assistant

Both the expert focus groups had limited participants with children in the required age range. The initial focus group had a grandmother who stays with her 26-month-old granddaughter. The second focus group had one father with a two-year-old son and a grandmother with a three-year-old grandson. All other participants had no current experience with children within the required age range. However, they were experts in child language and the Xitsonga language. A childminder working at one of the Early Childhood Development (ECD) centres withdrew from participating, being non-fluent in English. This left a total number of six participants in the second group.

The parents' focus group had 8 caregivers with children in the age range (see Table 11). They were recruited for 'thinking aloud' sessions. A parent in an African context is often viewed as the primary caregiver and protector of the family. The role of a parent in African culture extends beyond the biological relationship and includes responsibilities to the extended family and community. According to Mbiti (2006), the African concept of a parent involves caring, nurturing, teaching, and guiding the child, and it is believed that parents have a moral obligation to instil cultural and societal values in their children. One parent had to leave early due to a family emergency, and one parent reported that she was not fluent in English. They reviewed the translated

versions of the Xitsonga CDI and gave input (Waddington & Bull, 2007). Although the sessions were audio recorded for both focus groups, the facilitator (the researcher) also observed and diarised the events that were not immediately obvious or in case they could not be heard on the audio recording (International Test Commission, 2018; World Health Organization, 2019; Waddington & Bull, 2007). In addition, the researcher used member checking by giving a summary of the discussions and observations at the end of the session to increase the validity of the qualitative findings (Creswell & Creswell, 2018).

Table 11: Parent focus group

Participants	Age	Sex	Relationship to child	Experience with children
1	34 years	Female	Mother	Yes- has a 36 month old boy
2	22 years	Female	Mother	Yes – has an 18 month old girl
3	25 years	Female	Aunt	Yes – taking care of a 24 month old nephew
4	28 years	Female	Mother	Yes- has a 9-month old girl
5	52 years	Female	Grandmother	Yes – has a 24 month-old granddaughter and 10-month old grandson
6	26 years	Female	Mother	Yes – has a 30 month old daughter
7	42 years	Female	Aunt	Yes - 13 month old boy (left before the interview was completed.
8	34 years	Female	Research assistant	No

Six of the seven participants ($n=7$) in the parent focus group reported having a child or children between the ages of 16 and 32 months, and one had a 3 year old. The 8th person assisted the researcher with recording the conversation, taking notes, and writing down any behaviours observed during the interviews. Three caregivers brought their children. The children were cooperative and minimally disruptive. They

were given toys and lollipops and were checked on and cared for by the research assistant. All members participated equally in the discussions. They all gave consent by completing the forms and agreeing to participate in the study. Members of the focus groups were females, aged 22 to 52 years, fluent in Xitsonga and English, and they understood the culture and language development stages of the Xitsonga (Chávez & Canino, 2005; Guimarães et al., 2013; International Test Commission, 2018).

The pilot phase: The researcher recruited 71 caregivers to pilot the reviewed Xitsonga MB-CDI questionnaire (World Health Organization, 2019). Initially, 56 child participants were included ($M = 22$; $SD = 6.6$). Table 12 shows the age, sex and area where child participants were recruited.

Table 12: Pilot phase child participants' age, sex, and context ($n=43$)

	Semi-urban		Rural		TOTAL
	Females	Males	Females	Males	
16-18 months	4	0	4	3	11
19-21 months	4	1	2	2	9
22-24 months	5	3	1	1	10
25-27 months	2	3	2	1	8
28-30 months	1	1	0	0	2
31-32 months	1	0	2	0	3
TOTAL	17	8	11	7	43

The aim of the pilot phase was to evaluate children aged 16 to 32 months' knowledge of words included in the Xitsonga MB-CDI. Here, the researcher aimed to assess the equivalence of Xitsonga translated words against original English words and determine the best words to include in the tool. Although the aim was not necessarily to look at the early language development patterns, 12 children were excluded being out of the age range , and one was excluded because their sex was not

indicated. When these children were excluded, the sample size was 43 ($M = 22.5$; $SD = 4.6$). There was no significant difference between the mean age and SD of the initial sample and the final sample after exclusion. However, excluding these children meant unequal distribution in terms of age and sex. Due to time constraints and the COVID-19 pandemic, no additional data were collected. To increase the validity of the items included, the researcher compared and collated the data with that of other languages studied in the SA-CDI project.

Perneger et al. (2015) support the argument that findings from a pre-test sample are key to the translation, adaptation or development of an instrument. Selecting a sample size is based on the probability that should the size be smaller, the chance of detecting the problem may also be smaller. They concluded that, despite prior studies indicating that a pre-test sample size of five to eight participants might be used, 32 participants were necessary to establish an 80% power to detect a problem. The majority of the caregivers who completed the questionnaires were the mothers of these children (75%). Grandmothers and aunts contributed 23% of the total, while an uncle was responsible for 2%. The household income interquartile range (IQR) was R1375, with a minimum of R430 and a maximum of R9000 per month. At least 16% of the participants did not respond to questions about income and monthly household expenses. Cherla et al. (2019) reported that participants often choose nondisclosure about their financial condition for future monetary gain or the respondent not seeing the relevance of the question.

The main study: The researcher recruited 113 child participants; however, 14 were excluded for the reasons discussed in section 3.3.2. Data were collected using the adapted MB-CDI with a larger sample ($n=99$) to determine validity and feasibility of using this tool to describe lexical and grammatical growth in Xitsonga. The sample was collected from children aged 16 to 32 months ($M = 23.1$; $SD = 5.0$). Creswell and Plano Clark (2018) state that a sample size of at least 30 participants is sufficient for a correlational analysis. This preliminary study is part of a larger project in Southern Africa. Similar studies reported that 20 to 40 participants could yield the desired

results for this process (Vogt et al., 2015; Whitelaw, 2018). Table 13 provides an overview of the main study toddlers.

Table 13: Main study child participants' age, sex, and context ($n=99$)

Age	Semi-urban female	Semi-urban male	Rural female	Rural male	TOTAL
16-18 months	5	4	5	10	24
19-21 months	3	5	4	7	19
22-24 months	5	2	4	4	15
25-27 months	1	4	3	7	15
28-30 months	3	8	3	3	17
31-32 months	3	1	3	2	9
TOTAL	20	24	22	33	99

The researcher aimed to recruit 20 child participants in each age group with equal distribution in both contexts (rural and semi-urban) and sex (female and male). However, the distribution differed, with some age groups having more child participants and others slightly fewer. The rural context had 55 child participants, with 60% being males ($M = 22.5$; $SD = 4.9$). The semi-urban context had 44 child participants ($M = 23.8$; $SD = 5.1$), with females being fewer than males at 45%.

3.5. Data collection tools

A Xitsonga language development measure was needed but did not exist, and therefore had to be developed specifically for the study. A Xitsonga MB-CDI must not discriminate against low-income and rural children, which would jeopardise the tool's validity. The tool should provide information about age-appropriate norms for Xitsonga-speaking children independent of a child's SES or geographic area and be reliable and valid for use with this population.

3.5.1. Family Background Questionnaire

To investigate socio-demographic factors affecting vocabulary size variability, the researchers adapted an existing FBQ used by linguists at the University of Stellenbosch. The FBQ was adapted for Southern African contexts after collaboration with experts and the Southern African CDI team during several workshops (see Appendix C1: Family Questionnaire). For example, housing in South Africa varies widely. In rural areas, people might have several rondavels, equivalent to having several rooms (see Figure 11), and standard questions posed regarding house size may not reflect this. The FBQ asked about the type of housing to interpret the family's economic status.



Figure 11: Housing in typical villages in Giyani

The FBQ was used to collect socio-demographic information about the children and used as a measure of individual and environmental factors against which to examine patterns of vocabulary growth. The questionnaire asked about the individual and environmental factors outlined in Table 7, Table 13, Table 14 and Table 15.

The majority of the caregivers who completed the questionnaires were the mothers of the children. For semi-urban participants, mothers constituted 93% of the

adults compared to 75% of mothers in rural areas. Of the total sample, 56% of participants were from semi-urban areas, and the male toddlers accounted for 58% (see Table 12 in section 3.4.1). The rural percentage is expected to be higher because of the distribution of rural vs semi-urban dwellings in Limpopo. The majority of the dwellings are in rural areas. Statistics South Africa (2012) recorded that Limpopo has the lowest percentage (13.3%) of its population living in urban areas. Table 14 outlines the living arrangements of children participating in this study.

Table 14: Child participants' living arrangements

Living arrangement		Number of participants			
The child lives in more than one home		6			
Number of adults living with the child 1		3			
Number of adults living with the child (2 to 3)		63			
Number of adults living with the child >4		32			
Did not respond		1			
Adults living in the home with the child					
Single parent (mother/ father)		15			
Grandparent/s only		22			
Mother and father		20			
Parent/s and grandparent/s		41			
Others (relationship not mentioned)		1			
Children living with the child					
No other children		17			
1 other child		27			
2 other children		26			
More than 3 other children		29			
Ages of children living with the child		0-2years	2-5 years	6-11 years	12-17 years
No children		61	71	48	70
1 child		31	20	42	22
2 children		6	7	8	7
3 children		0	1	0	0
4+ children		1	0	1	0
TOTAL		99	99	99	99

Only six children were reported to be living in more than one household. It was established that these children stayed with grandparents during the week as their parents work away from home. They stayed with their parents during weekends and school holidays. The majority of the children (63%) were reported to live in the same household as their parents with between two to three adults. Only three (3%) children were reported to live with just one parent. Forty-one (41%) of the children lived with one or both of their parents and their grandparents. Fifty-five (55%) children shared a household with more than two children. Table 15 shows parental ages of the children in this study.

Table 15: Parental ages at the birth of the first child

Parent age	Mother	Father
<20	7	1
21-25	21	11
26-30	29	15
31-35	20	15
36-39	14	14
>40	8	15
Unknown	n/a	28
TOTAL	99	99

From this study, seven mothers were younger than 20 years old when they gave birth to their first child. About twenty-eight (28%) of the respondents did not know the age of the child's father. Table 16 outlines the education and income background of the parents.

Table 16: Main study parental education and income (n=99)

Parent qualification	Mother (%)	Father (%)
No formal education	0(0.0)	0
Completed primary education	1(1.01)	0
Did not complete high school	29	25
Completed high school	38	34
Studied beyond high school	29	15
Not known	2	25
Employment	Mother	Father
Unemployed	72	39
Employed	22	34
Self-employed	3	4
Unknown	2	21

Household income per month	Rural	Semi-urban
No income	2	1
R601 – R1 200	19	4
R1 201 – R2 400	18	5
R2 401 – R5 000	5	10
R5 001 – R10 000	7	11
R10 001 – R20 000	1	7
R20 001 – R40 000	0	3
R40 001 – R80 000	0	1
Unknown	3	2

All parents in this study had some formal education. The majority (38% of the mothers and 34% of the fathers) had completed high school (Grade 12/matric). The proportion of mothers who studied beyond high school (29%) was greater than that of the fathers, although many respondents did not know the education history of the fathers ($n = 25$). The majority of the mothers were unemployed, with 21% of participants reporting not knowing the fathers' income. Forty-four (80%) of the households earned less than R5000 a month in the rural context compared to 77% earning more than R5000 in the semi-urban context. The majority of other children

staying in the same household as the toddler were between 6 and 11 years old (42%) or between zero and two years old (31%).

3.5.2. MacArthur-Bates Communicative Development Inventory

The MB-CDI comprises an infant form (words and gestures) and a toddler form (words and sentences). They aim to document detailed information on early communicative skills. Initially, the only assessment tools available were screening instruments that sampled limited examples of early communicative behaviours to identify children with early language disorders. The MB-CDIs progressed from free-form interviews with caregivers to highly structured checklists administered orally and then to the current self-administered checklist format, which is the final version of the MB-CDI (Bates et al., 1994; Fenson et al., 1994). There are two sections (Part I and II) of the MB-CDI.

Part I: *“words children use”*, has 22 broad semantic categories listed in Table 17. According to Fenson et al. (1994), it is a word vocabulary production checklist of 680 words. The *“helping verbs”* category was excluded as it was found not to be applicable in the African indigenous languages.

Table 17: English MB-CDI categories and number of items (Fenson et al., 1994)

	Semantic categories	No of items
1.	sound effects and animal sounds	12
2.	animals (real or toy)	43
3.	transport/ vehicles (real or toy)	14
4.	toys	18
5.	food and drinks	68
6.	clothing	28
7.	body parts	27
8.	small household	50
9.	furniture and rooms	33
10.	outside things	31
11.	places to go	22
12.	people	29
13.	games and routines	25
14.	action words	103
15.	descriptive words	63
16.	words about time	12
17.	pronouns	25
18.	question words	7
19.	prepositions and areas	26
20.	quantifiers and articles	17
21.	helping verbs	21
22.	connecting words	6

Fenson and colleagues found that individual item data from the MB-CDI proved helpful when developing stimulus materials for experimental studies, for clinical use or testing hypotheses about the relative time of emergence of items and item categories. Additionally, they documented more extensive normative data on the acquisition of individual lexical items, including month-by-month percentages of words reported to be understood (8 to 16 months) and produced by children (8 to 30 months) over a longer period (Fenson et al., 1994). This study focused on the toddler form for children aged 16 to 30 months (see Appendix D: Xitsonga Adapted CDI Version 1). The form is used to document words that the child uses and their sentences

and grammar (Bates et al., 1994; Dale & Penfold, 2011). Table 17 outlines the categories and number of items in each category of the toddler form. However, the approach for assessing grammar is different from that of vocabulary.

Part II: “*sentences and grammar*” is organised into five sections to assess morphological and syntactic development. The morphological development is assessed by sections A and C (word endings) and B (word forms), whilst sections D and E assess syntactical development. Table 18 shows the areas of the “*sentences and grammar*” section.

Table 18: Areas of the morphological and syntactic development sections of the MB-CDI

	Area of development	Area assessed	Examples
A.	Word endings (Part I)	Questions tested production of plurals, adjective agreement, tenses (past and present continuous)	-s to denote plurals, possessive markers, tenses
B.	Word forms	Use a checklist to assess the child’s use of NCs, irregular forms and overgeneralisations	broke, ran/tooths, eaten
C.	Word endings (Part II)	Questions tested production of plurals, adjective agreement, tenses (past and present continuous)	-s to denote plurals, possessive markers, tenses
D.	Sentence length	Assess MLUs	Parents to write down three of the longest sentences the child has used recently
E.	Sentence complexity	Assess the presence or absence of copulas, helping verbs, possessives, plurals, tense markers, prepositions and articles in obligatory contexts	“where’s my dolly” vs “where’s my dolly named Ntombi”

IsiXhosa has a rich morphological representation of copulas that assimilates their NC systems (Du Plessis, 2010). As a result, the copula “*i*” was included for Xitsonga. However, Xitsonga, like the other African languages, has tense-aspect markers. The

SA-CDI team agreed on verbs to assess the various tense-aspect markers. For example, the English MB-CDI had one verb with the identified error: [eat] vs [eated] or [blow] vs [blowed]. As documented information on these errors does not exist for Xitsonga, the checklists had two or three words such as “*dya*” [eat], “*dye*” [ate], “*dyile*” [eaten] to establish what children will commonly use between 16 and 32 months. For uniformity, other word forms were included for the Xitsonga MB-CDI.

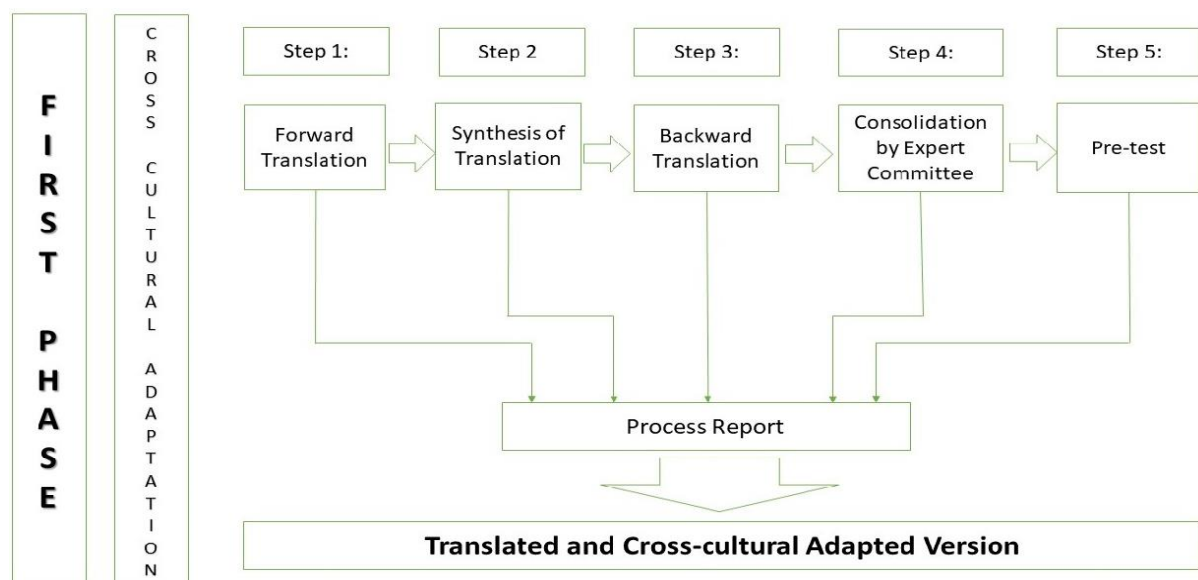
The literature on overgeneralisation in the early development of African indigenous languages is limited. However, there is some evidence to suggest that overgeneralisation may be less common in these languages than in other languages. For example, one study found that Sotho-speaking children made significantly fewer overgeneralisation errors than English-speaking children (Demuth, 1988). For detailed findings on the items included or excluded in the “*Sentence and Grammar*” section of the adapted Xitsonga MB-CDI, see section 4.5. In this study, caregivers were given three options for describing their child’s combinatorial language: “not yet,” “sometimes,” and “often”. Geisinger (1994) noted that even if the test itself does not change, whenever a measure is applied to a population that is qualitatively different from the one for which it was initially established, one must assess its continued usefulness and validity in that new demographic.

3.5.3. Cross-cultural adaptation of Xitsonga MB-CDI

The CDI board strongly discourage translations of the instrument or any other assessment instrument; instead, they recommend a linguistic and cultural adaptation (CDI Advisory Board, 2015). The International Test Commission (2018) informs test developers, users and administrators always to address fairness issues when assessing linguistically or culturally diverse individuals. It also supports findings by other researchers within the area of language development and assessment tools (Alcock et al., 2015; Bornman et al., 2010; Dale & Penfold, 2011; Pascoe & McLeod, 2016; Sousa & Rojjanasrirat, 2011; Steele & Edwards, 2008; Vogt et al., 2015).

Machado et al. (2018) did a systematic review of cross-cultural adaptation methods and reported that the steps proposed by Beaton et al. (2007) were valid and

reliable. Bornman et al. (2010) identified four conceptual and methodological issues to be considered, including equivalences focusing on language, function, culture, and metrics. This study employed the evidence-based model proposed by these authors to achieve equivalent items for the Xitsonga MB-CDI. Linguistic equivalence of the MB-CDI and the FBQ was achieved by translating these tools using “blind-back translation” methods and expert review (Beaton et al., 2007; Beaton et al., 2000;



Machado et al., 2018). Figure 12 shows the translation process employed in the adaptation phase of this study.

Figure 12: Forward-backwards translation process (adapted from Beaton et al., 2000)

3.5.3.1. Translations

A meeting was held with the translators to synthesise the translations before the focus groups consolidated them to reach a consensus on all translations. The researchers concluded by modifying the MB-CDI to render the instrument linguistically and culturally relevant before the thinking-out-loud sessions with the focus groups (Jackson-Maldonado et al., 2013). The modifications were in line with what had been done previously with the Italian version, for example. The Spanish content also reflected culturally appropriate vocabulary and routines (Caselli et al., 1999; Caselli et al., 1995; Peña, 2007). Similarly, in the study done in southern Mozambique, Vogt and colleagues identified 38 conceptual items that were not

culturally appropriate and replaced them with words considered more suitable for Mozambican families' culture, lifestyle, and environment.

All replaced words in Vogt and colleagues' study fulfilled the syntactic-semantic properties of the original item. For example, they replaced words such as: "*goat* for *duck*, an *ox* for *lion*, *cellphone* for *television*, and *bring* for *help*" (Vogt et al., 2015, p. 3). The modified questionnaire was then presented to the focus groups for thinking-out-loud sessions to adapt the instrument. Detailed findings of the translation process are discussed in section 4.2. As this study was part of a larger project, the Southern African CDI team also decided on words that could be excluded or included in the pilot study for uniformity across all the studied languages. The "*sentence and grammar*" sections for all the African languages in the Southern African CDI project were created similarly and, to a certain extent, informed by other studies done in African contexts.

3.5.3.2. Review of the draft instrument

To create the pre-final version of the questionnaire for pre-testing/piloting, the translated questionnaires were consolidated by the expert committee and the caregivers invited to the focus groups. For the FBQ, Boateng et al. (2018) identified five key item features that are necessary to guarantee the accuracy of construct measurement. These include the requirement that "(a) items be consistently understood; (b) items be administered to or communicated to respondents consistently; (c) items have a consistently communicated clear answer; (d) all respondents have access to the information necessary to answer the question accurately; and (e) respondents consistently provide the correct answers as specified by the question" (Boateng et al., 2018, p. 5). For the MB-CDI questionnaire, the committee reviewed the items and determined if there were any discrepancies (Beaton et al., 2000; Geisinger, 1994; Machado et al., 2018). Following the review by the focus group, an adapted Xitsonga MB-CDI (see Appendix D: Xitsonga Adapted CDI Version 1) was developed to be piloted.

3.5.3.3. Pilot of the draft Xitsonga MB-CDI

The pre-test was the last step in the adaptation process. The pre-final version of the Xitsonga MB-CDI was piloted on 56 caregivers with children between 16 and 32 months, who predominantly spoke Xitsonga and resided in Giyani or the neighbouring villages. However, only 43 MB-CDI responses were analysed (see section 3.4.1 for sample size). Beaton et al. (2000) stated that it is acceptable to include between 30 and 40 individuals for the pilot phase. Boateng et al. (2018) introduced two main parts of the pre-testing phase. First, an analysis of how well the questions reflect the original questionnaire. Second, a test of how effectively the responses to the questions yield reliable measurements. The construct validity, reliability, and item response patterns that are also essential to describing a successful cross-cultural adaptation should be acknowledged. Even though this stage does offer some helpful information about how the person interprets the questionnaire items, it is not a substitute for testing validity and reliability (Beaton et al., 2000; Boateng et al., 2018).

Where there were many gaps in the responses, a spontaneous language sample was used to check the use of the word classes or grammatical structures. In their study in Kenya, Alcock et al. (2015) piloted three drafts to develop 765-word vocabulary checklists for Kigirima and Kiswahili-speaking mothers. After the first pilot, a 750-word vocabulary checklist was used for the second pilot. From this pilot, the researcher included 635 items to be used for the adaptation phase of the Xitsonga MB-CDI. Several researchers have pointed out the limitations of CDIs in measuring language development (Feldman et al., 2000; Stiles, 1994; Tomasello & Mervis, 1994). For example, Hoff (2013a) argues that CDIs may be limited in their ability to capture the full range of children's language abilities and that they may not be sensitive enough to detect individual differences in language development. Similarly, Oller and Eilers (2002) argue that CDIs may not be sufficient for assessing children's language development in multilingual contexts. Alcock and Alibhai (2013) supported Childers et al. (2007), stating that spontaneous samples have been proven to represent children's early vocabulary accurately.

The pilot results allowed for the development of the Xitsonga MB-CDI used to report on trajectories and variabilities in early lexical and grammatical development in Xitsonga-speaking children between 16 and 32 months. The Xitsonga CDI version can be found at:

https://clinicallylinguistic.fra1.qualtrics.com/jfe/form/SV_51HX5SejXUT8FBc.

3.5.4. Validity and reliability of the Xitsonga MB-CDI

Validity and reliability are key considerations of an assessment tool's quality. Methods used to evaluate validity and reliability include observations, laboratory-based experimental methods, comparison with previously transcribed samples of children's speech, and even standardised evaluation tools (Alcock et al., 2015; Kimberlin & Winterstein, 2008). Although spontaneous speech data was collected, the study opted for the established approach of Vogt et al. (2015). Rather than analyzing transcribed speech for frequency lists, their method utilized parental interviews, fieldworker consultations, and multiple rounds of piloting and adaptations to tailor the MB-CDI to the specific context. In this study, validity and reliability was ensured by consulting a team of experts in Xitsonga, piloting the Xitsonga MB-CDI twice (first as the pre-test and second as the main study), and through descriptive analysis and correlations. The descriptive analysis used few criteria to assess the ceiling and floor effects. The researcher looked at distribution, graphical representations, corrected item-total correlation, difficulty, discriminability and correlation with age. Internal consistency was evaluated using Cronbach's alpha. These analyses assisted in the finalisation (inclusion and exclusion) of lexical items. Only three criteria were used for the sentence and grammar section. These were reliability, correlation with vocabulary and correlation with age.

3.5.4.1. Reliability

Fenson et al. (1994) reported that there are certain unique challenges in estimating and interpreting the reliability of a parent-report measurement. Internal consistency and test-retest measures may yield naturally high indices as a result of a

halo effect or as a result of parents remembering and repeating their prior answers regardless of their accuracy, i.e., an assessment tool's unreliability increases with the number of errors identified in it, and vice versa. Reliability is a key component of assessment and is viewed as a characteristic that enhances validity rather than as a factor that undermines validity. The Fenson et al. (1994) study revealed that the MB-CDI is reliable as it yielded Cronbach alpha levels of > 0.96 for the toddler production form with the corrected item-whole correlation of > 0.70 .

For this study, the form's internal consistency was calculated for the entire form, each part by age group. It yielded Cronbach alpha levels of > 0.98 . Additionally, due to the variability of the data distribution the Spearman coefficient was used to determine the correlation between the scores of the two sections and the correlation of each section with age. Internal consistency is an excellent technique to evaluate reliability of one dataset. It can be calculated without having to repeat the test or consult other researchers (Middleton, 2022). Table 19 shows that for pilot two (the main study described in this thesis), Cronbach's alpha was high ($> .90$, as per Tavakol & Dennick, 2011) for both the vocabulary (lexical items) and grammar sections.

Table 19: Internal consistency for Xitsonga MB-CDI

Section	N	Number of variables	Cronbach's alpha
Lexical items	99	728	.998
Sentences and grammar	99	27	.942 - .948

There was variability in the scores due to individual and SES factors. However, there was a strong correlation with age for both vocabulary production ($r = .45; p < .001$) and sentences and grammar ($r = .54, p < .001$) indicating sensitivity to age.

3.5.4.2. Validity

Validity requires approaches that address potential threats to drawing correct inferences from the integrated data (Creswell & Plano Clark, 2018). The findings of

the first objective informed the development of the adapted Xitsonga MB-CDI. The researcher systematically followed the stages of cross-cultural adaptation seen in Chapter Two, adapted from a published, theoretically sound framework. The adaptation process and validity of the Xitsonga MB-CDI were established with what Punch (2013) describes as **criterion-related validity**. The relation between the vocabulary size and socio-demographic factors was analysed and demonstrated that the Xitsonga MB-CDI does measure the vocabulary and grammatical development of Xitsonga-speaking toddlers in this study ($r = .45$; $p < .001$). The term “gold standard” measurement is frequently used to describe criterion variables. However, Xitsonga does not have additional assessments regarded as reliable indicators of language development. As a result, predictive validity was determined using similar studies in related languages such as Chichewa, Rhonga, and Kiswahili (Alcock et al., 2015).

Content and face validity were achieved by consulting with an expert panel and caregivers to ensure that the language used was culturally and linguistically acceptable for all participants. This study is also a sub-study of larger research work being undertaken by the Southern African CDI team in collaboration with international experts. It was, therefore, consistent with the other studies. Alcock et al. (2015) and Vogt et al. (2015) reported on face validity in their studies, noting that the quality of their indicators appeared to be a reasonable measure of the variable under consideration. In addition, the items recorded by caregivers were validated by comparing them with the other languages within the bigger study (Alcock et al., 2015; Babbie, 2013). Alcock et al. (2015) also reported that their transcribed language samples corresponded well with parent-reported vocabulary comprehension and production. Rather than adapting the MB-CDI using frequency lists resulting from transcribed spontaneous language samples, Vogt et al. (2015) relied on the results from parental interviews, consultations with fieldworkers, and a few rounds of piloting and readapting the tool.

With regard to **construct validity**, Fenson et al. (1994) recommend comparing the parent report with child performance obtained from a language sample to show evidence of construct validity. In addition, they recommend transcribing the language

samples and conducting qualitative, descriptive-linguistic analyses and quantitative comparisons. The focus groups and thinking-out-loud sessions were conducted to evaluate the items and statistical analyses were done to determine correlations and comparisons of the different groups (e.g., male and female, rural and semi-urban).

3.6. Research context

This study was conducted in Giyani and Malamulele, predominantly Xitsonga-speaking areas of South Africa. The geographic area of the research context can be seen in Figure 13.



Figure 13: Map of South Africa showing the research context

The researcher acknowledged the cultural norms and values of Vatsonga during the research process. Risenga (2002) recognised that Vatsonga communities are normatively organised and respectful (*"ku xixima"*). Protocol and hierarchy are significant to them. The undocumented indigenous knowledge includes the

normative order that underpins behaviours and attitudes. It is the bedrock of how people embrace their culture, diversity, complexity, and interconnected patterns (Risenga, 2002). Therefore, following the protocol outlined by the research assistants from those communities was important. The local research assistants served as guides on how to engage with the communities. Whitelaw (2018) stated that monolingual isiXhosa speakers might be raised in either rural or urban settings, and in both these settings of South Africa, low and high SES groups can be found. This statement is also true for Xitsonga-speaking families.

According to De Klerk and Gough (2002), English becomes increasingly widespread in families who speak local indigenous languages as they rise in economic status. As a result, children from affluent Xitsonga families are unlikely to be monolingual. Their parents most likely will begin teaching them English at a young age to enroll them in English-speaking schools. Dijkstra et al. (2020) noted that comparing urban and rural regions across national boundaries is challenging because official definitions of these areas vary substantially from country to country. One cannot learn from other nations' policies if the performance of urban and rural areas across national borders cannot be compared. It also implies that one cannot compare the metrics for urban and rural regions in the United Nations' Sustainable Development Goals (SDGs) across nations (Pillay et al., 2020).

Dijkstra et al. (2020) believe that standardising the classification approach could enable the discovery and assessment of effective policies in different nations that improve the quality of life in these areas, leading to more widespread application of such policies. It would also aid in monitoring service and infrastructure access and other SDG indicators in a form that allows for meaningful comparison and aggregation. This technique will be further developed and tested in some nations throughout the world. The Statistics South Africa (2001) discussion report on *"Investigation into appropriate definitions of urban and rural areas for South Africa"* acknowledges changes in South Africa's approach to dividing the area into urban and rural sections.

The Municipal Demarcation Board has begun to move away from this classification in favour of a more encompassing municipal one. However, this concept is still relevant for the statistical classification of key government programmes like integrated rural development and urban regeneration programmes (Statistics SA, 2012). The Census 2001 enumeration area (EA) type illustrates how the 16 EA types of Census 1996 can be divided into urban, semi-urban, and rural areas and subsequently into urban and non-urban areas. Semi-urban regions were merged with rural areas as non-urban areas in 1996. Figure 14 shows the map of Giyani and Malamulele classified as semi-urban.

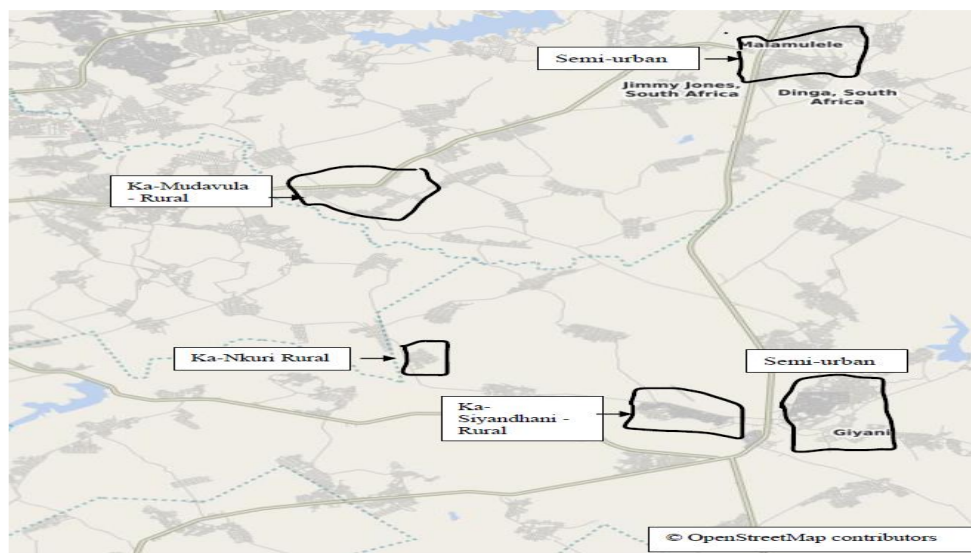


Figure 14: Map of Malamulele and Giyani classified as semi-urban according to OpenStreetMap
<https://www.openstreetmap.org/search?query=Giyani#map=13/-23.3153/30.7256>

The majority of the people in Limpopo live in non-urban areas. According to the 1996 classification, EAs are divided into five categories: urban formal; urban informal; commercial farms; tribal authority areas; and other non-urban areas. The EA Geography in 2001 is represented by the first four items listed above. The 'other non-urban areas' group was classified based on where it fell within the other four categories. In addition to these classifications, the Municipal Demarcation Board added semi-urban: formal and semi-urban: informal. From this new classification,

areas such as Giyani and Malamulele could be classified as semi-urban formal and not typical rural. However, the surrounding villages chosen for this study are typically classified as rural areas (Statistics South Africa, 2012). These areas were selected because they are predominantly Xitsonga-speaking areas.

3.7. Data collection

Before the data collection process, Leedy and Ormrod (2015) propose that the researcher must consider ethical aspects and not expose participants to unnecessary physical or psychological harm. In this section, we explore ethical considerations guiding our data collection process.

3.7.1. Ethical consideration

The researcher began by getting permission from the CDI Advisory Board to create an adaptation of the MB-CDI for Xitsonga before embarking on the project (see Appendix A1: Permission CDI Board). After that, she obtained ethical clearance from the University of Cape Town, Faculty of Health Sciences Human Research Ethics Committee (see Appemdix A2: Ethical Clearences from). Ethical clearance was also a prerequisite for the Limpopo Department of Health and Welfare to grant permission for the study to commence (see Appendix A3: Permission from Limpopo Department of Health).

The researcher used the permission letter from the provincial office to secure a meeting with the district office. The district office authorised the use of their facilities and the recruitment of the participants. This allowed the researcher to visit the data collection sites with the authorisation letters. She made appointments with the facility managers to explain the visit's purpose and provide information about the study. Ethical considerations for this study were guided by the Helsinki Declaration of 2013, which requires researchers to uphold several ethical principles when conducting research involving human subjects (World Medical Association, 2013). Ethical principles are privacy and confidentiality, beneficence, non-maleficence, autonomy and justice (World Medical Association, 2013).

Participants meeting the selection criteria were invited to a separate room or visited at home for privacy and consent (see Appendix B2a: Letter 1). The researcher used coding systems to ensure privacy and confidentiality of participants and their information, and to protect their identities (World Medical Association, 2013). For example, identities for guardians participating in the pilot study were coded as CDI-01, CDI-02, etc. The voice recordings were labelled using similar coding. Furthermore, the researcher did not include any identifying information when reporting on the results. The audio-recorded data was copied onto a flash disk and kept in a safe, confidential area with a secure password for access. The study was part of the Southern Africa CDI project. Data from the other languages together with this data will be stored in the UCT data management systems after the study period. It will also be kept at the South African Centre for Digital Language Resources (SADiLaR) data management systems.

Participants and their families were treated fairly and were respected, regardless of their social and economic backgrounds. The researcher maintained fairness by translating all forms and letters into Xitsonga so that families could participate in their preferred language. Non-maleficence was achieved by the researcher verifying that all methods used in the study were safe. Participants were gathered from safe and secure government institutions and community centres, for example. In addition, language samples were taken in the presence of the children's caregivers in their homes (World Medical Association, 2013).

Following Leedy and Ormrod (2015), the researcher informed the participants about the study's purpose and gave them the option to participate. In phase one, the researcher sent an information letter to the four translators and the 21 focus group members explaining the study's nature. All 25 of these participants agreed to participate by filling out and signing the consent papers. The caregivers who volunteered their children to be audio recorded for the spontaneous speech sample received letters to provide consent for their children to participate (see Appendix B3: Letter 2).

Consent obtained from caregivers was regarded as their willingness to participate. Verbal permission with the help of emojis to indicate a “yes” or a “no” given by the toddlers was also considered an indication of their willingness to participate. In phase two, 60 participants were told verbally about the study’s purpose and given the information letter when recruited to complete the MB-CDI and FBQ. Only 56 participants chose to be part of the study and signed the consent forms. In the final phase, the study used online questionnaires. The information was read, and the participants requested to consent verbally by selecting the statement on the online questionnaire. That was used as consent for the 107 individuals in the final phase.

The study was low risk. The only anticipated risk, should the child be identified with a communication delay or disorder, was psychological to the parent and the child. Two of the research assistants were social worker students working under the supervision of a psychologist who managed the NGO facilities. These student social workers were able to provide counselling to mothers in those cases and also arranged referrals for the children. Based on the case history information, three guardians of children identified as at risk of delayed language development were referred for further management. The assistants also helped a mother with cognitive impairment, and her child was referred to other health professionals for further management. Developing culturally and linguistically relevant parent-report tools will be beneficial because early identification can help prevent or minimise the risk of a child having developmental language delays, preventing learning difficulties later in life. The participants contributed to developing a tool that will benefit Xitsonga-speaking children and their families in the future.

The COVID-19 pandemic affected nearly all areas of research, including child language research. There were both risks and benefits associated with conducting child language research during this time. One of the benefits of the pandemic is that it led to the development of new research techniques that allow researchers to collect data remotely. This can be particularly useful for studying child language development (Hensen et al., 2021). For example, researchers can use online surveys, video recordings, and remote testing platforms to collect data from children and their

families. These new techniques can be more convenient for families and may allow for larger and more diverse samples than traditional in-person methods (Hensen et al., 2021; Morini & Blair, 2021).

However, there were also several risks associated with conducting child language research during the pandemic. One major risk was that the pandemic disrupted many families' daily routines, which could have negative impacts on children's language development (Kan, 2021). Another risk associated with conducting child language research during the pandemic was the potential for bias in the data. For example, families who were more adversely affected by the pandemic may have been less likely to participate in research, which could skew the results. Additionally, remote data collection methods may not be suitable for all families or may introduce new sources of bias, such as differences in internet access or technology literacy (Hoff, 2013a; Morini & Blair, 2021). Overall, the COVID-19 pandemic had both benefits and risks for child language research. While new remote data collection methods can provide opportunities for more efficient and diverse data collection, researchers must be aware of the potential biases introduced by the pandemic and take steps to minimise these biases.

The researcher guarded against prejudice and marginalisation, both intentional and unintentional, of all participants by treating them with equal respect, trustworthiness, and fairness, regardless of their linguistic, cultural, social, or economic background. The principle of distributive justice was followed, meaning that the participants will benefit most from the research because they are currently disadvantaged by the lack of appropriate language measures. All letters were in English and Xitsonga. The information was read to the caregivers in Xitsonga.

3.7.2. Data collection process

Translation phase: Translations were an ongoing process throughout phases one and two. The researcher translated the FBQ with the assistance of a professional translator. Two translators translated the MB-CDI from English to Xitsonga, and another two did the 'blind-back translation' from Xitsonga to English. The researcher

met with an academic expert in Xitsonga and a colleague to resolve identified word discrepancies. The meeting offered the researcher an opportunity to listen to the experts and learn from their knowledge of Xitsonga. The information gathered assisted in convening the focus groups. They explored the lexical and grammatical items in the translated tool to agree on the cultural relevance, check for words and alternatives, and to decide on the familiarity of the items listed in the MB-CDI by children between the age of 16 and 32 months (Kidd & Parshall, 2000; Mertens, 2019).

Pilot phase: This phase followed a quantitative approach. It was conducted between September 2019 and December 2019. The caregivers were asked to indicate whether their child did not know the word or *understands and says a word* on the MB-CDI either by leaving the circle blank or filling the circle next to what best described the child's language skills. When terms were offered as synonyms (for example, the English word [baby] can be realised as *ricece*, *n'wana*, or *nana* in Xitsonga), caregivers were asked to specify which of the synonyms their child knew. If a parent suggested "*Nyiko*" (which will be the name of the baby) as a synonym for the term [baby], the parent had to write the name the child used.

About four participants were comfortable with filling out the forms on their own. They were given the forms to complete or asked a family member to assist them in completing the form at home. The fieldworkers then collected the forms from the caregivers after three days. Both the FBQ and the MB-CDI had clear instructions in Xitsonga about the form and how it should be completed. The participants completed the first draft of the Xitsonga MB-CDI and the FBQ forms for the researcher to identify items that should be included or excluded from the forms. The findings from the completed forms were used to measure the prevalence of the items, differences in dialect, use of borrowed words and the correlation of vocabulary growth and grammatical structures with age.

The SA-CDI team agreed that certain questions should be asked of focus groups to guide the team regarding word combinations that children currently used. The questions asked were:

- (i) What did your child say this morning?
- (ii) What were three longest sentences you heard your child say in the past few days?

This question was asked to determine the type of sentences and the longest sentences used by the children. In Xitsonga, word order and word order changes affect the meaning of a sentence. Therefore, children must understand and use the different word orders and their meanings. The spontaneous language sample was also used to confirm the phrases given by the focus groups. Six toddlers were recruited, and sample was obtained from them. Two girls aged 30 months were recorded during play together. A 32 month old boy was recorded when having random conversations with mother. A 34 month old boy and 31 month old girl were recorded having conversation with an older sibling. A 36 month old boy was recorded having a conversation with an older sibling. Only the 30 month old girls had an hour of continuous play and recorded, the other were short clips of about 5 minutes each averaging around 30 minutes for each toddler. This was to evaluate the type of sentences children use between 30 to 36 months.

Main study: The quantitative approach was used in the final phase, which constituted the main study. The data from this phase were used to describe the patterns of early lexical and grammatical development in Xitsonga. Data were collected from February to November 2020 in South Africa during the COVID-19 lockdown limitations. A member of the SA-CDI team constructed a database in Microsoft Access to aid data collection from paper-based questionnaires. This database access allowed for the data-capturing process to be centralised for all the languages under investigation. The Qualtrics software was used for data capturing. Data was downloaded frequently by an SA-CDI team member to check the number of entries and detect entry errors (incorrectly captured, missing information or data not meeting the inclusion criteria).

Fieldworkers were employed to assist with data collection. The researcher recruited fieldworkers following the project guidelines (see Appendix E1: Training

Manual). The fieldworkers were asked the following questions before they could be employed:

If they worked with children:

1a. Where do you work?

2a. What age range are the kids you work with?

If they did not work with children:

1b. Where are you going to find participants with children?

2b. Will you be able to recruit participants with children aged 0 to 3 years old, or in what age range?

They were encouraged to start recruiting participants and detail the children's age (in years and months) and sex. Due to the availability of the supermarkets and network coverage, participants were asked if they needed supermarket vouchers and airtime/data (and for which mobile network). Once this was done, they needed to complete the table in the *Participant recruiting guide* (see Appendix E1: Training Manual) and give it to the research assistant, who then sent the list back to the project manager of the SA CDI team. The research assistant and the six fieldworkers (see Table 20) recruited participants from healthcare facilities and NGOs in the communities they serviced. As data were collected online, caregivers were compensated with mobile data vouchers to utilise during the interviews. The fieldworkers scheduled appointments and completed the forms by calling the participants on WhatsApp. COVID-19 protocols were observed by those who were able to complete the paperwork face to face. The caregivers received a R150 supermarket voucher to compensate them for the time taken to complete the questionnaire.

Table 20: Research fieldworkers

Fieldworker	Sex	Occupation
1	Female	B Speech-Language Pathology student
2	Female	NGO director/research assistant
3	Female	Speech-Language Pathologist
4	Female	Home-Based Care worker
5	Female	Home-Based Care worker
6	Female	Social Work student

Once data collection was completed, the data were saved in a format that followed the rules defining the case-by-variable format. Data scoring followed the rule of scoring as discussed in Fenson et al. (1994). The names of all variables and the items from the MB-CDI were listed in the first row of the Excel spreadsheet. The data were captured using binary data levels, with “1” being recorded if the child could say the word and “0” if they could not (Marshall & Jonker, 2011).

3.8. Data analysis

In exploratory sequential mixed methods design, many data collection, analysis, and inference approaches are used in a series of phases, and integration is the centrepiece of the approach (Creswell & Plano Clark, 2018). The research questions in the different phases direct the researcher about the sampling approach to be employed. The presence of meaningful integration distinguishes mixed methods from other approaches. Sequential integration was used to develop a culturally and linguistically appropriate tool by first qualitatively exploring what would work with participants before administering the quantitative questionnaire (Creswell & Plano Clark, 2018). Accurate inferencing can be complex, even with simple models. There are many different methods that can be used to explain the patterns of structure in empirical data. Data was captured in Excel spreadsheets and analysed using Excel and IBM SPSS Statistics Version 28.0.0.0 (190). Table 21 outlines this study’s data collection and analysis.

Table 21: Data analysis processes

Phases of research	Research question	Sampling methods and variables	Analysis
Pilot	RQ 1: What is the translation outcome and what are caregivers' and language experts' perceptions of commonly used words by Xitsonga-speaking toddlers between the ages of 16 and 32 months?	Purposive sampling (convenience) • Translators, • Focus groups • SA-CDI team Variables (equivalence): • Cultural • Linguistic	QUALITATIVE Interpretive content analysis Inductive approach
Development of adapted Xitsonga MB-CDI: pilot study	RQ 2: What is the relationship between age and vocabulary size among Xitsonga-speaking children aged 16 to 32 months? RQ 3: What are the frequent words used by Xitsonga-speaking children aged 16 to 32 months in early language development?	Snowball sampling Pilot 1 monolingual Xitsonga-speaking toddlers ages 16 to 32 months	QUANTITATIVE Descriptive statistics and frequencies describe commonly used lexical and grammar items Correlation analysis to determine the relationship between vocabulary size and age

Main study	RQ 4: What are the vocabulary compositions (semantic and syntactic categories) in Xitsonga-speaking children aged 16 to 32 months? RQ 5: How do Xitsonga-speaking children aged 16 to 32 months acquire complex morphology, and what is the correlation with vocabulary size? RQ 6: How does MLU develop in Xitsonga-speaking children aged 16 to 32 months? RQ 7: What is the relationship between MLU and other language development measures such as vocabulary size and grammar complexity?	Snowball sampling Monolingual Xitsonga-speaking toddlers aged 16 to 32 months Variables: Vocabulary size, grammar complexity and MLU as a dependent variable; age is the independent variable	QUANTITATIVE Descriptive statistics and frequencies to describe vocabulary size Correlation and regression analysis to determine the relationship between vocabulary size and age Independent <i>t</i>-test for group comparisons

The qualitative phase reported the findings using the interpretive and inductive approaches. The quantitative strand reported on frequencies, correlations, variances and tendencies and made inferences (Creswell & Plano Clark, 2018). Recordings were taken of the focus groups, and the SA-CDI study protocol (see Appendix E2: SA-CDI Protocol) was followed. The audio recordings of the focus group meetings were not transcribed; however, they were used to cross-check with the researcher's notes. Not all data collected from the focus groups were used, as explained in section 3.3.2.

Phases two and three involved quantitative data collection, which was subjected to quantitative analysis (i.e., descriptive statistics and inferential statistics). Tashakkori and Teddlie (2015, p. 101) describe meta-inference as "an overall conclusion, explanation or understanding developed through an integration of the inferences obtained from the qualitative and quantitative strands of a mixed-method study". The MB-CDI items were assessed in a multi-step and sequential approach, as illustrated in Figure 16. It is important to remember that this study was conducted as part of a wider SA-CDI project and operated within the project's framework, as described in Whitelaw (2018) and Southwood et al. (2021).

3.8.1. Phase one: pre-pilot

During the FBQ and MB-CDI translation, the researcher employed the deductive approach using themes relating to semantic, content, technical, criterion and construct equivalence between the original and the translated MB-CDI (Bornman et al., 2010; Pascoe & McLeod, 2016). A classical content analysis helped the translators reach a consensus on item equivalence (Stemler, 2015). To increase the validity, the two forward and two backward translators performed the analyses separately, discussed their results, and obtained consensus (Bengtsson, 2016).

After the translation of the data collection instruments, the pre-pilot phase documented qualitative findings from the focus groups. These findings were recorded, organised, categorised, and consolidated during the interpretive content

analysis. From this was generated a list of lexical and grammatical items to describe caregivers' and language experts' perceptions of lexical and grammatical development of Xitsonga in children between the ages of 16 to 32 months (Bengtsson, 2016). Interpretive content analysis is defined as a process where a researcher makes inferences from statements made objectively and systematically using inductively generated codes (Drisko & Maschi, 2016). The researcher chose content analysis to describe what the respondents said, kept extremely close to the text, used the words spoken by the respondents, and described the observable and meaningful content in the text and during the focus interviews (Bengtsson, 2016; Drisko & Maschi, 2016).

3.8.2. Phase two: pilot study

The second phase was testing the validity of the questionnaire items and making decisions on words to be included or excluded from the questionnaire that would be used to collect data for the main study. To include or exclude words in the adapted MB-CDI, the researcher used correlation analysis to estimate the strength of the relationship between these variables. Pearson correlation coefficient (r) was used to infer the monotonic relationship between the increase in vocabulary size and age. The significance of their relationship was measured using p -values³ (Dahiru, 2008). Alcock et al. (2019) recommended the following selection criteria for items to be included in the toddler form: frequency, correlation with age, and correlation with infant scale. The correlation coefficient is sometimes criticised as having no apparent intrinsic interpretation; thus, the researcher also used the "coefficient of determination (R^2)" (Zhang, 2017). Though the infant form results have not been reported for this study,

³ Significance testing: $p < .001^{***}$ (strong evidence); $p < .01^{**}$ (good evidence); $p < .05^*$ (moderate evidence) Dahiru, T. (2008). P-value, a true test of statistical significance? A cautionary note. *Annals of Ibadan Postgraduate Medicine*, 6(1), 21-26.

data was collected and used for this purpose. Table 22 shows the selection criteria.

Table 22: Selection criteria for word inclusion into the Xitsonga MB-CDI

Frequency	Correlation with age	Correlation with scale	Included
Included in the infant version			Yes
2 – 3 high-frequency words in the youngest children			
	$p < .05$		Yes
		$p < .03$	Maybe
Not on the infant scale, > .9			No
If < .1			No

Each analysis' scores for each semantic category were treated as individual items. Analyses incorporated scores that varied for different items due to an error in the printing of the questionnaire. For example, there were no responses for some lexical items because the items were not available on the questionnaire. The correlation thus depended on the variance from the other languages. Following Fenson et al. (1994) suggestion to compensate for the variability from month to month, linear and exponential models were used to generate statistical values to determine the fitted function.

3.8.3. Phase three: main study

Using the adapted MB-CDI, this study aimed to report vocabulary development and the emergence and extension of grammar in children aged 16 to 32 months. The findings of this phase were analysed using various statistical methods employed to analyse vocabulary composition data, such as measures of central tendency, variability, and correlations. Mean estimates also simplify data interpretation, making it easier to connect and understand the average language abilities of a particular age group. However, mean estimates have limitations, such as potential skewing by

outliers and overlooking the distribution and individual variability in language development. To gain a comprehensive understanding of language development, it is important to complement mean (M) estimates with additional measures, such as standard deviation (SD), percentiles, or individual case studies. Thus, inferential statistics, including t -tests and analysis of variance (ANOVA), were utilised to explore significant differences and relationships between age and the identified variables. However, before delving into the specific statistical analyses and their outcomes, it is essential to understand the assumptions of normality. Figure 15 shows a normal distribution histogram of data collected for this study.

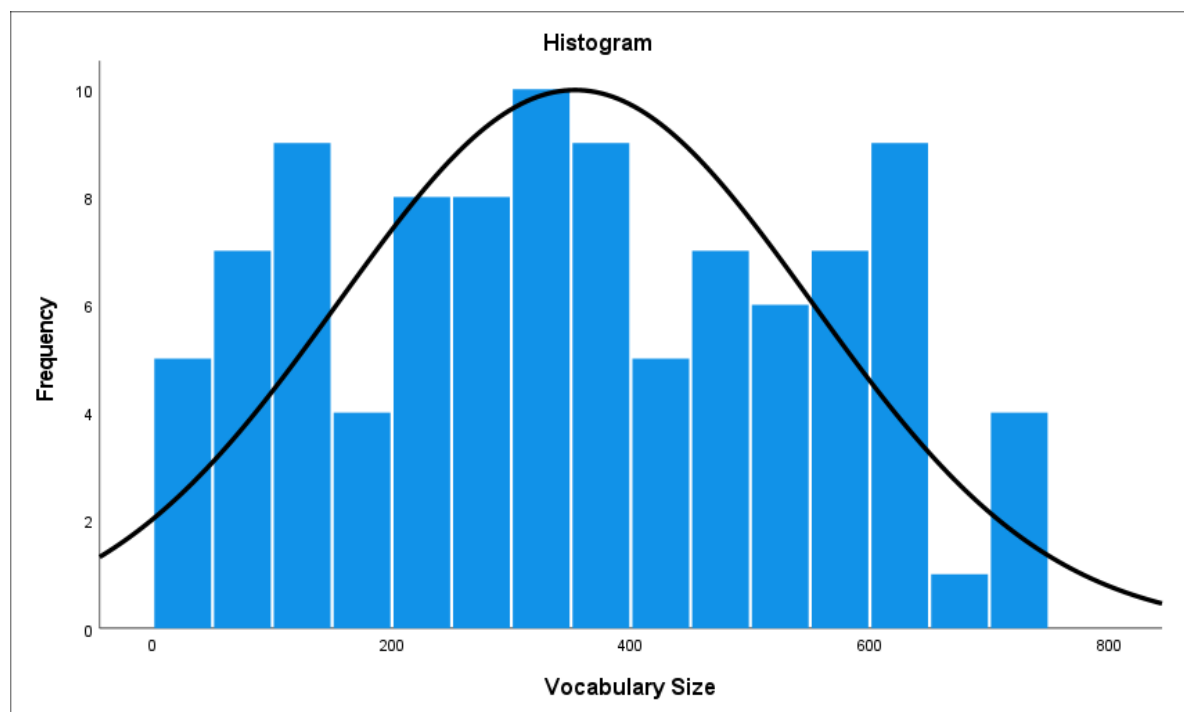


Figure 15: Normal distribution of data collected from Xitsonga-speaking children aged 16 to 32 months

While the assumption of normality may not always hold true for all datasets, it serves as a guiding principle for many statistical procedures. By evaluating the extent to which the research data adheres to this assumption, one can ensure the reliability and validity of statistical analyses and subsequent interpretations. Linear regression

was adopted to make inferences about growth trends in language acquisition. The dependent variable was the expressive vocabulary size reported by the caregivers, and the independent variable was age.

Correlation and regression analyses were conducted to assess the relationship between variables. Various indicators were involved when assessing developmental trends and individual variability in grammar using the MB-CDI inventories. For example, approaches used with lexical items might not be appropriate for the grammar section because semantic constructs may be expressed in a straightforward manner with vocabulary but in an overly complex way, or not at all, in another language (Alcock, 2017). Grammar development can take quite different paths in various languages. The researcher therefore needed to consider a different approach. An independent sample's *t*-test was used to assess group differences (sex and geographic area) in vocabulary production. The dependent variable was categorical (male/female and rural/semi-urban), and the independent variable was continuous (vocabulary score). Cohen's *d* analysis was used to report on effect sizes.

3.9. Summary

The chapter discussed the methodological approaches used for this study to ensure that the MB-CDI tool was reliable and valid for use with Xitsonga-speaking children and their families living in rural and semi-urban areas of Giyani. It clearly outlined the formulation of the study, the sample and the data collection tool. The study followed an exploratory sequential mixed design. The first phase was the development of the data collection tool (MB-CDI) which was guided by Beaton et al.'s (2000) cross-cultural adaptation process. The MB-CDI was translated from English to Xitsonga (phase one), reviewed and piloted (phase two) on a small sample before it was used to collect data from 99 monolingual Xitsonga-speaking children aged 16 to 32 months (phase three). The process ensured fairness and no bias in selecting the

words included in the Xitsonga MB-CDI. It also ensured that the items reached functional, cultural and linguistic equivalence. Finally, it explained how the data were analysed for the three phases using both qualitative and quantitative statistical analyses. The following chapter will discuss the results from the first two phases of the study.

CHAPTER 4: RESULTS AND DISCUSSION OF THE ADAPTATION OF THE XITSONGA MB-CDI

“You may never know what results come of your actions, but if you do
nothing, there will be no results.”

-Mahatma Gandhi

The field of language assessment and development presents complex challenges, particularly when adapting existing tools to different linguistic and cultural contexts. This chapter aims to explore the complexities of adapting the MB-CDI specifically for Xitsonga-speaking children. By examining factors that influence the reliability and validity of the adapted tool, this chapter seeks to enhance the understanding of its applicability and effectiveness in identifying language delays, disorders, or differences. Furthermore, it addresses the limitations and gaps encountered during the adaptation process, shedding light on the need for caution and further research in specific areas such as morphology and phonology development. By analysing these key points, this chapter advances the overall goal of the thesis, which is to provide insights into the assessment and understanding of language development in Xitsonga-speaking aged 16 to 32 months.

4.1. Introduction

This chapter reports on the qualitative and quantitative data collected and analysed sequentially and on the inferences that were integrated within the exploratory sequential design (Creswell & Plano Clark, 2018). The adaptation of the MB-CDI into Xitsonga required careful consideration of linguistic and cultural factors. The results are reported sequentially under the following topics:

- (i) The translation outcomes of the English MB-CDI
- (ii) The experts' and caregivers' perceptions of the cultural and linguistic equivalence of words in the MB-CDI
- (iii) The experts' and caregivers' perceptions of commonly used words by Xitsonga-speaking children aged 16 to 32 months
- (iv) The frequency of words used by Xitsonga-speaking children aged 16 to 32 months
- (v) Vocabulary size correlation with age of Xitsonga-speaking children aged 16 to 32 months
- (vi) Morphosyntactic correlation with age of Xitsonga-speaking children aged 16 to 32 months

Qualitative findings were analysed using interpretive content analysis, which used an inductive methodology to yield insightful conclusions. The quantitative component of the study, on the other hand, made use of tables to present descriptive data and frequencies. It provided an in-depth review of frequently used lexical and grammatical items from the MB-CDI. To determine the relationship between vocabulary size and age, a correlation analysis was performed as well, and the results were presented in tables and graphs.

4.2. Translation of the English MB-CDI

The aim of the translation process was to create a version of the MB-CDI that is equivalent to the English version in terms of linguistic, cultural and semantic aspects. One of the challenges of adapting a language assessment tool is to ensure that the words used in the tool are culturally and linguistically relevant to the target population. This means that the words should reflect the culture, values, beliefs, and practices of the population, as well as their linguistic patterns, norms, and variations (Mdlalo et al., 2016).

4.2.1. Uncommon/unfamiliar words

The translation of uncommon or unfamiliar words can be a significant challenge for translators. These words may be technical terms, specialised jargon, or neologisms that have not yet been widely adopted. The forward translator perceived the translation from American English as challenging with some words and consulted others or looked up specific words to understand their meaning. For example, the word [popsicle] was not familiar in SAE, where it would be called an [ice pop]. The confusion between the words [jelly] and [jello] also led the translators to consult and google the words. Translating some of these words accurately and effectively requires a deep understanding of the source language and culture, as well as the ability to research and analyse the context of the word (Munday, 2016).

4.2.2. Linguistic and cultural equivalence

The translation aimed to reach linguistic and cultural equivalence as suggested by other cross-cultural tool adaptation studies (Bornman et al., 2010; Kunene & Ahmed, 2016; Pascoe & McLeod, 2016; Ronski et al., 2018; Whitelaw, 2018). The translations revealed that some sound expressions in English are also realised as sound expressions in Xitsonga. Some of them are the same sound across languages (for example, [meow] and “*miyawu*”, [moo] and “*mhoo*”). Some sound expressions are realised differently (for example, [choo choo] to “*khuchu khuchu*”). The translators decided this word would be context-dependent because some children would have never seen or heard the train making that [choo choo] sound. Sound expressions in indigenous languages often have a cultural context that may not exist in other languages (Dingemanse, 2018).

Similar to English, there are sound expressions in Xitsonga. For example, [Yum yum] is realised as “*mmmm*” but may be readily expressed as a word rather than a sound, for example, “*nambu nambu*”. These words were a point of discussion as the forward translators disagreed on how best to translate this term but eventually

concurred that “*mmmm*” would be a better choice. The back translators could not translate the “*mmmm*” sound effect. However, the translator recognised the sound effect and the tone of delight when the researcher said “*mmmm*” aloud. As a result, they decided on the use of “*nambu nambu*” [it tastes good], as the intended meaning would be best understood as a written word rather than a sound effect. Some of the sound expressions were perceived to be ambiguous. There was, therefore, an addition of 6 new words perceived to be culturally relevant and commonly known to children in this context (see Table 24 in section 4.2.5). For example, the word [peep peep] was added because it was considered quite prevalent. It is primarily the sound of taxis signaling to passengers in these communities that they are ready for pickup. Dingemanse (2018) noted that translators must have a deep understanding of the local dialects and cultural nuances to translate these words accurately.

Some lexical items were a challenge for cultural equivalence. For example, the forward translators had difficulty translating [patty cake], the game. Both translators assumed that it was a type of cake. After discussion, they understood the word, but could not find a relevant term to represent that game. Thus, [patty cake] was not translated, and the researcher noted this for a discussion with the focus groups.

4.2.3. Semantic equivalence

Semantic equivalence is a complex concept. In translation, semantic equivalence is used to ensure that the meaning of a text is preserved when it is translated from one language to another. The translation of the “*animal*” category is one example of where translation of items to semantic equivalents of the target word was present in this study. The words were translated to another animal seen to be in the same family as the target word. For example, the term [wolf] was translated as “*mhinsi*” which means [hyena/wild dog], and [alligator] was translated as “*ngwenya*”, which means [crocodile].

In this study, some words in Xitsonga have different meanings from the English word in the MB-CDI. For example, the word [aunt] in English is represented in three ways in Xitsonga. For instance, “*hahani*” refers to your paternal aunt, “*mhanihulu*” refers to your maternal aunt who is older than your mother, and “*mhanintsongo*” refers to your maternal aunt who is younger than your mother. Mabunda (2013) further says that the meaning of a word is determined by how it is used, citing Ntsan’wisi’s observation in his paper published in 1985. She observed that a word might be vaguely translated if a term’s descriptor is not presented. As in the case of [aunt], it might not be clear which of the three is represented in Xitsonga.

4.2.4. Non-equivalence

Direct translation may lead either to a word that does not target the same structure or skill as in the original language, or a word that is not of the same level of difficulty as the original word (McLeod & Verdon, 2014; Southwood & Van Dulm, 2015). Xitsonga, like many languages spoken in a colonised nation, has been heavily influenced by British English and Afrikaans. For example, 14 items (78%) in the “*toys*” category used loan words from English and Afrikaans. Jaafar et al. (2019) noted that it was very common for a language to be influenced by another. One common type of non-equivalence, according to Baker (2018), is the use of loan words. Once a word or an expression is borrowed into a language, Baker (2018) argues that it becomes a challenge to control its use in the original language.

There were some words for which the translators proposed a replacement. For example, the replacement of [wolf] with [hyena], [alligator] with [crocodile], and [tiger] with [cheetah/leopard] as these animals are found in the study’s context. The lack of linguistically or semantically relevant names for items was also observed in other categories, such as “*food and drinks*”, and “*clothing and small household*”, where the items were context dependent. The translators and the researcher opted to leave such items out of the pilot study’s translated Xitsonga MB-CDI and replace them with words that fit the category and represent the current context. For example, [sled] was

replaced by [wheelbarrow] as most children in this context are familiar with a [wheelbarrow] as a mode of transporting wood and water. The questionnaire with the proposed replacements was presented to experts for review, as suggested by Geisinger (1994).

Baker (2018) commented that often no equivalence could be observed in languages with different forms such as English and Xitsonga. The author argues that the translation of helping verbs requires a careful analysis of their functions and effects in the source text and the target text. Equivalence is useful for guiding translators in choosing appropriate strategies and methods for translating helping verbs. It was noticed in this study that the forward translator did not translate words such as [am], [can], and [could] from the “*helping verbs*” category. Translation of these words was also not found in the English-Tsonga pocket dictionary (Swiss Mission in South Africa, 1982). While English has auxiliary verbs, Xitsonga has verb extensions like all languages in the African language group. After the consolidation of the focus groups by the researcher, it was agreed to exclude 21 items from the Xitsonga MB-CDI used in the pilot study. More items were added to determine which ones would yield better correlations when replacing an original English MB-CDI item. One of the main challenges in adapting the MB-CDI is achieving lexical equivalence between the source language (English) and the target language (Bleses et al., 2008). Other words had no lexical equivalence; in those cases, that word had a few items added in order to help with the explanation of its meaning. The caregivers therefore had more options for explanatory purposes.

4.2.5. Review of the translated version by experts

The experts advised against using borrowed words with a linguistically equivalent item. They advocated that the use of borrowed words contributes to diminishing the marginalised minority languages (Nkhwashu, 2010). During the translation process and meeting with the focus groups, words were included and excluded from the MB-CDIs of the Southern African CDI project. The focus groups

suggested removing 31 lexical items because of non-equivalence. The “*pronoun*” category had the most significant number (11) of excluded lexical items. The focus groups then added or removed the polysemous words in the different categories. For example, in the “*pronoun*” category, “*yena*” is an absolute pronoun in NC 1. The experts’ focus group suggested that it will thus represent all six (he, she, his, hers, him, her) pronouns in the MB-CDI.

Similarly, Alcock et al. (2015) reported that Kiswahili and Kigiriana have extensive noun systems and a system of demonstratives which can represent the “*pronoun*” and “*quantifier*” categories in the original English MB-CDI. Most of the items were retained from the original American English MB-CDI except for the “*animals*”, “*games and routines*”, “*small household*” and “*action words*” categories. The “*small household*” category had 38 more items, whilst the “*action words*” category had 55 more items from the focus groups’ lists. Interestingly, on the other hand, a category such as “*toys*” did not exclude nor add any items. Table 23 shows the total number of items excluded or added in each category as perceived to be used commonly by children aged 16 to 32 months.

Table 23: Number of excluded and included items in the Xitsonga MB-CDI

Category	Items in the English MB-CDI	Number excluded	Total number added for the pilot	Example of items added
sound effects and animal sounds	12	0	8	Choo choo, cluck cluck, tring tring
animals (real or toy)	43	4	29	Lizard, ostrich, worm
transport/vehicles (real or toy)	14	1	6	Cart/wagon, taxi/combi, wheelbarrow
toys	18	0	0	
food and drinks	68	10	28	Tea, spinach, hard porridge
clothing	28	3	17	T-shirt, bangle, skirt
body parts	27	0	10	Heart, neck, lap
small household	50	1	38	Umbrella, torch, kettle
furniture and rooms	33	2	16	Braai area, Veranda
outside things	31	2	11	Gravel, lawn, traffic light/ robot
places to go	22	2	6	Creche, mall/ shopping centre, garden
people	29	0	10	Paternal/maternal aunt, paternal/maternal uncle, white person
games and routines	25	1	40	Wash your hands, playhouse, happy birthday to you
action words	103	0	55	Breastfeed, carry on the back, visit
descriptive words	63	0	21	

words about time	12	0	4	Afternoon, first, then
pronouns	25	11	0	You (plural), yours, themselves
questions words	7	0	0	
prepositions and areas	26	0	6	Against, here are/is, through
quantifiers and articles	17	0	0	
helping verbs	21	21	0	Not relevant in Xitsonga
connecting words	6	0	0	

Table 24 shows the categories and words removed from the English version MB-CDI for the Xitsonga version. Across the 22 lexical categories, there were some items that the focus groups perceived as uncommon for the age groups in this study or that had no equivalence in the Xitsonga language. It also shows items removed from the Xitsonga MB-CDI for the above reasons. For example, the item [this little pig] was translated into Xitsonga as “*xingulubyana*” which means [piglet]. The focus groups debated whether the item “*xingulubyana*” should be removed from the “*games and routine*” category because it is derogatory to refer to a person as a [pig]. The researcher agreed with the focus groups to remove this item from the list. The study followed recommendations by other studies such as the ones done in rural Senegal, Kenya and Mozambique to exclude or include items (Alcock et al., 2015; Vogt et al., 2015; Weber et al., 2018).

Table 24: Examples of English version MB-CDI words removed for the Xitsonga version

Lexical categories				Reason for exclusion
animals (real or toy)				
deer	goose	moose	penguin	Cultural lack of equivalence
transport/vehicles (real or toy)				
sled				Cultural lack of equivalence
food and drinks				
applesauce	pickle	pretzel	vanilla	Cultural lack of equivalence
clothing				
mittens	snowsuit			Cultural lack of equivalence
furniture and rooms				
basement	highchair	rocking chair		SES
outside things				
snow	snowman			Cultural lack of equivalence
people (12)				
grandma/ grandpa	cowboy	mailman		No sex difference (grandma and grandpa), cultural lack of equivalence
games and routines				
this little pig	pattycake			Derogatory (little pig), cultural lack of equivalence
pronouns				More than one category of pronoun has the same referent

In Xitsonga, word order and changes in word order impact the meaning of a sentence. Young children can comprehend and produce different grammatical elements. The prefix determining the NC might differ depending on the dialect of a particular context. Such an example is the word [tree]. The first word, “*murhi*”,

singular for a [tree], carries the prefix “*mu-*”, whilst the other word “*nsinya*”, is also singular for [tree] but considered to have a zero prefix (Demuth, 2000). However, the plural forms carry the prefix “*mi-*” for both words. Therefore, the agreement markers used for both words would be similar, “*murhi wu*” or “*nsinya wu*”. Due to such differences in dialect, more than one translator and committee were used to avoid possible translation errors (Al-Amer et al., 2015). Another form is the significance of tone evident with homographs, i.e., written the same but pronounced differently (Baloyi, 2012; Zerbian, 2007). Similarly, the word “*murhi*” may mean medicine. The focus group participants perceived that the word would be known by this age group and belong to the same NC irrespective of what it means.

4.3. Caregivers’ and language experts’ experiences

Several research projects have been done in African contexts investigating parent perceptions of language development, such as the study done by Ronski et al. (2018). In most instances, these studies report on “caregivers’ perceptions about how the child communicates and how the child’s communication affects the interactions” (Ronski et al., 2018, p. 3). Perceptions are subjective and individualistic and can be influenced by a person’s first-hand experience. Caregivers shared their perceptions about the MB-CDI questionnaire and the items in different categories. Their perceptions were influenced by how they understood early language development for the age range studied, familiarity with the words or items in the MB-CDI, and their children’s exposure to the words in the MB-CDI. It was important for the researcher to understand the participants’ perceptions of language assessment tools such as the MB-CDI. Therefore, the discussions were guided by the headings below.

4.3.1. Knowledge of child language assessment tools

All members of the focus groups ($n = 19$), apart from two (speech-language pathologists in the experts’ panel), did not know anything about the MB-CDI before this focus group meeting. Most of the caregivers ($n = 6$) in this study had never been

involved in any research on child language. Furthermore, these caregivers were unaware of any language screening form, as none of their children had been screened or assessed for language development. One parent said:

“Mina a ninga swi tivi ku vana vakamberiwa ku vulavula, hi tolovele ku pimanisa hi van’wana vana va tintangha ta yena”.

[Translation: “I did not know that a child can be examined for talking; we normally just gauge him/her based on other children his/her age”.]

The MB-CDI is a relevant tool to be used for this study because it does not rely on extensive training of the parent or researcher administering the task, as opposed to alternative methods such as diary records or recordings of interactions with young children in laboratory sessions. According to Kalashnikova et al. (2016), MB-CDIs provide an index of children’s vocabulary knowledge not constrained to a limited set of interactions (Alcock, 2017; Fenson et al. 1994; Tomasello & Mervis, 1994; Vogt et al., 2015). Even though caregivers do not have experience with their children being assessed, the statement above affirms that caregivers are aware of their child’s language development. Although caregivers in this study were not knowledgeable about language assessment tools, they were very familiar with their children’s language abilities, as argued by several authors (Bello et al., 2012; Chigonda, 2017; Dale et al., 1989). They could make reasonably reliable judgments about those abilities (Bleses et al., 2018; Bleses et al., 2008; Fenson et al., 1994; Skarakis-Doyle et al., 2009).

4.3.2. Parent response bias

Parental response biases may present themselves differently in diverse populations with varying language, socioeconomic, and cultural backgrounds, as well as across different inventories (Fenson et al., 1994). Some parents usually assess their children’s language development by comparing them with their peers. This may

result in parental response bias as the parent can overestimate or underestimate the child's language ability. Also, this might create some form of bias if children are compared with developmentally delayed children. Another issue that may lead to response bias is the report by the parents of not considering their children's development in months, especially once they were more than a year old. Children's language skills change rapidly in the early years (Bates et al., 1994). One parent said:

"Aah mina a ni nga swi langutisi ngopfu hi tinh'weti ta n'wana, ni languta ngopfu hi ti ntangha takwe."

[Translation: "I was not looking at it based on the months, I only compared him with his peers".]

The caregivers found it difficult to declare the child's age using months, a challenge mentioned in the FBQ's comments section. Some caregivers were confused about how to record their child's age when they were told they would have to report it in months. Parental response biases may present differently in diverse populations with varying language, socioeconomic, and cultural backgrounds and across different inventories (Bleses et al., 2018; Fenson et al., 1994; Simonsen et al., 2014). Caregivers should accurately estimate their infant's vocabulary composition and be more sensitive to their children's developmental problems (Efstratopoulou et al., 2012; Kalashnikova et al., 2016).

4.3.3. Caregivers' challenges with the MB-CDI

The length of the MB-CDI was a concern to all the participants ($n = 19$). There were suggestions that the form should be shorter for the person completing it to maintain their attention to the end. The time required to do the full MB-CDI may not be available in busy clinics or research projects where there are numerous other procedures to conduct. Low parent literacy skills also meant that some caregivers would be unable to complete the form without assistance. All the participants in the

focus groups agreed with Fenson et al. (2000b) that a short form could improve the efficiency of the data obtained from caregivers, especially those with limited literacy skills.

The MB-CDIs rely on parent knowledge of their child's current and emerging language and communication skills rather than on long-term memory of the child's behaviour (Alcock & Alibhai, 2013). After the consolidation, caregivers and language experts agreed that 869 items should be included in the Xitsonga MB-CDI used in the pilot study. They were confident that these words constituted commonly used lexical items understood and used by children between the ages of 16, and 32 months. The findings from this phase were used to develop a translated Xitsonga FBQ and the MB-CDI form administered in the pilot study (Beaton et al., 2007). The study found that caregivers were aware of their children's language development and were able to make reliable judgments about their abilities. However, there was a risk of parental response bias, mitigated by careful attention to the design of the language assessment tool.

4.4. Adapting the lexicon/vocabulary

Several factors contributed to the inclusion and exclusion of words in the adaptation of the Xitsonga MB-CDI to be piloted. These are discussed below.

4.4.1. Culture-specific items

Culturally inappropriate words were [vagina] and [penis]. In Vatsonga culture, it is taboo to speak about private parts. However, these words were not removed, and more socially acceptable words like "*tsuvitsuvi*" [penis] or "*xipaci*" [vagina], or a common name such as "*a phambhili/a mahlweni*", were used. It was agreed that, as families were likely to use different names for these body parts, the caregivers could write the word that was used. Xitsonga researcher Mabunda (2013) discovered that euphemistic expressions are used to allude to different sensitive situations that are not openly expressed in Xitsonga because they are deemed vulgar, offensive, or

embarrassing by the community. Table 25 shows some examples of words reported to be offensive in Xitsonga.

Table 25: Words reported to be offensive in Xitsonga

Original word	Replacement
Buttocks/bottom	What you sit on
Penis	Private part
Vagina	Private part
This little pig	Omitted

Baker (2008) argues that some words have no equivalent across languages or cultures. A word familiar in one language might not exist in another as the concept is completely unknown. Such words could be abstract or concrete, referring to a religious belief, a social habit, or a type of food. There were ‘culture-specific’ concepts in categories such as *“food and drink”*, *“clothing”* and *“small household”* items, and the focus group agreed to omit such items from the pilot study or replace them with words that fit the category and represent the current context. For example, the word [mittens] was removed and not replaced, as the Vatsonga children would not be familiar with such an item due to the hot weather in this context (see Table 24).

4.4.2. Use of loan words

Mabunda (2013) also noted that the insufficiency of words in languages might lead to over-translation (a translation error, which can be problematic because some English words cannot be identified entirely with Xitsonga words). The language experts and caregivers agreed with the translations of the items and noted the high use of loan words in some categories.

4.4.3. Differences in expressive meaning

The Xitsonga population differs from the English community for which the MB-CDI was developed. Baker (2018) defines expressive meaning as the “speaker’s feelings or attitude towards what is being said” (p. 53). She argues that expressive

meaning is often difficult to translate because it is often conveyed through non-literal means, such as tone of voice, facial expressions, and body language. Baker provides several examples of how expressive meaning can be difficult to translate. For example, the English word “please” can be used to express a variety of different emotions, such as politeness, gratitude, or urgency. The equivalent word in another language may not have the same range of meanings, or it may be used in a different way. Some words in Xitsonga have different meanings from the English words in the MB-CDI. For example, in the “*preposition and area*” category, there are polysemous words in Xitsonga expressed differently in English. Such as:

(a) English: [Above]

Xitsonga: *Henhla*

(b) English: [Up]

Xitsonga: *Henhla*

(c) English: [On top]

Xitsonga: *Henhla*

The focus groups agreed that only one word would be used to represent all three words, or the three words would be enlisted in one row.

Another example of lexical items in the MB-CDI represented by one item was in the “*pronoun*” category. According to Mabunda (2013), pronouns represent what is termed “referential context”. She suggests that with referential context, the meaning of the words is fixed to naming specific referents. In Xitsonga, a pronoun is identical in its origin with the derivative prefix of the nouns. The Xitsonga NC systems are

grouped according to the nouns' characteristics (Nurse & Philippson, 2003; McCormack, 2007). For example, NC 1 and 2 are for people; NC 7 and 8 are tools, specialists and languages (Demuth, 2000; Nurse & Philippson, 2003). The pronouns [she], [he], [him], [her], [his], [hers] could be expressed as "*yena*" in Xitsonga because pronouns do not distinguish gender; thus, only one pronoun could represent position and object.

4.4.4. Key factors observed to influence the vocabulary

During the data analysis process, key factors were observed to influence the vocabulary known by the children. Some of the factors are discussed below.

4.4.4.1. Familiarity with the word

If the words used in the assessment tool are culturally unfamiliar to the child or even the parent, the results may be biased or invalid (Mdlalo et al., 2019; Snow & Van Hemel, 2008). Some words that might not be culturally relevant were substituted by what the children knew. For example, [spaghetti] was referred to as [macaroni]. Furthermore, it was noted that some children did not differentiate between various types of clothing, such as [jacket, coat, sweater and jersey]. All these could be referred to as a jersey by the children.

4.4.4.2. Differences in dialect

Dialectal differences may pose a challenge when assessing a child using words that have a different dialect than the one spoken by the child or parent (Lee-James & Johnson, 2022). The name "*honci*" is synonymous with the term "*nguluve*" which means [pig]. Caregivers also explained that their children might be using different names for the items listed. Children who used synonymous names were accepted as commonly using the vocabulary. Dialectal differences can affect the validity, reliability and fairness of a language assessment tool (Alcock et al., 2015; McLeod, 2020; Short et al., 2017; Southwood, 2013).

4.4.4.3. Brand name

Another interesting factor reported by participants was using a brand name to represent a lexical item. For example, for [yoghurt], the children will say [Danone] or [Colgate], referring to [toothpaste]. Hong et al. (2002) argue that the use of 'brand names' instead of the object's names may pose a challenge to test validity. Their argument is based on unfamiliarity with the brand due to context or SES, or even brand names becoming outdated and irrelevant. As a result, the brand names were not used in the adapted Xitsonga MB-CDI.

4.4.4.4. Concepts not lexicalised in Xitsonga

The focus groups also proposed the inclusion of other games such as "*papapa ku hava*" [a game that is clapping of hands and touching the cheeks] and excluding [patty cake]. Other culturally relevant words included [high five] and [snack]. The focus groups suggested adding the items "*xap*" [thumbs up] and "*hlamba mavoko*" [wash your hands,] which in Vatsonga culture might be a figurative way of saying [you are about to eat]. They further suggested an addition of twenty-five words to the "*games and routine*" category for the pilot study to cover most culturally equivalent words. It is important to note that the lack of lexicalization for certain concepts does not necessarily mean that they are not understood or recognised in each culture. Many concepts can be expressed through other means, such as gestures, facial expressions, or tone of voice (Baker, 2018; Goddard & Wierzbicka, 2014).

There are several challenges to translating and assessing language development in Xitsonga. These challenges include the use of euphemisms and other indirect language to express sensitive topics, the lack of equivalent words in Xitsonga and English, the use of loan words, differences in dialect, and the cultural relevance of words. Despite these challenges, the study found that it is possible to develop accurate and reliable language assessments for Xitsonga-speaking children. This can be done by considering the cultural and linguistic factors that influence language development in this context.

4.5. Adapting the grammar

To adapt the MB-CDI Xitsonga “*Sentence and Grammar*” section, the researcher drew on Alcock’s suggestions of items to include or exclude from this section (from a symposium held at the University of Cape Town, in August 2019). Her proposal was based on Kenya’s East African languages study findings. Her study asked the following questions:

- (i) Can the caregivers accurately report their child’s grammar?
- (ii) Does the item or set of items correlate with the child’s age?

Findings from their study revealed significant associations between the information provided by mothers and the spontaneous speech samples recorded from a sample size of 10 participants. These associations were particularly noteworthy in relation to the type-token ratio and total grammar scores ($r = 0.59, p < 0.05$), as well as the type-token ratio and scores on the morpheme section of the grammar questionnaire ($r = 0.63, p < 0.05$). These study findings were therefore used to guide the development of the sentence section (Alcock et al., 2015).

Following Alcock’s recommendations, the grammar section of the Kiswahili and Kigiriana versions of the Communicative Development Inventories (CDIs) aims to capture various aspects of grammatical development in children. Similar to the English MB-CDIs “*words and sentences*,” the Kiswahili/Kigiriana CDIs employed pairs of examples to represent more complex grammatical structures, emphasising additional clauses or adjectives rather than contrasting correct and incorrect utterances. In some versions of the CDIs for other languages, contrasts between grammatically correct and incorrect forms have also been utilised. The responses provided by parents on the Kiswahili/Kigiriana CDIs regarding their child’s communicative abilities showed strong correspondence with multiple evaluations of abilities obtained from other sources, indicating that parents had a clear understanding of the purpose and content of the questionnaires (Alcock et al., 2015). As a result, the Xitsonga adaptation followed this recommendation.

4.5.1. Word forms

This system provides children with information about how to form plurals and other grammatical structures, which may enable them to make fewer overgeneralisation errors (Mdee, 2001; Simango, 1994). Section A of the Kilifi CDI focuses on small parts of words, specifically the use of noun and verb prefixes and suffixes. This section explores their general usage, including those representing NCs, plurals, and the past tense (Alcock et al., 2015). As such, the focus groups debated items that are included in the other SA-CDI languages and agreed on items to be included in the Xitsonga MB-CDI. For consistency, the same items were used for the other languages. Table 26 outlines the description and words used in Xitsonga, guided by isiXhosa, to enable comparisons between the two languages.

Table 26: Description and examples of items used to assess morphological development

English description	English	isiXhosa	Xitsonga
Testing the production of NC prefixes	baby/mother	bhabha vs. ubhabha / mama vs. umama	n'wana / mhani
Testing the production of plurals (use class 1/2, 5/6, and 9/10 as examples)	baby / babies, stone / stones, dog / dogs	umntwana / abantwana, ilitye / amatye,inja / izinja	n'wana / vana ribye/ maribye mbyana / timbyana
Demonstrative agreement (using 'big' and 'small' as examples)	a small one/ it is small a big one / it is big	encinci/incinci enkulu/inkulu omkhulu/mkhulu elincinci/lincinci	ximbyanyana (a small dog)/ dyimbyana (a big dog)
Present tense	come in vs you are coming in	ngena / uyangena	nghena / wa nghena
Past tense (-ile suffix)	I take vs I took/ I put off / I put off	ndiyathatha / ndithathile ndiyacima / ndicimile	ndza teka / ndzi tekile ndza tima / ndzi timile

Some words in Xitsonga are used as a phrase compared to just one word in isiXhosa. For example, in the adjective agreement, only the prefix is added in isiXhosa. On the other hand, in Xitsonga, the prefix “*xi-*” and the infix “*-anya-*” are added to the noun “*mbyana*” [dog] to express that it is small. African indigenous-speaking children are exposed to more regular grammatical rules than English-speaking children. These languages have a more regular system of plural formation than English, which means that children may be less likely to encounter irregular forms. However, more research is needed to better understand the nature of over-generalisation in African indigenous languages. The existing evidence suggests that over-generalisation may be less common in these languages than in other languages (Demuth, 1988; Mdee, 2001; Simango, 1994). According to Demuth (1988), there are several possible explanations for this difference. One possibility is that the indigenous languages’ NC system makes it less likely for children to overgeneralise grammatical rules. These languages have a complex NC system, which means that nouns are assigned to different classes based on their meaning.

One of the main challenges in adapting the MB-CDI is choosing appropriate word forms for the target language. Word forms are the specific shapes or variants of words that appear in a language, such as singular or plural, masculine or feminine, past or present tense, etc. Different languages may have different word forms for the same concept or idea, depending on their grammatical system and rules (Marchman et al., 2004). Mabunda (2013) argues that the meaning of some words is determined by how they are used. African indigenous languages often employ a structure comprising a root, a stem, and a series of affixes that convey information about tense, aspect, mood, and various other grammatical features. Scholars such as Kiso (2012), Nurse and Devos (2019), and Zeller (2004) have dedicated their studies to exploring and understanding these linguistic phenomena. By studying the intricate relationships between roots, stems, and affixes, researchers have made significant progress in unravelling the complexities of African indigenous languages.

Beuchat (1962: 106), as cited in (Zerbian, 2007), noted that surface tone patterns in Xitsonga depend on the word’s position in the sentence, the context used for the

sentence, the presence of modifiers, and the tone of the preceding verb only. The effect of tone was also evident in the participants' report on sentence complexities. For example, "*va ndzi hleka*" – [they are/were (depending on the tone) laughing at me] compared with "*ndzi va hleka*" – [I was laughing at them]. After discussions with the SA-CDI team, Alcock et al. (2019) suggested using NC as a checklist to assess the nouns in this section. For consistency, the same words in NCs 1-10 were used for all the languages. Table 27 shows the words used and their translated English words.

Table 27: Word forms: NCs 1–10

Description/what was tested	English example	Xitsonga Example
Class 1/1a NC prefix present?	woman	nsati / wansati / <i>n'wansati</i>
Class 2 NC prefix present?	children	nana / n'wana / <i>vana</i>
Class 3 NC prefix present?	porridge	kapu / nkapu/ <i>mukapu</i>
Class 4 NC prefix present?	trees	murhi / <i>mirhi</i> or nsinya/ <i>minsinya</i>
Class 5 NC prefix present?	spoon	pula / <i>lepula</i>
Class 6 NC prefix present?	leaves	tluka / atluka / <i>matluka</i>
Class 7 NC prefix present?	chair	tulu / <i>xitulu</i>
Class 9 NC prefix present?	ball	bolo / <i>ibolo</i>
Class 10 NC prefix present?	dogs	mbyana / <i>timbyana</i>

Dialectal differences were noted with NC4, where both words mean [trees] in English. The first word, "*murhi*", singular for a [tree], carries the prefix "*mu-*", whilst the other word "*nsinya*", also singular for [tree], does not have the prefix "*mu-*". However, the plural forms carry the prefix "*mi-*" for both words. NC9 should carry the prefix "*yi(n)-*". The word used for the languages was [ball], which is "*bolo*" in Xitsonga. As with the example of the word [tree], the plural will have the class 10 prefix "*ti(n)-*", "*tibolo*". The researcher could also have included [house] – "*yindlu*", the plural form of which would be "*tindlu*" or "*tiyindlu*". The same is noted with the prefix "*n'wa*" representing NC1a in Xitsonga. The discussion concluded that the word "*n'wana*" would be used for uniformity to test the production of NC prefixes.

Alcock et al. (2019) suggested using NC1 (*mu-*) and NC3 (*mu-*) as examples to caregivers for testing the production of NC prefixes in Part I of the “*sentence and grammar*” section. To assess the verbs in the word forms section, the SA-CDI team suggested using descriptions in Table 28 to guide the choice of items.

Table 28: Word forms: verbs included in Xitsonga MB-CDI

Description/what was tested	English example	Xitsonga example
Immature past tense - have they reached the full form or is it only partially there?	I kicked	raha / rahe/ rahile
Overgeneralisation of past tense (applicative)	sleep	tlela / etlele / etlerile
SM omission in negative	don't want vs. I don't want	a lavi / a ndzi swi lavi
Negative command	don't go	famba / u nga fambi
Subjunctive	I play outside? vs should I play outside?	ndzi tlanga ehandle / ndzi ya tlanga ehandle
Future - have they reached the full form or is it only partially there?	sit here vs I will sit here	tshama laha / ndzi ta tshama laha
Present tense	go	famba / wa famba/ ndza famba
OM use without tense	pushing me vs you are pushing me	susumeta / wa ndzi susumeta
OM use in the present tense - are they using it when they should be?	I love vs. I love you	ndza rhandza / ndza ku rhandza
Copulative - if you ask your child “what is this”?	paper vs it is a paper	phepha / i phepha

Alcock et al. (2019) advised that when testing the production of plurals, the NCs 1/2, 5/6, and 9/10 be used as examples. For consistency, the same words in NCs 1-10 were used for all the languages. This was discussed in section 3.5.2. Subject-verb agreement is indicated with prefixes used as subject markers in Xitsonga. It is consistent with the NC features of the preverbal subject to use the subject marker (Lee & Hlungwani, 2015). For example, with a phrase such as [I don't want to] in Xitsonga, the subject marker will depend on what you do not want. The NC of the thing you do

not wish for will determine the subject marker. Therefore, if it is a [ball], it belongs to NC9. In Xitsonga, you will say “a ndzi *yi* lavi”. Therefore, the subject marker in this example will be “*yi*”. These are examples of the NC and agreement markers discussed by the focus groups.

The groups agreed on including a number of these to give the caregivers more examples. This was also a suggestion from the isiXhosa researchers, who found that parents struggled a bit with this section and needed more clarity from the fieldworkers (Mitchley, 2015). Each NC has its own agreement markers with prepositions, pronouns, and adjectives. The verbal aspects of a sentence are particularly complex, as they distinguish between subject and object NCs. The team of experts advised on a further literature review to understand holophrases and the use of tone in Xitsonga. Xitsonga is a tone language with a two-tone system (Zerbian, 2007). Tone is used to distinguish lexical and grammatical differences. This information was beneficial in constructing the “*grammar and sentences*” section.

4.5.2. Word endings

The focus groups agreed that children between 16 to 32 months would have learned the complexity of Xitsonga morphology. They believed these children would understand and use tense aspects, applicative, locative, and the agreement markers for the various NCs. Xitsonga, like the other African languages, has tense-aspect markers. The most common tense markers are represented by suffixes “-a”, “-e”, “-i”, “-ile” and “-anga”. For example, [eat] is “*dya*” in Xitsonga. An example of how the suffix changes the word “*dya*” is illustrated in Table 29.

Table 29: Examples of tense-aspect markers in Xitsonga

Xitsonga	English
dya	eat
dye	ate
dyile	eaten
dyanga	not eaten
dyi	not eating

The SA-CDI team agreed on verbs to assess the various tense-aspect markers. For example, the English MB-CDI had one verb with the identified error: [eat] vs [eaten] or [blow] vs [blowed]. Xitsonga does not have documented information on these errors. Thus, the checklists had two or three of the tense markers (as shown with the example in Table 29: “*dya*”, “*dye*”, “*dyile*”) to establish what children will commonly use between 16 and 32 months. Translating indigenous languages is a complex task that requires a high level of skill and expertise. Translators must be able to understand the source language and culture, as well as the target language and culture. They must also be able to research and analyse the context of the word and be aware of the potential for non-equivalence.

4.5.3. Sentence types and complexity

To assess the first section of sentence complexity, the researcher used a forced-choice recognition format. Caregivers chose the member of 14 sentence sets of three that best reflected the child’s present speech level (Fenson et al., 1994). The types of sentences that children acquire and the levels to which they master complexity vary from language to language for children. Based on the discussions of the grammar sections that included the use of agreement markers, the focus groups agreed that children between 16 and 32 months would have started combining sentences. The focus groups and the SA-CDI team agreed that children between 16 and 32 months do combine sentences and use agreement markers.

For the second section, there was also a forced-choice recognition format in which caregivers chose the member of each of the 37 sentence pairs that best reflected the child's present speech level. The minimal contrasts demonstrated by Bates et al. (1994) and Fenson et al. (1994) included the presence or absence of copulas, auxiliary verbs, possessives, plurals, tense markers, prepositions and articles in obligatory contexts. It consisted of a few grammatically correct words but varied complexity, such as [*'where's my dolly'* vs *'where's my dolly named Ntombi'* or *'look at me'* vs *'look at me dancing'*]. For English, with its relatively modest inflectional morphology and the general absence of case markings, the initial step in grammatical development for most children is combining words. This generalisation is not entirely accurate even for English and is, of course, highly inaccurate for other languages.

With regard to the issue of grammatical items not acquired in an errorless manner (e.g., the use of possessive markers in English) and where these were obtained using a spontaneous language sample, Dr Alcock made another proposal (Alcock et al., 2019). In English, a child could make an error such as [baby blanket] instead of [baby's blanket]. These errors might be different in Xitsonga because Xitsonga uses copulas and subject/object markers. In this case, the child would say "*nkumba n'wana*" instead of "*i nkumba wa n'wana*". The child would still be correct if they omit the copula "*i*" and say "*nkumba wa n'wana*". Spontaneous speech samples were therefore used to check these differences. Dr Alcock's proposal was that these grammatical items should be avoided because they are less helpful in assessing development. She also suggested that the MB-CDI avoid asking about verbal extensions because the applicative in Kiswahili and Kigiriana, for example, was either not utilised or incorrectly used (Alcock et al., 2019). The focus group discussions and the review of the translated MB-CDI were used to develop a Xitsonga MB-CDI piloted on 43 Xitsonga-speaking children between the ages of 16 and 32 months. The use of focus groups with caregivers was an important step in the development of the Xitsonga MB-CDI.

4.6. Results from the pilot study of the reviewed Xitsonga MB-CDI

This section will discuss the results of the pilot phase of the reviewed version of the Xitsonga MB-CDI. It describes the frequency in the production of items in the various categories of the MB-CDI by Xitsonga-speaking children aged 16 to 32 months and reports on correlation (i.e., Pearson) between age and vocabulary size. The purpose of this analysis was to include or exclude items from the MB-CDI depending on their usage by children between 16 and 32 months. This section addresses the following research questions:

- (i) What are frequent words used by Xitsonga-speaking children aged 16 to 32 months in early language development?
- (ii) What is the relationship between age and vocabulary size among Xitsonga-speaking children aged 16 to 32 months?
- (iii) What is the relationship between age and morphosyntactic development among Xitsonga-speaking children aged 16 to 32 months?

The MB-CDIs are not intended to be a comprehensive and detailed representation of a child's entire vocabulary. Instead, the focus is on assessing the child's overall vocabulary level rather than listing every word they know. Fenson et al. (1994, p. 14) suggested factors as a guide when selecting items to be included in the MB-CDI. Firstly, identify items that are "sensitive to developmental change" and that have been demonstrated to be reliable measures of a child's language abilities. Secondly, include questions that parents will understand easily.

4.6.1. Frequency of words used by Xitsonga-speaking children aged 16 to 32 months

This section presents the results of a study on the frequency of words used by Xitsonga-speaking children aged 16 to 32 months. Table 30 shows a summary of the statistical analyses of included items per lexical category (detailed statistical analyses can be seen in Appendix F: Pilot descriptive statistics of lexical categories). Even though Table 30 shows no correlation between the categories and age in this sample,

when individual items were analysed, the findings allowed for the inclusion and exclusion of items based on the criteria outlined in Table 22. The inclusion and exclusion of lexical items were done to ensure the validity and reliability of the tool to the Vatsonga culture, lifestyle and environment. Some words were not in the original toddler form and were added by the SA-CDI team or the focus groups. For example, the word “*barha*” [wheelbarrow] was added to the “*vehicles*” category by the focus groups and the SA-CDI team to replace “*xileje*” [sled], even though these items have different functions. The item [sled] is unfamiliar to this context, whilst [wheelbarrow] is familiar. Of the Xitsonga-speaking toddlers, 64% reported frequent use of this word [wheelbarrow] and it had a significant positive correlation with age ($r = .36$ and $p < .01$).

Another example is the dialectal difference of “*nguluve/honci*” [pig]. On the MB-CDI completed by the parents, the enlisted item was “*nguluve*”; however, “*honci*” was reported as an optional word frequently used by 23 children (53.8%) in this study despite no correlation with age ($r = -.11$ and $p > .05$). Dialectal difference might result in a dearth of items to be used in an assessment instrument (Southwood, 2013). Several authors suggest that cultural and linguistic relevance should be considered when selecting items for the adapted tool (Hambleton & Li, 2005; Vogt et al., 2015).

Table 30: Summary of statistical analysis of lexical items included in the Xitsonga MB-CDI questionnaire ($n = 44$)

Category	Xitsonga MB- CDI number of items (pilot 1)	Xitsonga MB- CDI number of items (main study)	Number of items excluded from the main study	Number of items known by > 50% of the sample	Correlation with age (r)	Sig (2-tailed) (p)
sound effects	18	17	1	6	.17	.30
animals	62	52	10	5	.10	.50
vehicles	17	12	5	4	.15	.36
toys	18	18	0	3	.11	.40
food and drinks	81	72	9	19	.17	.35
clothing	34	34	0	5	.11	.50
body parts	34	31	3	11	.18	.26
small household	86	71	15	4	.11	.37
furniture and rooms	41	32	9	4	.14	.37
outside things	37	27	10	4	.18	.35
places to go	26	18	8	3	.13	.45
people	30	25	5	6	.24	.21
games and routines	59	35	24	13	.20	.24
action words	142	136	6	35	.17	.31
descriptive words	79	76	3	3	.16	.32
words about time	16	12	4	0	.06	.43
pronouns	26	19	7	2	.20	.25

question words	7	7	0	0	.21	.17
prepositions & areas	27	24	3	1	.14	.39
quantifiers & articles	16	13	3	0	.07	.43
helping verbs	13	13	0	0	.17	.33
connecting words	5	6	0	0	.17	.37
Total no of items	874	750	125			

According to Xu and Tenenbaum (2007), children tend to learn more general or superordinate words before they learn more specific or subordinate words. The significance of the relationship and the linguistic and cultural relevance or appropriateness determined the inclusion or exclusion of items in the “*Vocabulary Checklist*” section for the Xitsonga MB-CDI based on the statistical analysis and recommendations from the SA-CDI team (Alcock et al., 2019; Weber et al., 2018).

Table 31 shows the frequency composition and correlation with age of fifty highly correlated items included in the Xitsonga MB-CDI (see Appendix F: Pilot descriptive statistics of lexical categories, for detailed statistics of the analyses).

Table 31: Frequency of words included in Xitsonga MB-CDI and their correlation with age

Word	Category	% Frequency of items	Correlation with age (<i>r</i>) ⁴	Sig (2-tailed) (<i>p</i>) ⁵
OM_hina [ours]	pronouns	84	.38	.003**
Etlela [asleep]	descriptive words	80	.33	.012*
Kambe [but]	connecting words	77	.42	.001***
Xi_(OM) [it]	pronouns	77	.32	.015*
Aka [build]	action words	73	.40	.002**
Homu [cow]	animal words	73	.37	.003**
Sasekile [pretty]	descriptive words	73	.38	.003**
Ndzhaka yindlu [backyard]	outside things	73	.49	.005**
Papantsongo [uncle]	people	73	.36	.007**
Khirayoni [crayon]	toys	70	.37	.006**
Ku xaveni [shopping]	games and routines	70	.32	.015*
Hoxela hansa [throw down]	action words	68	.39	.003**
Yima [stand]	action words	68	.36	.006**
Xisuti [waist]	body parts	68	.34	.011*
Kuma [find]	action words	68	.34	.011*

⁴ *r* is a value that ranges from -1 to 1, where a value of -1 indicates a perfect negative relationship (when one variable increases, the other decreases), 0 indicates no relationship, and a value of 1 indicates a perfect positive relationship (when one variable increases, the other also increases).

⁵ Significance testing: *p* < .001*** (strong evidence); *p* < .01** (good evidence); *p* < .05* (moderate evidence).

Kokwana [grandmother]	people	68	.33	.014*
Tsala [write]	action words	66	.50	.000***
Hu hu [woof woof]	sound effects	66	.39	.003**
Hikokwalaho ka yini [why]	questions	66	.36	.006**
Teka [take]	action words	64	.39	.003**
Barha [wheelbarrow]	vehicles	64	.36	.006**
Navela [wish]	action words	64	.33	.012*
Papahulu [uncle]	people	64	.33	.013*
Vona [see]	games and routines	64	.33	.014*
Buti [brother]	people	61	.41	.002**
Lexi/leswi (OM) [this/these]	pronouns	61	.36	.006**
Tlula [jump]	action words	61	.35	.008**
Xikulu [so big]	games and routines	61	.34	.010**
Huku [chicken]	animal words	59	.44	.001***
Hay 5 [high 5]	games and routines	59	.45	.001***
Sesi/tati [sister]	people	59	.35	.008**
Tsakamisa [wee]	action words	59	.35	.008**
Xorhangisa [underpants]	clothing	57	.39	.003**
Hundzuluka/jika [turn around]	games and routines	57	.38	.004**
Chela [pour]	action words	57	.34	.010**
Miyawu [meow]	sound effects	57	.34	.011**
Wanuna [man/uncle]	people	55	.40	.002**
Famba pipita [go potty]	games and routines	55	.38	.004**

Yana [go]	action words	55	.35	.009**
Bodlela [bottle]	small household	52	.41	.002**
Hlamba mavoko [wash your hands]	games and routines	52	.36	.006**
Hansi [down]	prepositions and areas	52	.34	.011**
Fonela [call]	games and routines	52	.33	.015**
Malume [uncle]	people	50	.38	.004**
Mbhongolo/donki [donkey]	animals	50	.36	.007**
Khoma [hold]	action words	50	.33	.013**
Mpfula [rain]	outside things	48	.35	.007**
Thekisi [taxi/combi]	vehicles	45	.40	.003**
Nkolo [throat]	body parts	43	.40	.002**
Twa ndlala [hungry]	descriptive words	39	.34	.010**

Some words that the focus groups reported as commonly known or frequently used by the children were found to have a significant correlation with age and were commonly understood and used by the children in this study. Nouns that are more concrete are reported to be used frequently by children earlier than less concrete or abstract words (Hoff, 2013; Nelson et al., 1993). For example, the lexical items “*huku*” [chicken], ($r = .44$ and $p < .001$), and “*homu*” [cow] ($r = .39$ and $p < .01$) showed a positive correlation with 86% frequently using the word “*huku*” and 71% frequently using “*homu*”. It was interesting to note that items that were in the same family but more specific such as [chicken] vs [hen] or [cow] vs [calf] were different in the frequency used by the children in this study. For example, “*mbhaha*” [hen] ($r = .05$ and $p > .05$) and “*rhole*” [calf] ($r = -.04$ and $p > .05$) showed no significant correlation when compared to [chicken] and [cow]. Both items were included following guidelines from the CDI Advisory Board and other researchers that one needs to take into account the ceiling effect, the floor effect and those that fall in the middle, as neither too difficult nor too easy (Alcock et al., 2019; Weber et al., 2018).

The “*quantifiers and articles*” category had the least frequently used items, with a percentage range of 10.7% to 32.1% of the children who reported using these words. This category was also challenging for the translators and the focus groups when trying to obtain equivalence in translation. For example, the word “*-ntsongo*” [few] was challenging for both back and forward translators. It had to carry a prefix which was determined by the NC. It was not excluded from the list as the language samples had also shown that children as young as two use the quantifier “*-ntsongo*” in their daily conversations. Statistical analysis revealed that the word [few] was the least used (10.7%) by the children in this study and had no correlation with age ($r = .15$, $p > .05$). Frank et al. (2021) noted in the Wordbank project report on cross-cultural studies that there is an under-representation of function words. Even though there is an under-representation, these words were included in the adapted Xitsonga MB-CDI.

Technical challenges meant some categories had missing items due to omission on the printed form. For example, the “*outside things*” category had 41% of the lexical items included and a limited number ($n = 14$) of the participants responded, thus,

analysis for these items was not considered a true reflection of words to be included or excluded. Fenson et al. (1994) recommend exclusion from the list if the items in a category are fewer than 5% of the total or extremely infrequent. Thus, items were excluded from the list after consultations with the SA-CDI team and following analysis of these items in other languages (Alcock, 2019). Decisions for such words to be included or excluded were supported by discussions in consultation with the SA-CDI team.

4.6.2. Age and vocabulary size in Xitsonga-speaking children aged 16 to 32 months

It is important to consider the correlation between vocabulary size and age when developing a language assessment tool because vocabulary development is closely tied to age. Children typically follow a predictable pattern of vocabulary growth, with certain milestones being reached at specific ages. By taking into account the typical vocabulary size for a given age, language assessment tools can measure a child's language development more accurately and identify any potential delays or difficulties (Bleses et al., 2018; Boateng et al., 2018; Frank et al., 2021). Figure 16 shows vocabulary size of 43 Xitsonga-speaking toddlers between the ages of 16 to 32 months.

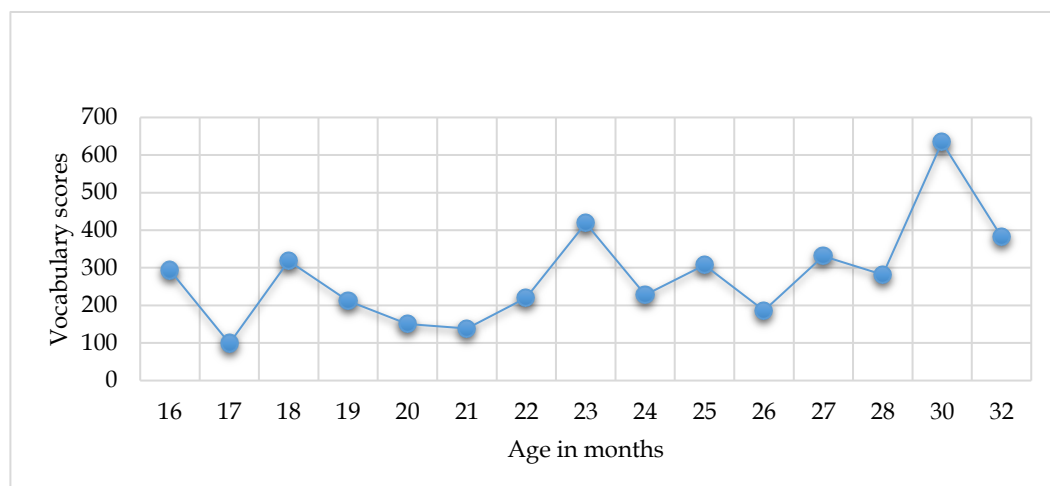


Figure 16: Vocabulary size for Xitsonga-speaking children aged 16 to 32 months ($n=43$)

There is variability in the vocabulary size due to the unequal distribution of the children in each monthly distribution (see section 3.4.1, Table 12). The percentage of vocabulary size was calculated by dividing the number of words that each child produced by the total number of words in the Words and Sentences form of the translated Xitsonga MB-CDI. The minimum vocabulary size was 28, which was observed for a 22 month old child. The maximum vocabulary size was 701, which was observed for a 32 month old child. There was a positive and significant correlation between age and vocabulary size ($r = 0.67, p < 0.01$), indicating that older children had larger vocabularies than younger children. However, there was a large variation in size within some age groups, for example, at 16 months (min = 68, max = 608) and 26 months (min = 67, max = 295).

There are several factors that might contribute to these variabilities. This may reflect individual differences in cognitive abilities, learning styles, or motivation for word learning among children (Fenson et al., 1994). It may also reflect environmental factors such as parental input quality and quantity, or linguistic factors such as morphological complexity or NC system in a language (Mdlalo et al., 2016). These linguistic features may affect children's vocabulary development by facilitating or hindering their word recognition and production. These findings were in line with previous studies that have reported a positive relationship between age and vocabulary size in early childhood (Hoff, 2006). This suggests that vocabulary development follows a similar trajectory across different linguistic and cultural contexts, as children acquire more words as they grow older and have more exposure to language. This demonstrates that the items analysed for the Xitsonga MB-CDI can show similar patterns and, as such, could be used to document Xitsonga lexical development.

4.6.3. Age and morphosyntactic development of Xitsonga used by children aged 16 to 32 months

The "*sentence and grammar*" section aimed to describe the children's use of words, from bound morphemes to complex sentences. The items analysed enabled

understanding of children's production of NCs, plurals, tenses, and adjective agreement. Xitsonga has a rich and complicated morphology in which noun and verb roots are modified with prefixes, infixes, and suffixes. Thus, the second section will report on grammatical structure, from morpheme-bound structures, to the MLU and the complexity of sentences used by the children. For this section, thirty-nine ($n = 39$) responses were statistically analysed using frequency analysis and Pearson's correlation. Three caregivers did not complete this section for their children and were excluded from the analysis.

4.6.3.1. Correlation of bound morphemes and agreement markers with age

The grammar section analysed five areas of bound morphemes and agreement markers. The internal consistency of the "*sentence and grammar*" section obtained a Cronbach's alpha coefficient $> .90$. This means that the items in the "*sentence and grammar*" section are all measuring the same construct and that the test is a reliable measure of that construct. Furthermore, the findings show a relationship between the production of bound morphemes, agreement markers and age from the sample in this study. The bound morphemes included NC production, demonstrative and tense markers. The agreement markers included subject and object markers. Table 32 shows that there is a significant positive correlation between the production of the three areas of the grammar production and age (apart from the demonstrative marker and past tense having p values greater than .05, implying the association with age is insignificant).

Table 32: Statistical analysis of the grammar production by Xitsonga-speaking toddlers and their correlation with age

	<i>n</i>	Mean score % ($\bar{x}$)	Pearson correlation (<i>r</i>)	Sig (2- tailed) (<i>p</i>) ⁶
NC	39	50	.33	.040*
Subject agreement marker	39	42	.41	.009**
Demonstrative marker	39	63	.30	.062
Present tense	39	53	.57	.000***
Past tense	39	61	.28	.081

⁶ Correlations are significant at *** $p < .001$ (strong evidence) ** $p < .01$ (good evidence); * $p < .05$ (moderate evidence)

These findings show that these items could be included in the grammar section of the reviewed MB-CDI to be piloted with Xitsonga-speaking children between 16 and 32 months.

4.6.3.2. Correlation of NCs with age

Nelson et al. (1993) note that NC development is related to lexical development, thus the grammar section was necessary to understand the early language development of Xitsonga-speaking children. The choice of the items used could have been another challenge in this section. For example, the word in NC 5, “*lepula*” [spoon] showed no correlation with age ($r = .21$ and $p > .05$) even though reported to be known by 53.8% of the toddlers. Noun development varies across languages, depending on the number and complexity of NCs and rules of assigning them to nouns (Gxilishe, 2008). Xitsonga’s NC system is characterised by prefixes and subject markers carrying features regarding NC and number. The questionnaire section asked the participants to rate the children’s ability to use the nouns, the correct NC prefixes, and the subject marker in agreement with the NC. The child was awarded zero (0) if they did not use the noun, one (1) for using the noun with an absent or incorrect NC prefix, and a two (2) when a child used the correct NC prefix. Table 33 highlights the average scores for the production of prefixes and subject markers of NCs 1-10.

Table 33: Average % scores of children using prefixes and subject markers in Xitsonga

	<i>n</i>	Not yet producing (%)	Use noun (%)	Use prefix (%)	Pearson correlation between age and frequency of NC use	Sig. (2- tailed)
NC1	39	53.8	43.6	2.6	-.11	.517
NC2	39	23.1	59.0	17.9	.05	.769
NC3	39	33.3	56.4	10.3	.39	.013*
NC4	39	43.6	48.7	7.7	-.18	.274
NC5	39	53.8	41.0	5.1	.21	.199
NC6	39	53.8	35.9	10.3	.15	.354
NC7	39	43.6	51.3	5.1	.40	.011*
NC9	39	41.0	51.3	7.7	.36	.023*
NC10	39	41.0	51.3	7.7	.27	.091

NOTE: NC 8 was erroneously omitted

In Xitsonga-speaking children between the ages of 16 and 32 months, the results revealed a lower correlation between age and the use of NCs 3, 7, and 9, and no correlation for the other NCs. Xitsonga-speaking toddlers have a higher noun composition; however, using the correct NC prefix showed a weaker correlation. It might be worth further investigating the individual analysis of the words used in assessing this. The focus groups and SA-CDI team also looked at the type of words, sentence types and complexity to evaluate the children's language skills. At 32 months, a child was observed using these nouns and subject markers. For example:

NC 1/2:

(a) Child 1 (female 32 months): "teka n'wana wa wena ha famba hina"

VERB-[teka]- ØNC1-OBJ-[n'wana]-SM1-[wa]-2ND Pers Sing. PRON-[wena]-OBJM-[ha]- VERB-[famba]- 1ST Pers Plur. PRON-[hina]

[TRANSLATION: take your child; we are leaving]

(b) Child 2 (male 32 months): *"i swa mhani, swa vamhani"*

Concord-[i]-OM8-[swa]- ØNC1-OBJ-[mhani], OM8-[swa] NC2-prefix-[va]-NC1-OBJ-[mhani]

[TRANSLATION: it is for the mother, for the mothers]

NC 5/6:

(c) Child 1 (female 32 months): *"hi leyi murhi wa wena"*

ADV-[hi]-ADJ4-[leyi]-NC3-SBJ-[murhi]-Cl3-POSS-[wa]- 2ND Pers Sing. PRON-[wena]

[TRANSLATION: here is your medicine]

(d) Child 2 (male 32 months): *"veka, a kona mafurha la?"*

VERB-[veka]- Ø-POSS-[-a]-ADV-[kona]-NC5prefix-[ma]-OBJ-[furha]-ADV-[la]?

[TRANSLATION: put down, is there a lotion here?]

Gxilishe (2008) noted that NC development follows a general pattern of three partially overlapping stages. Firstly, no prefix with full or partial noun stems; secondly, 'shadow' vowel and nasal prefixes, and lastly, phonologically appropriate NC prefixes. The children sampled showed the use of NCs with correct markers, as in the examples above. In (a) it is shown that a 32-month-old Xitsonga speaker used NC with the right subject marker. In (b) it is shown that the child of the same age used NC 2. On the other hand, the same children in (c) and (d) showed some errors in possessive markers and adjective agreement. In their study, Pascoe and Smouse (2012) found that children between 1 and 3 years old produced NC prefixes and subject markers on verbs consistently and accurately, with few errors of omission or substitution. The presence or absence of the subject did not affect the subject-verb agreement. Similar trends were also reported in other studies researching African indigenous language acquisition (Demuth, 2003; Gxilishe et al., 2007; Smouse et al.,

2012). This shows that NC development could be used to document word forms in Xitsonga.

4.6.3.3. Correlation of agreement markers with age

On the other hand, 42% of toddlers use the “*subject agreement marker*” by ages 16 to 32 months. For example, the use of “*wena*” [you – second person singular] and “*n’wina*” [you – second person plural] showed a statistically significant positive correlation with age ($r = .41; p < .01$). This also varies across languages depending on number and complexity of agreement features and the rules for assigning them to verbs (Gxilishe, 2008). However, the findings show that the agreement markers could be used in documenting early language development in Xitsonga.

4.6.3.4. Correlation of demonstrative markers with age

The “*demonstrative marker*” showed that on average, 63% of the toddlers were reported to be using the augmentative NC, such as using the prefix “*xi-*” or “*dyi-*” to express size (for example, “*ximbyanyana*” [puppy] or “*dyimbyana*” [extremely big dog]). However, the statistical analysis revealed no correlation with age ($r = .30, p > .05$). Demonstrative markers vary across languages and in form function and meaning. They are not typically common in the first words children learn but become more frequent and complex as children’s vocabulary and grammar grow (González-Peña et al., 2020; Jachimek et al., 2022).

4.6.3.5. Correlation of mean sentence length (MSL) with age

The toddler form also assesses syntactic development. All the participants (100%) included in this phase of the study reported that their children had started combining words. The statistical analysis showed a positive correlation ($r = .93, p < .05$) with age contributing to 86.8% of the variance. Thus, it shows that the MSL section should be included in the Xitsonga MB-CDI as it demonstrates that it is useful in tracking children’s language development. Paul (2007) and Hoff (2006) both support the use of MSL to measure language development. The focus groups and SA-CDI team

agreed that the sentence types and complexity should be included in the Xitsonga MB-CDI to be used to document patterns of morphosyntactic development.

4.7. Summary

This chapter reported on the adaptation of the MB-CDI from English to Xitsonga and the results of the first pilot of this initial adaptation. The adaptation involved the translation of items and then input from expert and parents' focus groups. The SA-CDI team also played a significant role with the guidance of Dr Alcock who had experience from a study done in Kenya. The perceptions of the focus groups on early language development and items on the MB-CDI brought about valuable information in the adaptation process. The concern about the length of the MB-CDI highlighted that it might affect the validity and reliability of the tool. There were suggestions that the form should be shorter for the person completing it to maintain their attention. Low parental literacy skills also meant that some caregivers would be unable to complete the form without assistance.

Some words have no equivalence across languages or cultures, and a concept familiar in one language might not exist in another as it is entirely unknown. The Xitsonga language is very different from English for which the MB-CDI was developed. Some words in Xitsonga have different meanings from English words. Thus, for item's validity, it was essential to consider cultural and contextual differences. It was also noticed that there are key factors that may influence the words used in the Xitsonga MB-CDI. These were familiarity with the words, differences in dialect, the use of loan words and brand names and even words not lexicalised in Xitsonga. It was suggested that these factors should be noted in order to increase the validity and reliability of the tool. A pilot study was then undertaken, and statistical analysis of the lexical and grammatical items used in the pilot study was carried out. The findings showed that most of the included items demonstrated a significant positive correlation with age. Some new items were included, and some were excluded, due to the ceiling or floor effects described in the inclusion and exclusion

criteria. The following chapter will discuss the results of the final phase of the study, the main study, with a larger sample of children that used the adapted Xitsonga MB-CDI to document early lexical and grammatical development.

CHAPTER 5: RESULTS OF PHASE THREE – THE MAIN STUDY

“By the time I am nearing the end of a story, the first part will have been reread and altered and corrected at least one hundred and fifty times.”

-Roald Dahl

The study's third and final phase was conducted following extensive consultations, pilot testing and drawing from other researchers' experiences. This section presents the study's results that aimed to describe the lexical and grammatical development of Xitsonga-speaking children aged 16 to 32 months. The results are based on data collected using the adapted Xitsonga MB-CDI which was administered to 99 caregivers of Xitsonga-speaking children living in semi-urban and rural areas of Limpopo Province, South Africa.

5.1. Introduction

This chapter reports on data analysed using descriptive and inferential statistics on the topics that describe developmental changes in vocabulary composition and morphosyntactic development. These topics are linked to the research questions, and they are as follows:

- i. The patterns of vocabulary development
- ii. The developmental changes in vocabulary composition
- iii. The patterns of grammar development [grammatical compositions and their relation to vocabulary size]
- iv. The development of MLU and how it varies with age
- v. The correlation between MLU and other language development areas

5.2. The patterns of vocabulary development

This section aims to provide an overview of findings on the patterns of vocabulary development, including the trends and individual differences in Xitsonga-speaking children between the ages of 16 and 32 months. Vocabulary development is complex and characterised by individual differences. The trends and individual differences are discussed below.

5.2.1. Vocabulary development trends

Vocabulary development is not a uniform or linear process; rather there are several trends and patterns that can be observed. Figure 17 shows a linear developmental trend of Xitsonga vocabulary production calculated at the 10th, 25th, 50th (median), 75th and 90th percentiles.

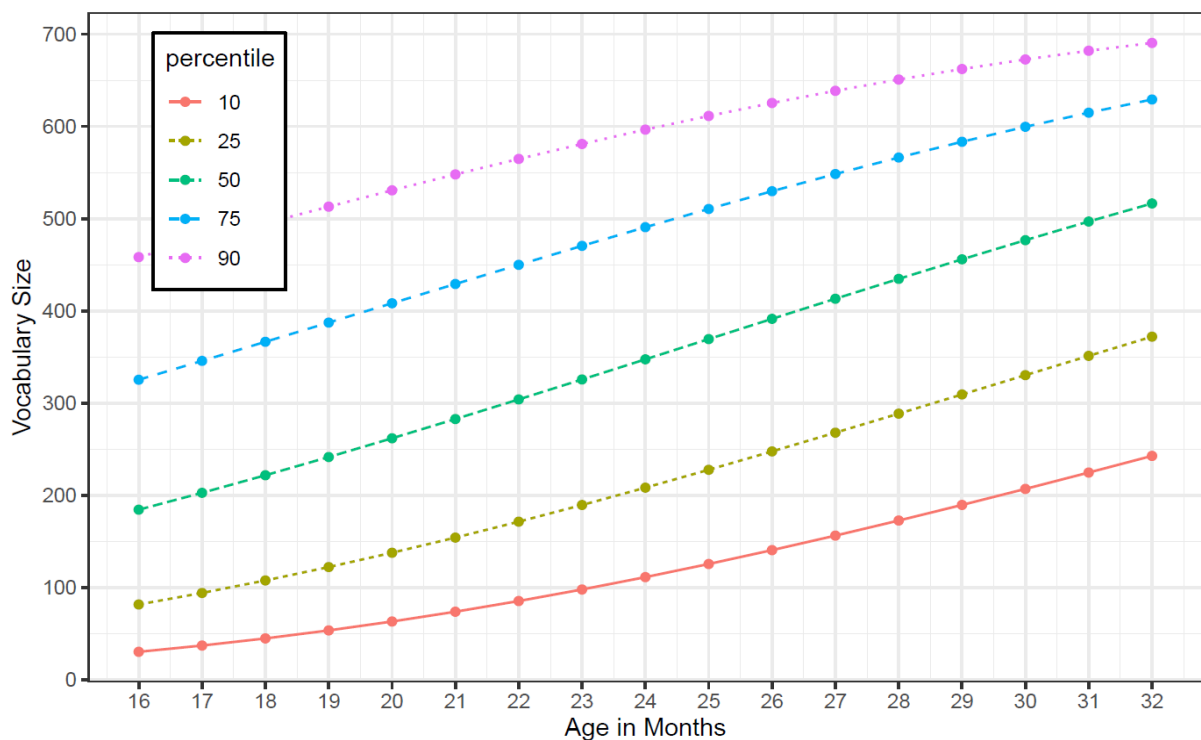


Figure 17: Fitted graph of the number of lexical items produced by Xitsonga-speaking toddlers ($n=99$) with linear and exponential mathematical models used for the fitted graph)

Results confirm the trend of word production increasing with age, as expected in typically developing children. Age positively correlated with vocabulary production ($r = .45$; $p < .001$), with age accounting for 20.5% of the variance. Word production between the ages of 16 to 32 months provides an overview of the developmental trends (based on a median) within these age groups. The children's productive vocabulary size ranged from 21 to 701 words. The median number of words produced by the entire sample was 318. Xitsonga-speaking toddlers at the 50th percentile produced more than 124 words at 16 months and 547 words at 30 months. Figure 18 shows the variability in the development of vocabulary size of children in this study.

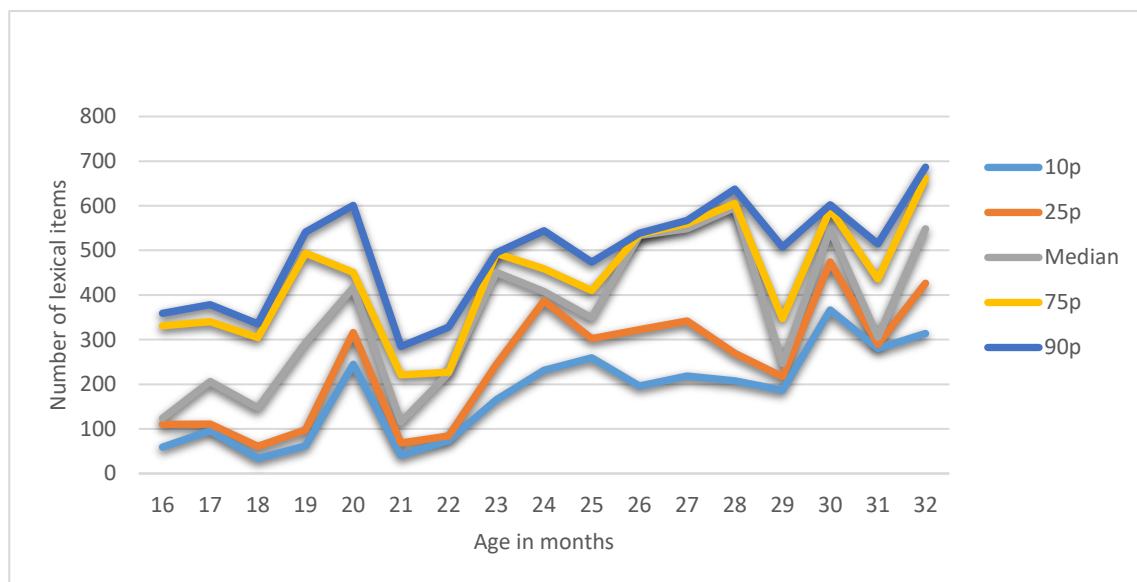


Figure 18: Number of lexical items produced by Xitsonga-speaking toddlers ($n=99$)

There was significant variability in scores at various development points. For example, on the 10th percentile at 21 months, children had a productive vocabulary size of 41 words, though at 20 months it was much higher with 245 words. Those on the 90th percentile at 21 months reported a vocabulary size of 284 words though at 20 months, it was also much higher with 601 words. Similarly, a drop was observed at 29 months, with children on the 10th percentile reporting a vocabulary size of 187 words, and those at the median having a productive vocabulary size of 246 words (see Figure

18). A spurt in the growth of expressive vocabulary was observed between 19 and 20 months. At the age of 19 months, the 10th percentile vocabulary size was 62 words, those on the 90th percentile achieved a vocabulary size of 541 words, and the median vocabulary size was 293 words. However, at 20 months, the vocabulary size was much higher, with a 10th percentile vocabulary size of 245 words. This means that 10% of children this age in this study produced less than 245 words. Interestingly, at 20 months, parental reports showed a median vocabulary size of 416 words compared to 293 at 19 months. The specific patterns of growth and decline may vary across different age groups.

Figure 18 shows the fitted graph of the number of lexical items produced by Xitsonga-speaking toddlers. It shows that the separation between the 10th and 25th percentiles, and the 75th and 90th percentiles was relatively small compared to the other data points. For instance, it was observed that 17 month old children scored 96 and 111 words at the 10th and 25th percentiles respectively. At the same age, the productive vocabulary was 340 on the 75th and 378 on the 90th percentiles. This age group recorded a significant gap between the median and these percentiles (10th, 25th, 75th, and 90th). Furthermore, Figure 18 shows that the gap between the median and the 75th and 90th percentiles had decreased for children older than 25 months. At 30 months, children on the 90th percentile had a vocabulary size of 602 words, with 592 words at the 75th percentile and a median vocabulary size of 547 words. Individual factors will influence the nature of the sample at each age interval.

The data presented in Figure 17 and Figure 18 indicate that children's vocabulary growth is predictable between the ages of 16 and 32 months, but that there is a large degree of variability at each age level. A significant correlation with age and vocabulary size suggests a growth in vocabulary with increasing age. These trends and patterns are expected given the cross-sectional methodology, i.e., the trajectory presented in Figure 17 is based on observations of different children at each age interval rather than following one cohort of children longitudinally over time. Overall, these results suggest that the vocabulary development trend of Xitsonga-speaking

children in this study is characterised by periods of both growth and decline, with an overall increasing trend.

5.2.2. Individual differences in vocabulary development

Individual variability in vocabulary development can be observed in vocabulary size. Xitsonga-speaking children between the age of 16 and 32 months in this study had a mean vocabulary size of 335 words with a *SD* of 192.8. There was wide variation in the vocabulary development of the sample, as described in section 5.2.1. The study did not undertake an extensive analysis of the other factors mentioned. However, a brief description of sex, geographic location and their influence on vocabulary development by Xitsonga-speaking children aged 16 to 32 months is included. *T*-tests were used to assess differences in vocabulary development due to sex and geographic location.

The results indicated that there were no significant differences in vocabulary development between males and females ($t(97) = -1.27, p > .05$). However, it is worth noting that the female participants exhibited a larger vocabulary size ($M = 382.2, SD = 189.8$) compared to the male participants ($M = 331.3, SD = 202.6$). The correlation analysis between the sex variable and vocabulary development also revealed no significant association ($F[1,98] = 2.53, R^2 = .04, p > .05$). On the other hand, the findings demonstrated a small effect size in the difference of vocabulary development between children from different geographic areas ($t(97) = -3.72, p < .001$, Cohen's $d = -.094$), favouring children from semi-urban areas. Specifically, participants from semi-urban areas exhibited a larger vocabulary size ($M = 431, SD = 167$) compared to participants from rural areas ($M = 291.2, SD = 197.8$). The correlation analysis between the geographic area of the children and vocabulary development revealed a significant positive association ($F[1,98] = 11.89, R^2 = .16, p < .001$).

These results suggest the presence of individual differences in the vocabulary development of Xitsonga-speaking children in this study. Some children may develop their vocabulary more quickly or slowly than others, resulting in a wide range of vocabulary sizes among children of the same age. While sex did not have a statistically

significant correlation with vocabulary development, geographic area did. These results highlight the importance of considering multiple factors when examining variability in vocabulary development. While individual differences such as sex may play a role, environmental factors such as geographic area can also have a significant impact.

5.3. Developmental changes in vocabulary composition

This section reports on vocabulary composition in Xitsonga-speaking children aged 16 to 32 months. When analysing data, in this section, children were categorised based on their developmental stage rather than their chronological age. In accordance with the suggestions made by Bates et al. (1994), the researcher divided the data into separate groups for the levels between 0 and 50 words and 51 and 100 words, even though most of the levels represent increments of 100 words. Previous research has indicated that the 50-word point may be a significant developmental milestone. Table 34 shows the descriptive statistics (i.e., mean, *SD*, and smallest and largest vocabulary sizes) of each group.

Table 34: Vocabulary size range of Xitsonga-speaking children in the main study sample

Range of vocab size	<i>N</i>	Mean	<i>SD</i>	Smallest vocab size	Largest vocab size
0 - 50	5	25.8	5.3	22	35
51 - 100	7	73.1	12.8	54	92
101 - 200	15	136.1	23.3	104	177
201 - 300	15	256.5	31.3	208	297
301 - 400	18	347.9	31.3	303	399
401 - 500	13	459.2	31.0	411	500
501 - 600	12	554.8	28.3	514	598
>600	14	661.8	45.5	610	733

In this section, the results of the analysis of vocabulary size are presented. The study included participants with a wide range of vocabulary sizes, as shown in Table 34. Results were organised into subsections based on the range of vocabulary sizes. To understand the relationship between the developmental stage and the lexical categories, the linear regression model was adopted. The researcher also conducted one-way ANOVA to compare the effect of vocabulary size on the number of words in each lexical category used by Xitsonga-speaking children in this study.

5.3.1. Composition of early vocabulary

The vocabulary composition outlines the development of common nouns, predicates, and function words, also referred to as closed-class words. Table 35 shows the descriptive statistics of the three lexical categories analysed in this section.

Table 35: Descriptive statistics for the children participating in the main study by vocabulary size and composition of three categories (noun, predicate and function words)

Categories	Total items/words	Mean	SD
Overall lexical items	733	350.3	201.7
Common nouns	322	158.8	85.2
Predicates	208	96.3	67.9
Function words	68	26.3	23.3

The common nouns included categories from the MB-CDI such as *“animals”*, *“transport”*, *“toys”*, *“clothing”*, *“body parts”*, *“small household items”*, *“food and drinks”*, and *“furniture”*. Categories such as *“people”* and *“places to go”*, which included common nouns as well as adverbs, were excluded. The predicates consisted of verbs and adjectives represented in the MB-CDI categories of *“action words”* and *“descriptive words”*, and excluded categories such as *“quantifiers”*, *“articles”* and *“pronominal adjectives”*. The function words included categories from the MB-CDI such as *“pronouns”*, *“prepositions”*, *“question words”*, *“quantifiers”*, and *“connecting words”*. Table 35 also shows that the mean vocabulary size for the children who used common nouns was 158.8 words, while the mean vocabulary size for the children who used predicates was 96.3 words and the mean vocabulary size for the children who used function words was 26.3 words.

Figure 19 shows the average composition of lexical categories used by Xitsonga-speaking children in this study. The composition of each lexical category was calculated based on the total vocabulary items (per lexical category) produced by each child in relation to their overall vocabulary size.

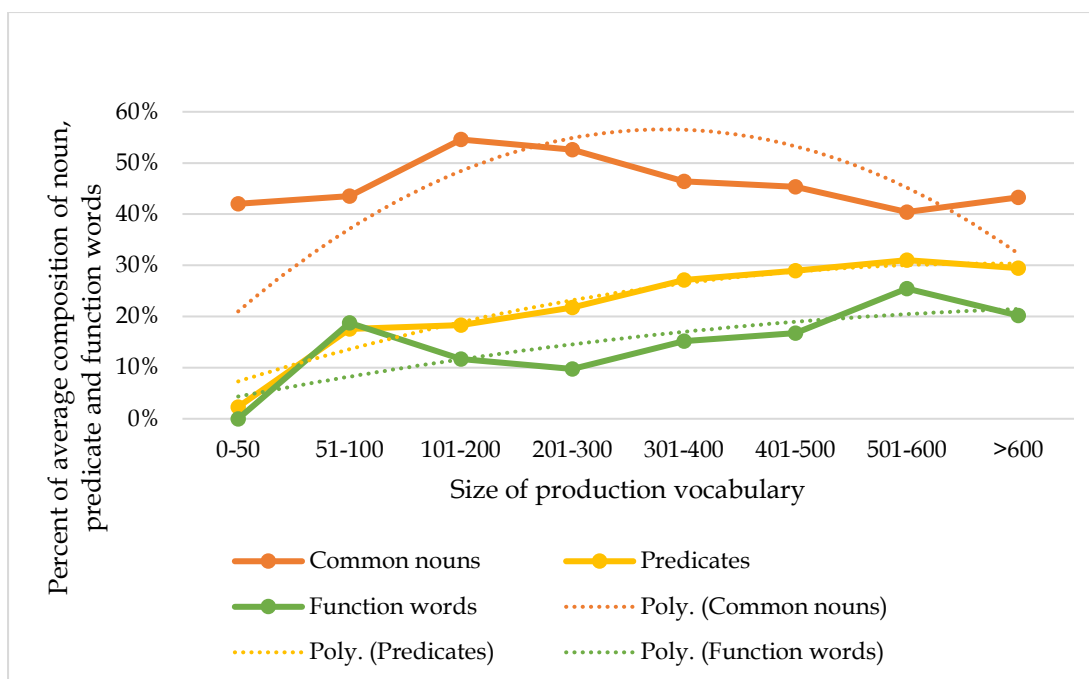


Figure 19: Average composition of the nouns, predicates and function words at each vocabulary level⁶

In the Xitsonga MB-CDI, common nouns make up the largest portion with 322 items (44% of the total items), followed by predicates with 208 items (28% of the total items), and lastly, function words with 68 items (9% of the total items). The three categories showed different developmental trends. The findings showed that even when children produced fewer than 50 words, most were common nouns (nouns = 42%, predicate = 9% and function words = 0%). At around the time when children were reported to be producing 200-300 words, the rate at which they added new nouns to their vocabulary was less than it was earlier (i.e., between 50 and 200 words). A linear regression model was adopted to understand the relationship between the vocabulary compositions of the lexical categories and the total vocabulary size of the children. The linear regression analysis showed that the model was statistically

⁶ Polynomial linear regression trendline was used for **common nouns** ($y = -0,0242x^2 + 0,2341x$ $R^2 = 0,3016$), **predicates** ($y = -0,005x^2 + 0,078x$ $R^2 = 0,9365$) and **function words** ($y = -0,0024x^2 + 0,0459x$ $R^2 = 0,5527$).

significant ($F [1, 97] = 533.8, p < .0001$), with approximately 86.7% of the variation in total vocabulary size explained by the model. However, the intercept was not statistically significant ($t (97) = -.73, p = .47$), with an estimated value of -13.2 (where the standard error (SE) = 18.1).

The developmental pattern of predicates differed from that of nouns. A significant increase in the composition of predicates and function words was observed when these children had a total vocabulary size of 301-400. The results showed that the model was statistically significant ($F [1, 94] = 726.1, p < .0001$), with approximately 89.6% of the variation in total vocabulary size explained by the model. The intercept was statistically significant ($t (94) = 6.3, p < .0001$), with an estimated value of 86.7 ($SE = 13.7$). Similarly with function words, linear regression analysis showed that the model was statistically significant ($F [1, 84] = 221.5, p < .0001$), with approximately 71.26% of the variation in total vocabulary size explained by the model. The intercept was statistically significant ($t (84) = 7.2, p < .0001$), with an estimated value of 175.7 ($SE = 24.5$). The ANOVA test found that there was a significant difference in vocabulary size between the three groups ($F [3,392] = 144.6, p < .01$), with the children who used common nouns having the largest vocabulary. These results suggest that the use of common nouns is associated with larger vocabulary sizes in Xitsonga-speaking children aged 16 to 32 months. Another way of illustrating the proportion of total noun, predicate and function word items on the Xitsonga-MB-CDI reported at each vocabulary level from 16 to 32 months is given in Figure 20.

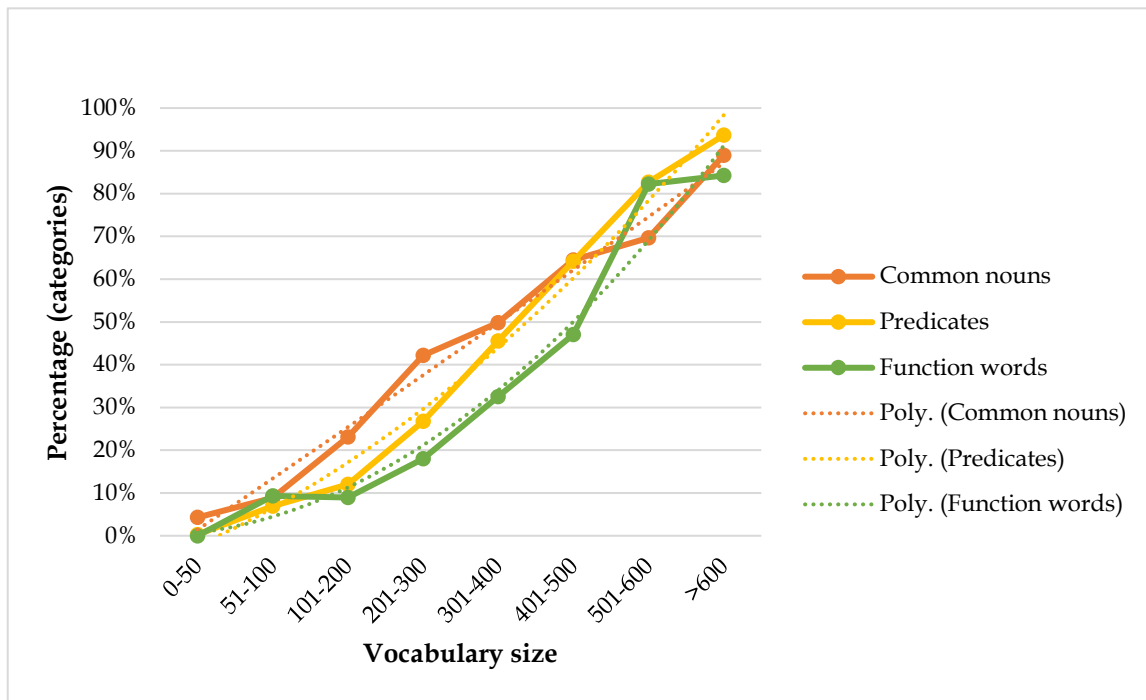


Figure 20: Proportion of total noun, predicate and function word items on Xitsonga-MB-CDI reported at each vocabulary level from 16 to 32 months

Xitsonga-speaking toddlers in this study had a vocabulary composition that was 50% nouns when they had an overall vocabulary size of more than 300 words. However, only when their total production vocabulary was between 401 and 500 words was a 50% composition of function words observed. Figure 19 and Figure 20 show similar trends of nouns being the largest proportion of words produced by Xitsonga-speaking children in this study. Even though there are some differences in the representation of nouns and predicates, the word classes appear to be close to each other (e.g., they both have a vocabulary composition of 50% when the children are reported to have a total vocabulary of just over 300). The findings suggest that the developmental trends of children's vocabulary differ across the three categories of words: nouns, predicates, and function words. Bates et al. (1994) expanded on an approach to studying the development of children's vocabulary that involves plotting the proportion of different word types (e.g., nouns, verbs, adjectives) in a child's vocabulary against the total size of the child's vocabulary. They recommended that a statistical model with third-order polynomials to analyse the data be used. This model shows how the proportion of words in different categories changes as the overall

vocabulary size increases. Figure 21 shows an example of how the proportion is plotted.

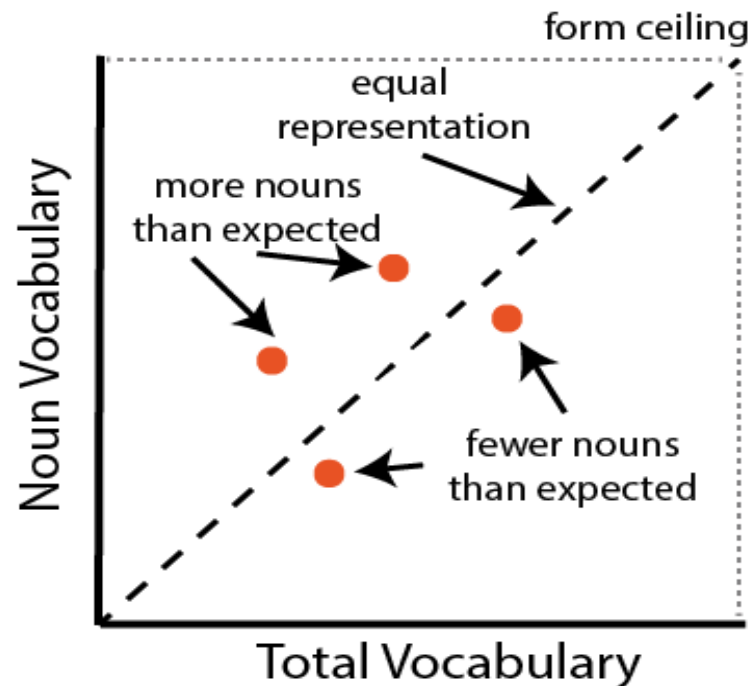


Figure 21: Example of Bates et al.'s (1994) plot of the proportion of lexical category (noun) to total vocabulary (Frank et al., 2021)

The diagonal line on this plot represents the expected proportion of each word type, if a child learned words without any bias. A child who learns more nouns than expected would have a data point above the diagonal, while a child who learns fewer nouns than expected would have a data point below the diagonal. By averaging these data points, one can assess the average bias for or against nouns (and other categories as well). Figure 22 displays individual children's vocabularies as points, with each colour representing a different lexical category. As a result, each child is represented once in every data point. The curves illustrate the relationship between the three lexical categories and the total vocabulary.

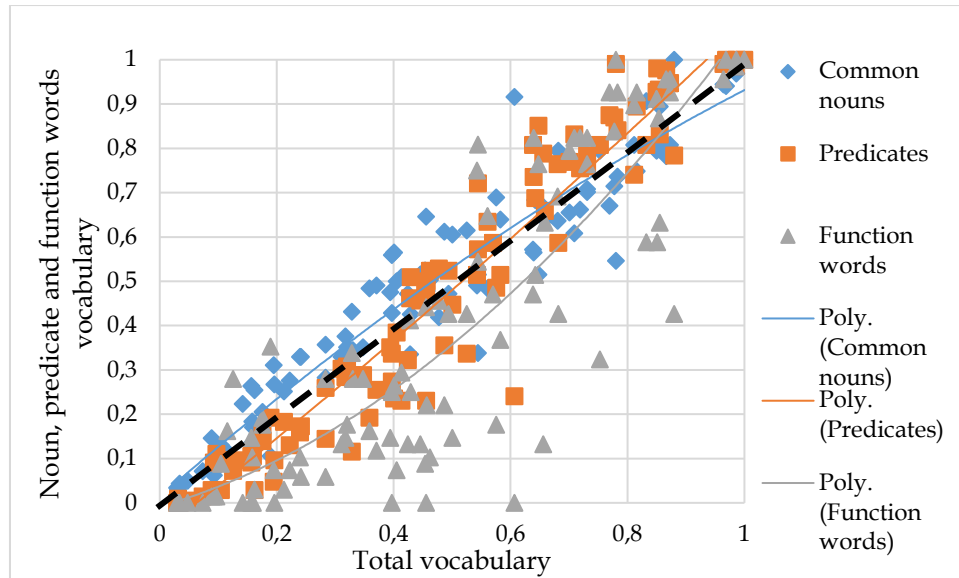


Figure 22: Proportion of total noun, predicate and function word items on Xitsonga-MB-CDI reported at each vocabulary level from 16 to 32 months

The findings consistently show that function words are the least represented in the vocabulary composition of the three categories. As the children's total vocabulary size increases, the proportion of nouns and predicates in their vocabulary increases more quickly than the proportion of function words. Even with the variability in vocabulary composition among the three categories, they still show a significant correlation. Table 36 shows the correlation among the three lexical categories analysed.

Table 36: Correlation between three lexical categories and the total vocabulary size of Xitsonga-speaking children aged 16 to 32 months ($n=99$)

		Predicates	Function words	Total vocab size	Common nouns
Predicates	Pearson correlation	1	.90**	.97**	.86**
	Sig. (2-tailed)		<.001	<.001	<.001
	N	99	99	99	99
Function words	Pearson correlation	.90**	1	.86**	.71**
	Sig. (2-tailed)	<.001		<.001	<.001
	N	99	99	99	99
Total vocab size	Pearson correlation	.97**	.86**	1	.97**
	Sig. (2-tailed)	<.001	0,000<.001		<.001
	N	99	99	99	99
Common nouns	Pearson correlation	.86**	.71**	.97**	1
	Sig. (2-tailed)	<.001	<.001	<.001	
	N	99	99	99	99
**. Correlation is significant at the 0.01 level (2-tailed)					

The total vocabulary size of Xitsonga-speaking children in this study is significantly correlated with the noun category ($r = .97, p < .001$), predicates ($r = .97, p < .001$) and function words ($r = .86, p < .001$). This correlation confirms the visual representation of Figure 19. However, common nouns had a stronger correlation with predicates ($r = .86, p < .001$) when compared to the function words ($r = .71, p < .001$). Predicates correlated more strongly with total vocabulary size when compared to common nouns ($r = .96, p < .001$) and function words ($r = .86, p < .001$). The results suggest that as the number of predicates used by the Xitsonga-speaking children in this study increased, the number of common nouns used tended to increase more than the number of function words used.

The predicates category was further broken down to examine the bias estimates in production for action and descriptive words. In this analysis, the action word

category only includes main verbs and not modals or auxiliaries, which are analysed separately as part of a category called closed-class vocabulary items. Similarly, the descriptive category does not include closed-class modifiers like quantifiers, articles, and pronominal adjectives. The “*action words*” category had 136 items whilst “*descriptive words*” category had 72 items.

A one-way ANOVA was conducted to compare the effect of vocabulary size on the number of descriptive and action words used by children. Figure 23 shows the proportion of action and descriptive words produced by each child as a function of the proportion of the total vocabulary size of that child. Within the composition of the predicate category, action words are reported to have a higher production compared to descriptive words. As shown in Figure 23, there were more action words than expected whilst the descriptive words were less than expected. The mean vocabulary size for the children who used the most action words was 66.4 words, while the mean vocabulary size for the children who used the fewest action words was 27 words. The mean vocabulary size for the children who used the most descriptive words was 180.6 words, while the mean vocabulary size for the children who used the fewest descriptive words was 130.2 words.

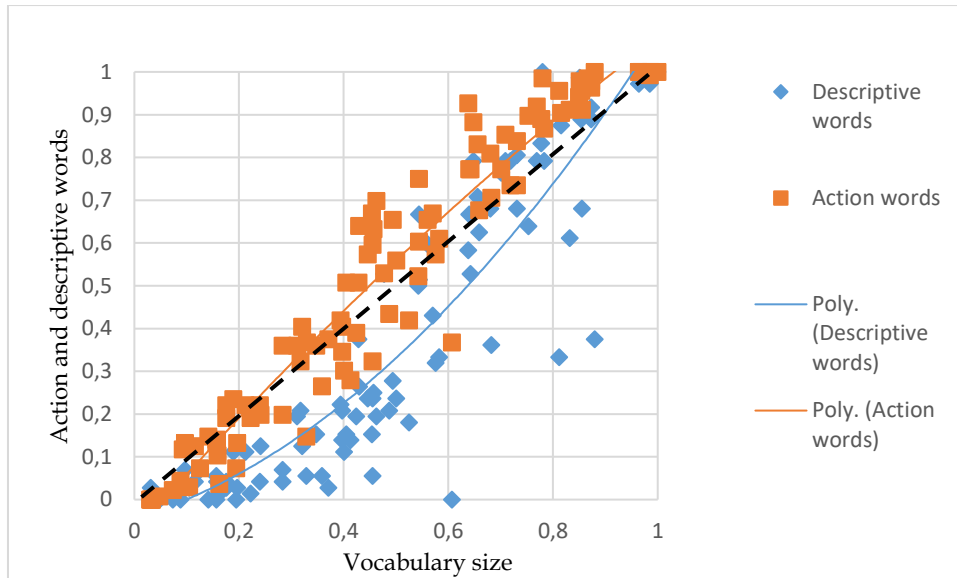


Figure 23: Proportion of verbs and adjectives produced by each child as a function of the proportion of all vocabulary items produced by that child ($n=99$). Lines show model fit.

ANOVA results show that the relationship between the number of action words used, and vocabulary size was stronger ($F [1,97] = 1318,4$, $r = .97$, $p < .001$) than the relationship between the number of descriptive words used and vocabulary size ($F [1,97] = 493.2$, $r = .91$, $p < .001$). This shows that, even when the children in this study have a smaller vocabulary size, they still have more action words compared to descriptive words.

5.3.2. Noun bias

Table 37 shows the distribution of children by different levels of vocabulary size. The difference in mean values between nouns and predicates in this table suggests that, on average, there are more nouns than predicates in the vocabularies of the children in each vocabulary size range. For example, for children with a total vocabulary size of 0-50, the mean number of nouns is 13.8 while the mean number of predicates is only 0.6.

Table 37: Descriptive statistics of nouns and predicates of Xitsonga-speaking children aged 16 to 32 months ($n=99$)

Levels of vocabulary size	NOUNS					PREDICATES			
	<i>N</i>	Mean	<i>SD</i>	Min	Max	Mean	<i>SD</i>	Min	Max
0-50	5	13.8	8.0	3	25	0.6	0.9	0	2
51-100	7	31.3	10.6	20	47	13.1	8.0	3	23
101-200	15	74.3	22.5	34	106	25.1	9.8	6	40
201-300	15	135.8	28.2	91	182	55.7	15.2	24	80
301-400	18	160.5	27.8	108	208	94.7	25.3	48	150
401-500	13	207.7	37.0	156	295	133.5	34.3	50	177
501-600	12	224.2	23.9	176	260	171.9	15.2	154	206
<600	14	286.5	27.7	252	322	194.8	15.5	163	208

NOTE: Min – Max is the smallest and largest vocabulary produced

The difference in *SD* values between nouns and predicates indicates the amount of variability in the number of nouns and predicates within each vocabulary size range. For a vocabulary size of 0-50, the *SD* for nouns is 8.0 while the *SD* for predicates is only 0.9. This suggests that there is more variability in the number of nouns than in the number of predicates for vocabulary size of 0-50 words. Figure 24 shows that variability by outlining the proportion of each lexical category produced by each child as a function of the proportion of all vocabulary items produced by that child. It further shows that a child who learns more nouns, predicates and function words than expected would have a data point above the diagonal, while a child who learns fewer of these words than expected would have a data point below the diagonal.

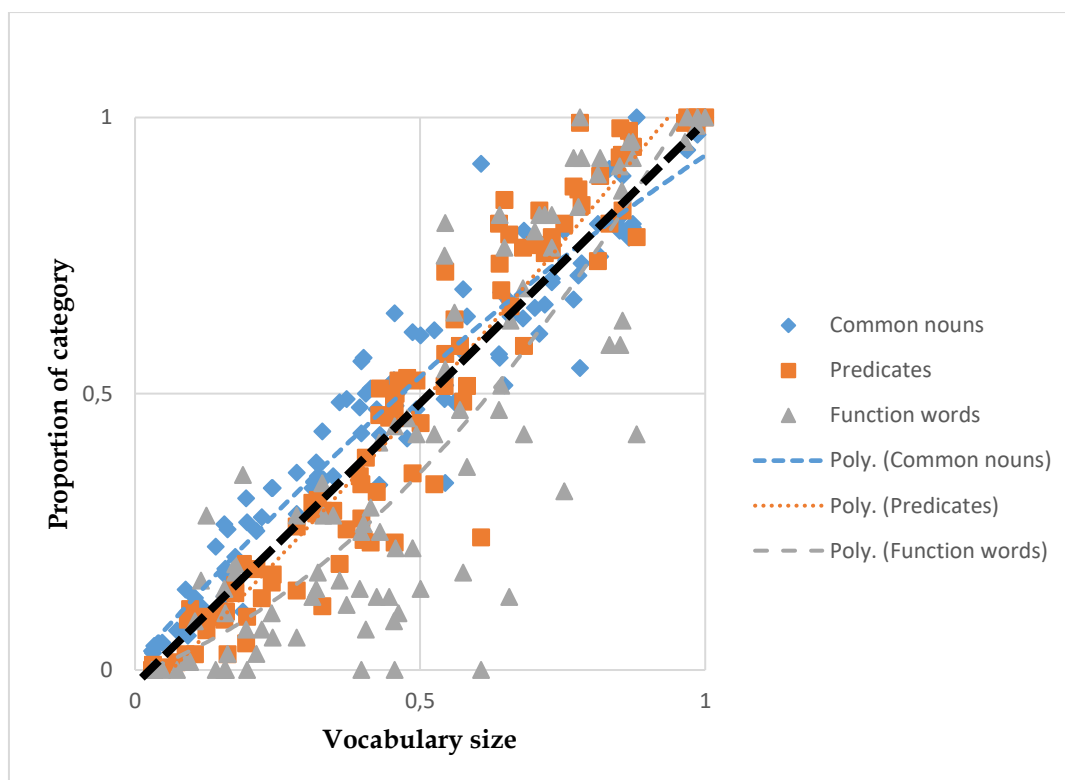


Figure 24: Proportion of each lexical category produced by each child as a function of the proportion of all vocabulary items produced by that child. Solid line shows model fit.

To measure the bias in a sample one calculates the difference between the area under the curve and the diagonal. If the curve is above the diagonal, this difference will be positive, indicating a positive noun bias. If the curve is below the diagonal, the difference will be negative. The most obvious in Figure 24 is the under-representation of function words. The nouns are densely populated at the bottom; however, they are closely related to the predicates. Results indicated a strong positive correlation between nouns and predicates ($r = 0.86$) with approximately 73.4% of the variation. The regression model was highly significant ($F [1,97] = 267.8, p < .001$); however, the intercept was not statistically significant ($t (16) = -1.6, p > .05$).

The “*body parts*”, “*food and drinks*” and “*transport*” categories have a higher representation in the noun category than other categories. Figure 25 shows the percentage of average production for each category of the noun, predicate and function words.

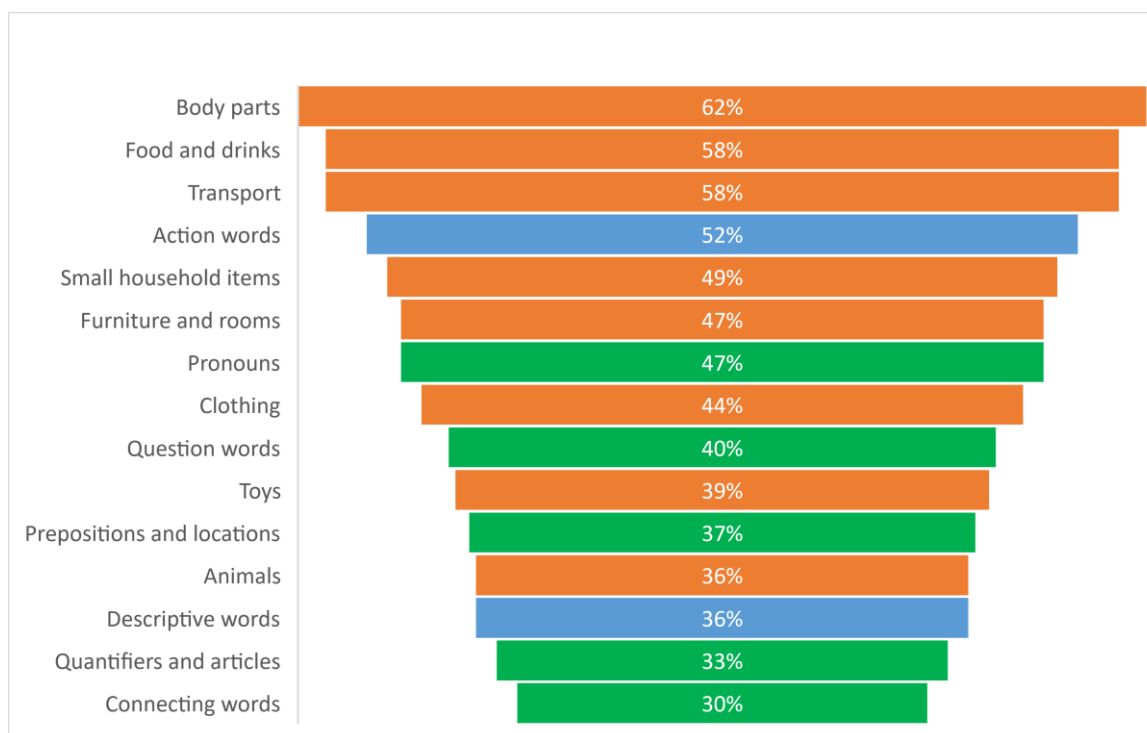


Figure 25: Average percentages of production vocabulary of Xitsonga-speaking children aged 16 to 32 months in noun, predicate and function word categories
(NOTE: Colour code: orange – nouns, blue – predicates, green – function words)

The results show the average production of lexical items varies across different categories. The noun category has highest composition with the highest average production observed for “*body parts*” (62%), followed by “*food and drinks*” and “*transport*” (both at 58%). The predicate category has “*action words*” (52%) and then “*descriptive words*” (36%) in the bottom three. The lowest average production was observed for function words with “*connecting words*” (30%). The rate of noun acquisition in relation to the rate of acquisition of other word types is discussed further. Table 38 outlines the first age at which 50% or more of the children by age in months were reported to understand and say the words in the toddler form.

Table 38: First words reported to be produced by 50% or more of the sample by age in months ($n=99$)

Words	Age in months	% of monthly sample	Category
<i>Foni</i> [phone]	16	67%	small household
<i>Huku</i> [chicken]	17	67%	animals
<i>Bolo</i> [ball]	17	60%	toys
<i>Huku</i> [chicken meat]	17	60%	food and drinks
<i>Movha</i> [car]	18	73%	transport
<i>Hu hu</i> [woof woof]	20	60%	sounds effects
<i>Mhooo</i> [moo]	20	67%	sounds effects
<i>Mmmm</i> [yummy]	20	60%	sounds effects
<i>Wu wu wu</i> [woop woop]	20	60%	sounds effects
<i>Donki</i> / <i>mbongholo</i> [donkey]	20	50%	animals
<i>Homu</i> [cow]	20	64%	animals
<i>Mbyana</i> [dog]	20	60%	animals
<i>Apula</i> [apple]	20	60%	food and drinks
<i>Khodirinki</i> [cool drink]	20	50%	food and drinks
<i>Masi</i> [milk]	20	60%	food and drinks
<i>Masimba</i> [crisps/chips]	20	60%	food and drinks
<i>Mukapu</i> [soft porridge]	20	60%	food and drinks
<i>Nyama</i> [meat]	20	60%	food and drinks
<i>Tiya</i> [tea]	20	60%	food and drinks
<i>Misisi</i> [hair]	20	60%	body parts
<i>Xisibi</i> [soap]	20	50%	small household
<i>TV</i> [TV]	20	60%	furniture and rooms
<i>Mhani</i> / <i>mama</i> [mom/mommy]	20	67%	people
<i>Papa</i> / <i>bava</i> [dad/daddy]	20	50%	people
<i>Hay 5</i> [high 5]	20	50%	games and routines
<i>Tisa</i> [bring]	20	60%	games and routines
<i>Xap</i> [thumb up]	20	50%	games and routines
<i>Bana</i> [hit]	20	50%	action words

<i>Mati</i> [water]	21	60%	outside things
<i>Avuxeni</i> [good morning]	22	50%	games and routines
<i>Brr</i> [brr]	23	67%	sounds effects
<i>Dyana</i> [eat]	23	50%	action words
<i>Etlela</i> [sleep]	23	50%	action words
<i>Famba</i> [go/walk]	23	60%	action words
<i>Pfuka</i> [wake up]	24	60%	games and routines
<i>Ina</i> [yes]	25	57%	games and routines

NOTE: *Column 1 shows lexical items reported to have $\geq 50\%$ production within the 16 to 32 months age range

**Column 2 indicates the age in months when the children reached the 50% reporting level

***Column 3 indicates minimum % score averaged in the month's sample for each lexical item

Table 38 further confirms that nouns make up most the words used by the children in this sample. Another observation was that the common words used earlier by these children are related to their immediate environment such as food, toys, animals and family members. For example, by the age of 20 months, most of the early words in these categories reached a reporting level of 50%. At 16 months of age, 67% of the monthly sample learned the word “foni” [phone] from the “small household” category. At 17 months of age, 67% of the children in this study learned the word “huku” [chicken] from the “animals” category and 60% learned the word “bolo” [ball] from the “toys” category. At 20 months of age, 60% of the monthly sample learned words such as “hu hu” [woof woof], “mhooo” [moo], and “mmmm” [yummy] from the “sounds effects” category. Additionally, at 20 months of age, 50-64% of the children in this study learned words such as “donki / mbongholo” [donkey], “homu” [cow], and “mbyana” [dog] from the “animals” category and words such as “apula” [apple], “khodirinki” [cool drink], and “masi” [milk] from the “food and drinks” category.

In contrast, the verbs “dyana” [eat], “etlela” [sleep], and “famba” [walk/go] were only observed in the vocabulary composition of these children at 23 months.

Function words were absent from the list of the first 50 words understood and used by Xitsonga-speaking toddlers. These words were acquired later and were more prominent in the list of words that did not meet the 50% reporting threshold (see Appendix G: Table of individual analysis of the lexical item on the toddler form based on when they were first observed) within the age range of 16 to 32 months. Items in the “connecting words” category, such as “kambe” [but] and “swi nga leswi” [then], are more complex and only reported to be produced at 28 and 26 months respectively. Predicate categories were acquired later for Xitsonga-speaking children within 16 to 32 months. This suggests that there may be a noun bias in the early vocabulary development of these children, where nouns are acquired faster than other word types, such as predicates and function words. Reliability of bias estimates was not done for this study because only data for production were collected.

5.4. Patterns of grammar development

The development of grammar in early language acquisition is a complex process that is influenced by a variety of factors. The Xitsonga MB-CDI Part II assesses the development of morphology and syntax in Xitsonga-speaking children aged 16 to 32 months. The first three sections assess the production of bound morphemes and agreement markers, while the second half focuses on multiword utterances and sentence complexity. The relationship between vocabulary size, word form scores and syntactic complexities will be reported later. The regression model and Pearson’s correlation were used for analysis.

5.4.1. Patterns of morphological development

The Xitsonga MB-CDI had sections to assess patterns of morphological development. What follows is a report of the findings on bound morphemes and agreement markers.

5.4.1.1. Production of bound morphemes

The first section had five areas assessing bound morphemes: plurals, noun demonstratives, adjective agreement, and tense (both present and past) morphology. The minimum and maximum scores for the production of bound morphemes among children in this sample were 0 and 1 for all categories. Table 39 presents summary statistics on the variability in the production of bound morphemes by Xitsonga-speaking children aged 16 to 32 months.

Table 39: Summary statistics of bound morphemes of Xitsonga-speaking children aged 16 to 32 months

Categories	<i>N</i>	Mean	<i>SD</i>	Minimum	Maximum
Plurals	99	0.50	0.50	0	1
Noun demonstratives	99	0.54	0.50	0	1
Adjective agreement	99	0.45	0.50	0	1
Present tense	99	0.63	0.48	0	1
Past tense	99	0.45	0.50	0	1

The results show that the complexity in the production of bound morphemes by children in this sample increased with age. At 16 months, these children were reported to be producing at least one of the bound morphemes. By 17 months, it had increased to 1.8 and continued to increase to 3 at 23 months and 4 at 24 months. The complexity continued to increase to 4.1 at 25 months and peaked at 4.5 at 26 months before decreasing slightly to 4 at 27 months.

The modelled relationship between age and bound morphemes produced by Xitsonga-speaking toddlers in this study is outlined in Figure 26. It shows the patterns in the production of bound morphemes among children in this sample. Though there is a linear growth in the production of bound morphemes, which was found to be statistically significant ($F [1,99] = 41.5, r = .54, p < .0001$), with age accounting for 30% of the variance, there was variability as outlined in Table 39. For example, the mean production of the present tense was higher ($M = .63, SD = .48$) than the mean

production of the past tense ($M = .45$, $SD = .50$). Figure 26 shows the variability in the production of the different bound morphemes.

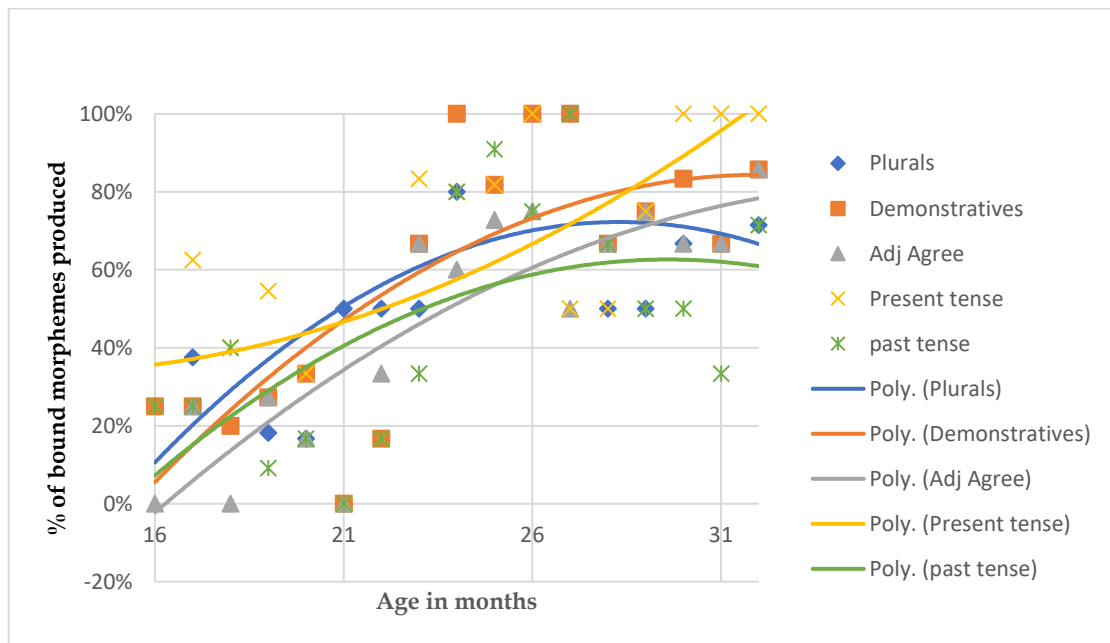


Figure 26: Variability in the production of bound morphemes by Xitsonga-speaking children aged 16 to 32 months ($n=99$)

The results of Table 39 show the percentage of children using different bound morphemes at different ages in months. The data indicate that present tense markers started to appear earlier with around 63% of the children using them at 17 months and gradually increasing to 100% by 26 months. Adjective agreement started with no children using it at 16 months and gradually increased to 86% use by 32 months, but never reached 100%. A similar pattern was observed with the production of past tense bound morphemes. Even though there are variabilities, overall, the data suggest that children's use of these grammatical forms increased with age. A statistically significant correlation existed between vocabulary size and the production of bound morphemes ($F [1,98] = 38.3$, $r = .53$, $p < .05$), with the total number of bound morphemes produced accounting for 28.3% of the variation in vocabulary size. The coefficients show that the intercept is 206.6 and the slope is 53.7. This means that the predicted vocabulary size for a child who produces zero bound morphemes is 206.6 words. For

each additional bound morpheme produced, the predicted vocabulary size increases by 53.7 words. The strength of this relationship is moderate, and the confidence intervals for the intercept and slope are relatively narrow. This suggests that the findings of this analysis are reliable and can be used to make inferences about the relationship between these two variables.

5.4.1.2. Production of verb morphology

The CDI form also included phrases with five linguistic features that were agreed to be common in Xitsonga. Figure 27 presents the production of different linguistic features across various age groups in months by Xitsonga-speaking children aged 16 to 32 months. The linguistic features analysed include past tense, negative marker, person and number affix, causative, and copulative.

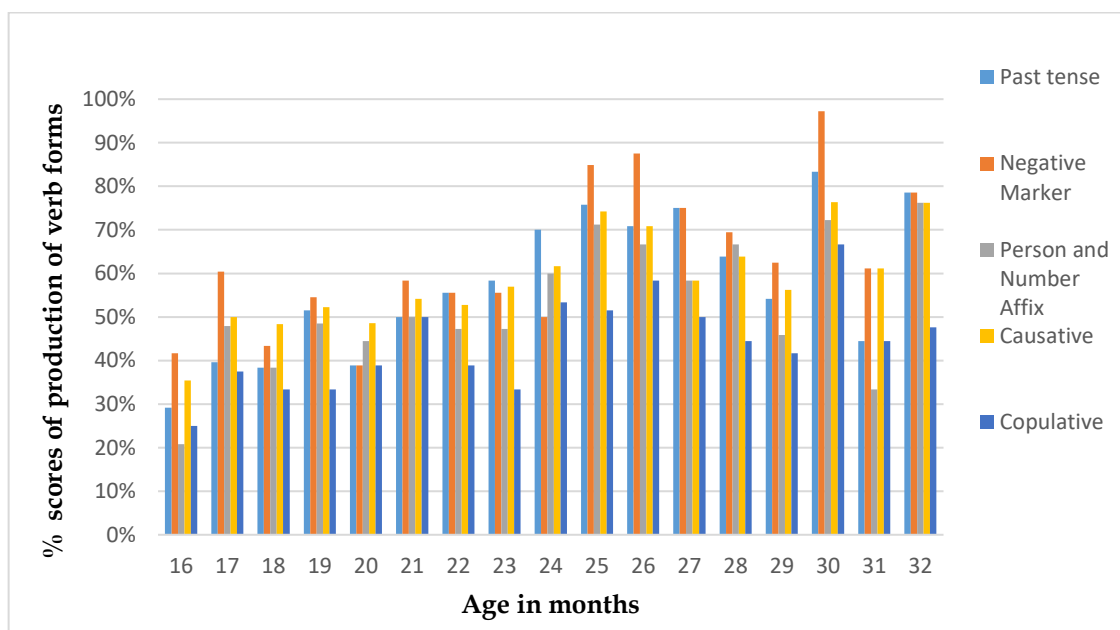


Figure 27: Acquisition of verb morphemes in Xitsonga

Rapid growth was observed in children's production of verb morphemes and agreement markers. The children in this study showed that growth in the use of these morphemes develops over time. For example, the percentage of correct use of the past tense morpheme increased from 29% at 16 months to 83% at 30 months. It was also

noted that these children acquired some morphemes earlier than others. For example, the negative marker was acquired relatively early (achieve >50% at 17 months), while the copula was acquired relatively late (achieve >50% at 24 months). The findings suggest that the acquisition of grammatical morphemes follows a predictable pattern. Children typically acquire the simpler morphemes earlier and the more complex morphemes later. There was a statistically significant relationship between age and use of verb morphemes ($r = .47$, $p < .001$), with age accounting for 21.7% of the variance. The linguistic features are discussed individually below.

5.4.1.2.1. Production of past tense

As shown in Figure 28, the use of the past tense suffix “-ile” showed variability in its production by children in this sample. There is linear growth that was statistically significant ($F [1,99] = 27.9$; $p < .001$; $r = .47$), with age accounting for 21.9% of the variance.

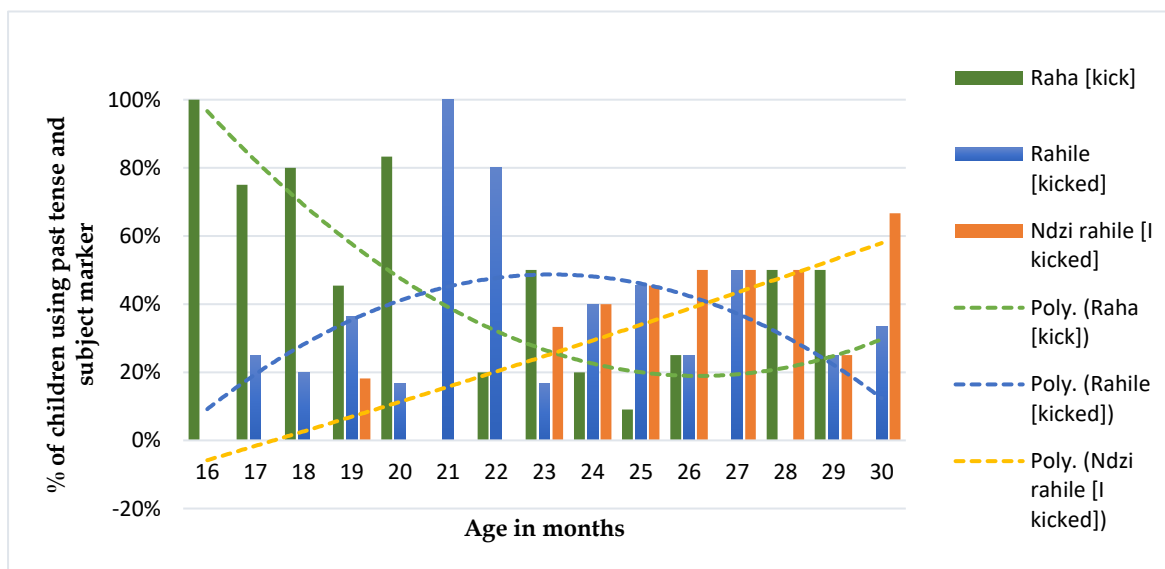


Figure 28: Children’s production of the past tense and subject marker ($n=99$)

In Xitsonga, a past tense carries a suffix “-ile”, for example, “raha” [kick] and “rahile” [kicked]. The final vowel of the SM will also change from “-a” to “-i” to

indicate past tense when used in the 1st person, e.g., “*ndza raha*” [I kick] compared to “*ndzi rahile*” [I kicked]. Figure 28 shows that although more than 50% of the children in this sample achieved accurate production of the suffix “-ile” by 21 months, the SM “*ndzi*” was observed to stabilise only by the age of 25 months. However, it was observed that even at 30 months, not all the children (67%) use the SM with the past tense suffix. The omission of the initial syllable of the SM was also observed where the child was reported to say “*i rahile*” instead of “*ndzi rahile*”. The omission of an initial morpheme can change the meaning of the statement, depending on the tone used for the word or phrase. In this case, “*i rahile*” can mean [she/he kicked]; thus “*i*” is used as a copulative prefix. The production of “*i*” as a copulative prefix will be discussed in section 5.3.4 below.

5.4.1.2.2. Production of subject marker with present tense

Children in this sample were observed to use the correct SM with the present tense. The present tense carries a final vowel “-a” as discussed above. Figure 29 shows that children in this sample developed the use of the present tense earlier than other markers.

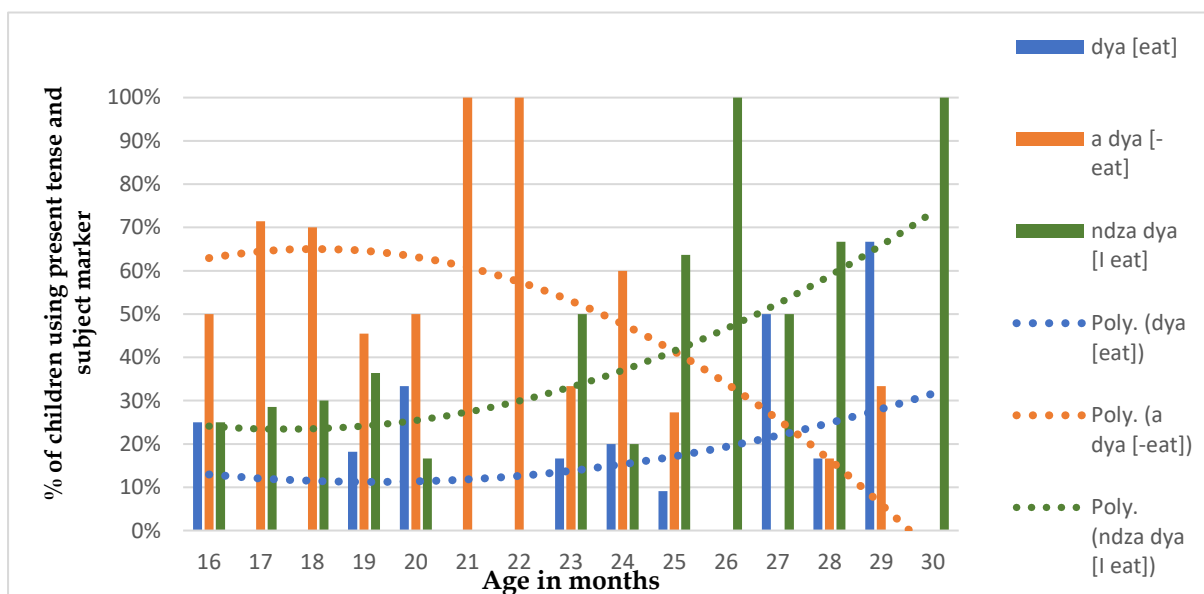


Figure 29: Children’s production of the present tense and subject marker ($n=99$)

All the children in this sample used verbs with correct present tense by 16 months. It was interesting to observe that 75% of the children could also use SMs by 16 months. Although 50% of the children omitted the initial phoneme “*ndz-*” on the SM, they used the correct final vowel “*a*” to indicate the present tense. By 17 months, all the children were using the SM, even though 71% were still omitting the initial phoneme “*ndz-*”. By 30 months, all the children were accurately producing the SM “*ndza*” when used in the present tense. The same trend was observed with the other present tense items used in the toddler form. There was a statistically significant association ($F [1,99] = 12.6; p < .001, r = .335$) between age and production of the present tense, with age accounting for 11.3% of the variance.

5.4.1.2.3. Production of negative command

The toddler form also assesses the use of the negative command in the present tense. A statistically significant correlation ($F [1;99] = 20.4; r = .41, p < .001$) was observed between age and the production of the final vowel to show negative command and the 2nd person agreement marker. Age accounted for 17% of the variance. Figure 30 shows that the negative command stabilised later in children in this sample.

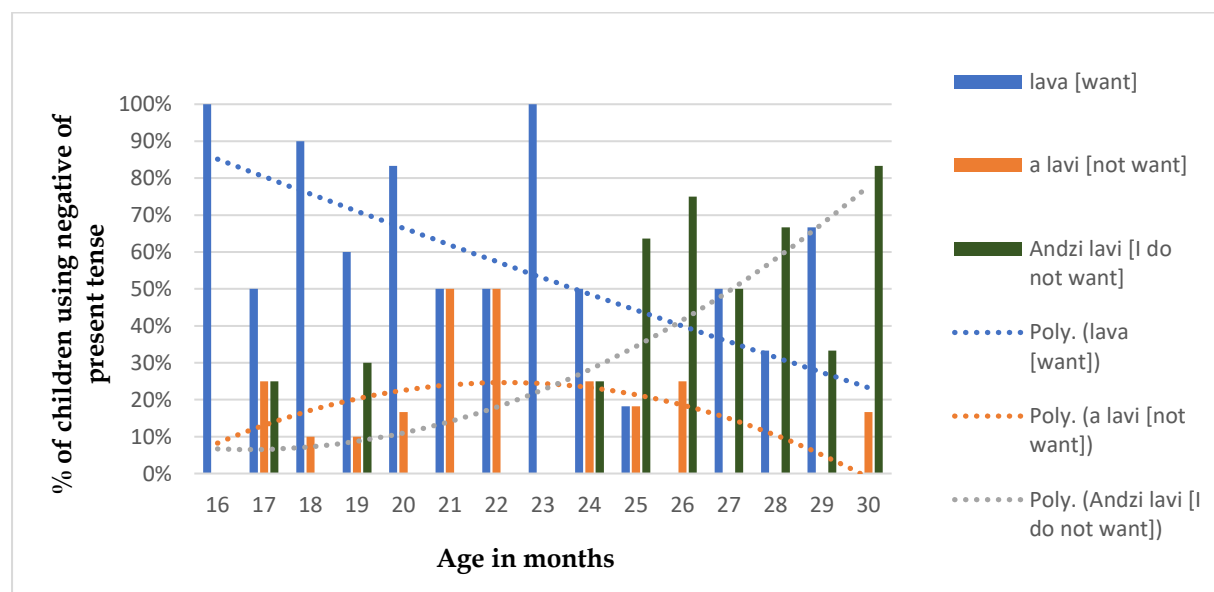


Figure 30: Children’s production of the negative form of the present tense ($n=99$)

Even though 50% of children in this sample developed the use of the final vowel “-i” to show a negative command by the age of 17 months, only 25% could use the correct subject agreement “ndzi”. The other 25% omitted the SM agreement and used “a lavi” [I want-not] instead. There was rapid growth between the age of 24 and 25 months: from 25% of the children using the SM agreement at 24 months to 64% at 25 months. The use of SM agreement appears to be challenging because even at 30 months, not all the children used it, although use had increased to 83%. By the age of 25 months, 64% of children were able to utilise the agreement marker in the 2nd person. This percentage increased to 100% by the age of 30 months, in contrast to the 83% when the marker was used in the 1st person. The same trend was observed when the negative was used in the 2nd person. There was a statistically significant ($F [1,99] = 15.3$; $r = .37$, $p < .001$) relationship between age and the production of the final vowel to show negative command and the 1st person agreement marker. Age accounted for 13.4% of the variance.

5.4.1.2.4. Present continuous tense

The use of verb morphology “-isa” – to indicate the present continuous tense was also observed using the Xitsonga MB-CDI toddler form. Figure 31 shows the variability in the development of production of the present continuous tense in Xitsonga observed in children between 16 and 32 months in this sample.

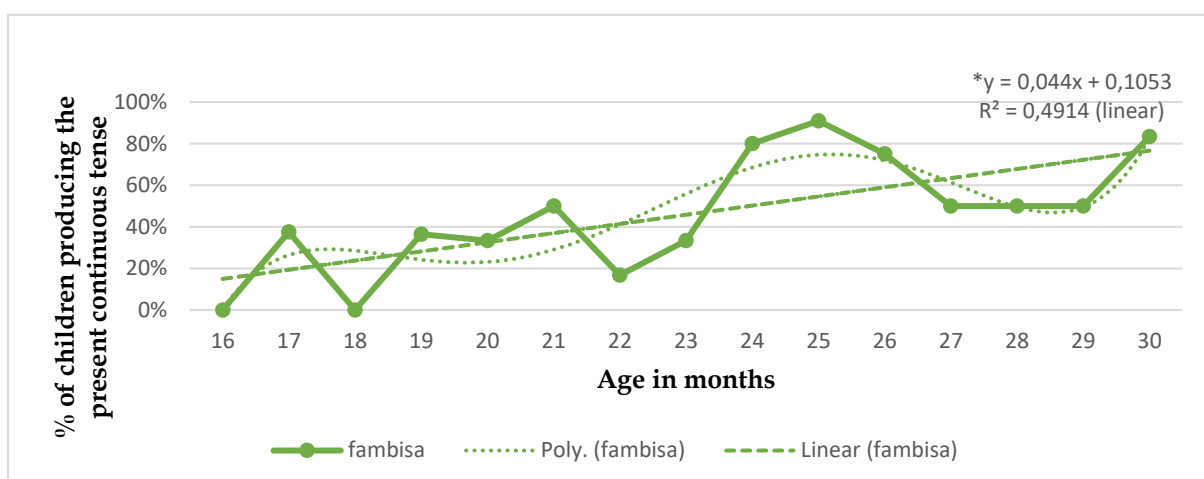


Figure 31: Production of present continuous tense using the word “fambisa” [make it move] as an illustrative example and the linear regressions ($n=99$)

Present continuous tense morphology emerged at 17 months, with 36% of the children in this sample using it. A growth spurt in the production of the present continuous tense was observed between 22 (17%) and 25 (91%) months. Though there was variability in the production of the continuous tense across the different ages, as observed in Figure 31, there was a significant effect of age ($F [1; 99] = 20; r = .41, p < .001$), accounting for 16.8% of the variance.

5.4.1.2.5. Production of future tense and object agreement marker

The morpheme “-ta-” derived from the verb “-ta-” [come] can be used to indicate the future tense in Xitsonga. The use of future tense markers was observed to develop later in children in this sample. Eighteen percent of the children in this sample were “not yet” using the future tense marker by 30 months. Figure 32 shows extensive variability in the development of the future tense amongst the children.

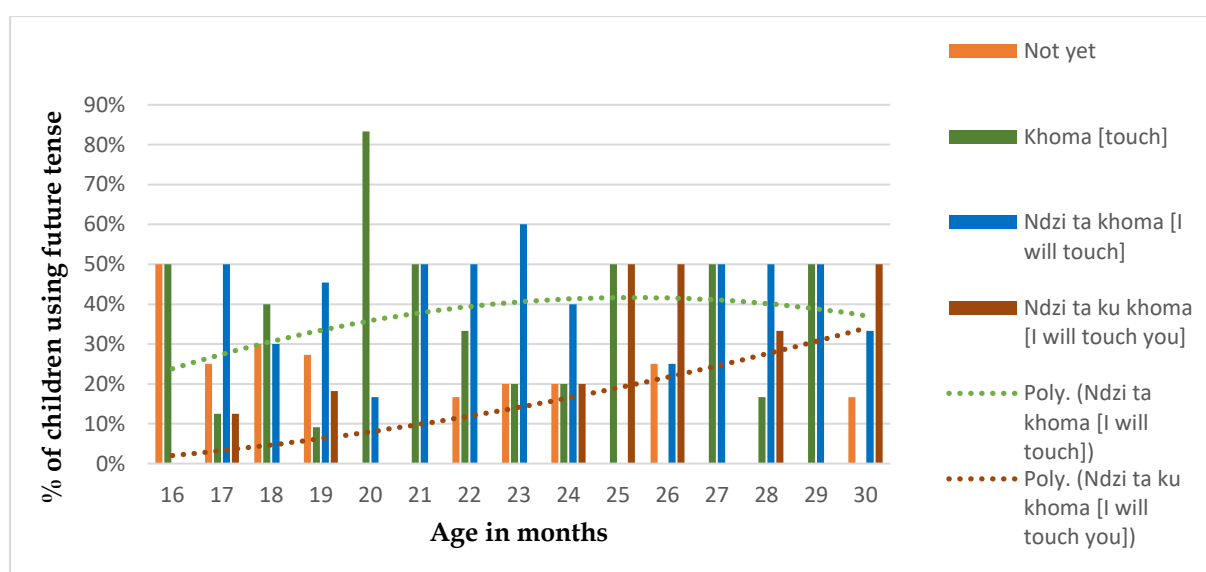


Figure 32: Production of future tense by Xitsonga-speaking children between 16 and 32 months ($n=99$)

Half (50%) of the sample in this study did “not yet” use the future tense morphemes at 16 months. A growth spurt was observed from 16 to 17 months, at which point 50% of the children started using the morpheme “ta” to indicate future tense. For example, they were observed to say “*ndzi ta khoma*” [I will touch], but only

began using “*ta*” with the correct OM by 25 months, saying “*ndzi ta ku khoma*” [I will touch you]. However, the production of the future tense marker decreased to 17% at 20 months, but showed a growth spurt between 21 and 25 months, with 50-60% of the children using it. The same was observed with the object agreement marker, used by 50% of the children by 25 months but decreasing to no children using it at 27 and 29 months. This might be due to variability in the number of participants in these age groups. The linear regression model showed a relationship between age and production of the future tense that was statistically significant ($F(1;99) = 11.5; p < .001; r = .32$), with age accounting for 10.4% of the variance.

When using a different sentence, the object agreement marker followed the same trend as with the above phrase, even when used with the present tense. The toddler form assesses the object agreement marker in the present tense by asking if the child can say “*ndza ku rhandza mhani*” [I love you mom]. At 17 months, 14% of the children started using the object agreement marker. There was a decrease at 27 and 29 months but the ability to say this peaked at 30 months, with 66% of the children using the OM agreement “often”, compared with 50% for the future tense. Despite variability in the scores obtained, there was a linear relationship between age and object agreement marker ($F[1,99] = 8.5; p < .05; r = 0.28$), with age accounting for 8% of the variance.

5.4.1.2.6. Production of prepositional perfective

A suffix expresses the prepositional perfective in Xitsonga “*-ile*”, not to be confused with the suffix “*-ile*” used to denote the past tense. The difference is that the prepositional perfective refers to a perspective aspect which shows the completion of an action, but it does not indicate time by itself. The example used is “*pfula*” [open]. When it carries the suffix “*-ile*” for perfect tense, it is produced “*pfuleli*”, meaning [open for]. For past tense, it would be “*pfulerile*”, meaning [opened for].

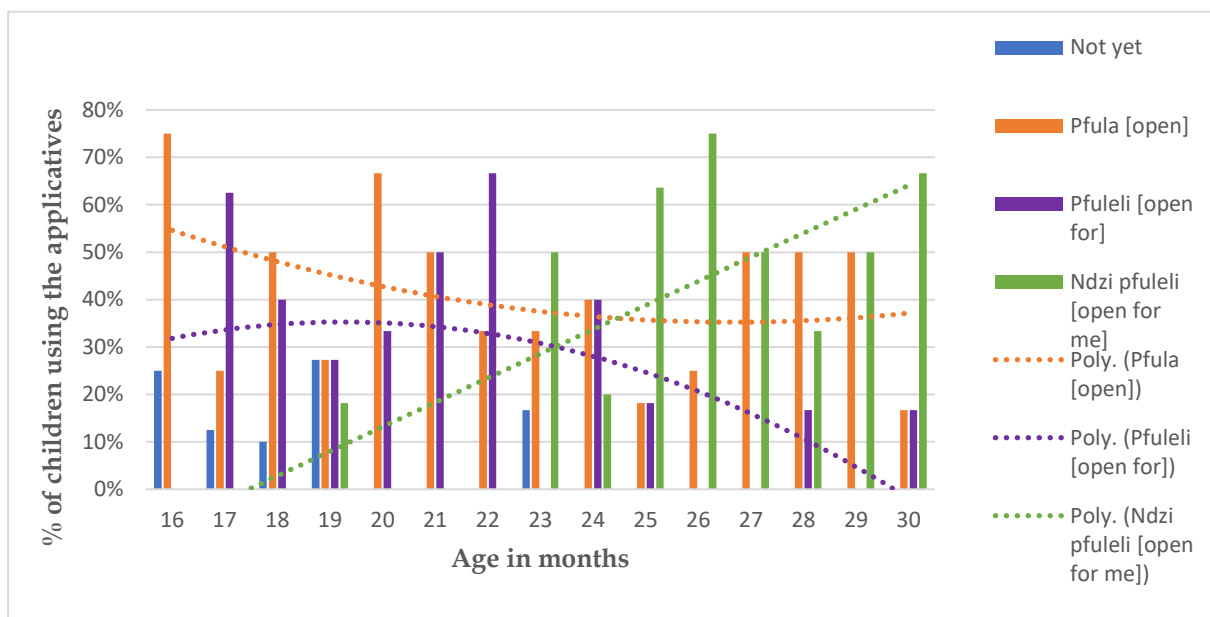


Figure 33 shows the variability in the prepositional perfective production with and without the SM.

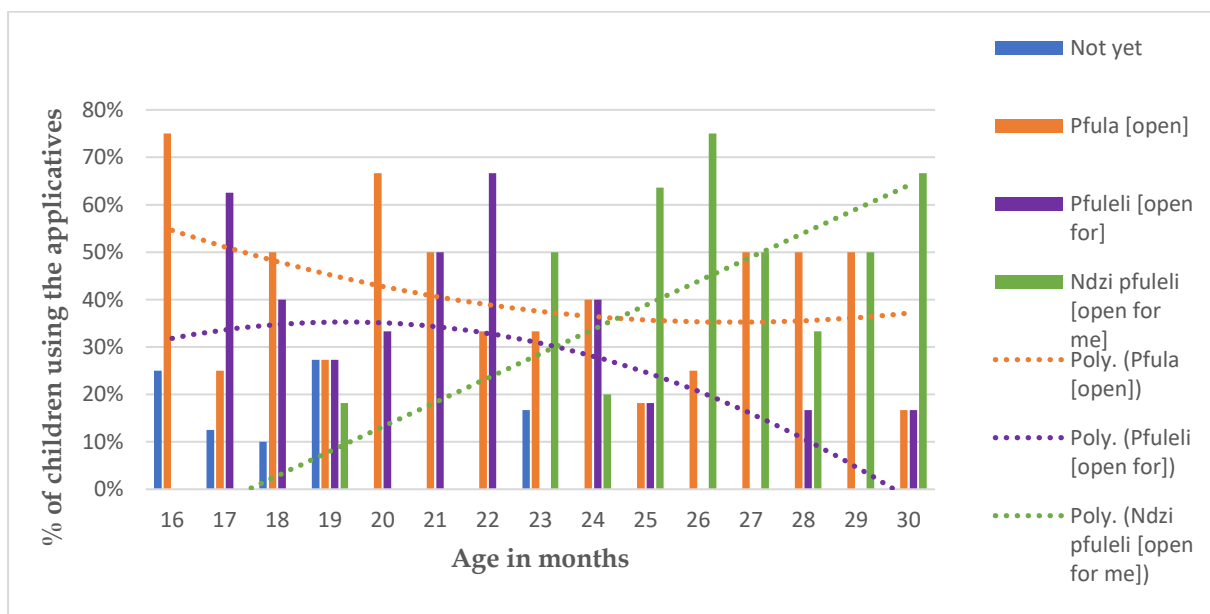


Figure 33: Production of prepositional perfective morphology by Xitsonga-speaking children between 16 and 32 months ($n=99$)

Seven percent of all the children in this sample were not yet using the perfect tense. However, 38% used the present tense, "*pfula*" [open]. Even though 56% could use the perfect tense, only 31% used it with the correct SM. By 17 months, 63% of the children were using the suffix "*-ile*" to denote a perfect tense. However, it was only by 23 months that 50% of the children could use the perfect tense with the SM "*ndzi*" [you]. Subject markers, in this instance, seemed to be a challenge for children, as even at 30 months, only 63% were using them. The linear regression model showed a statistically significant ($F [1,99] = 20.0; p < .001; r = .41$) relationship between age and the production of the perfect tense and the use of the SM. Age accounted for 16.8% of the variance.

5.4.1.3. NC morphology

Nouns are observed relatively early in vocabulary development (see section 5.3.1). NCs 1 to 10 were reported in the toddler form except for NC 8 (plural form for NC7), which was erroneously omitted from the original data collection toddler form. Participants were asked to choose the NC their child was more likely to use when producing sentences. Figure 34 shows the variability in the development of NC morphology in children between 16 and 32 months in this sample. At 16 months, the 10th percentile in this sample achieved a mean score reporting level of 12.3, increasing slightly to 18 by the 90th percentile. The median scores followed the same trend.

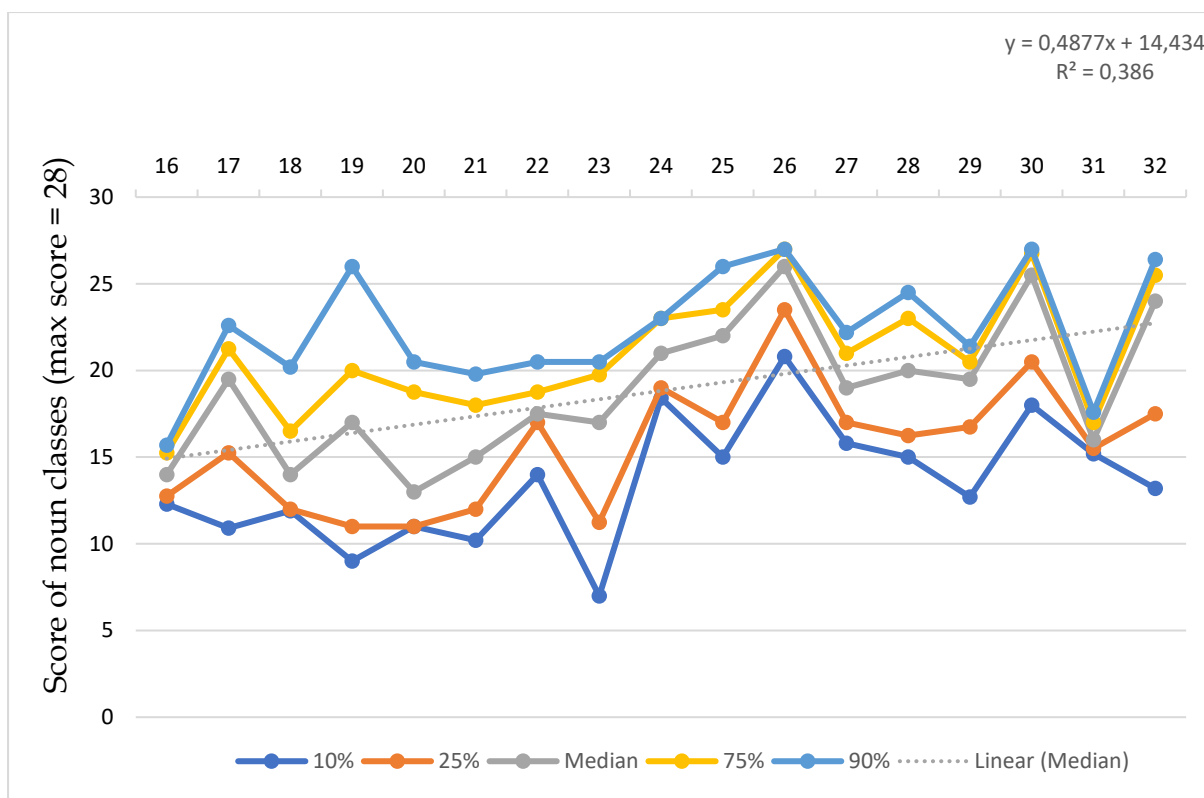


Figure 34: Scores for NCs produced by children each month (n=99)

It was observed that children might omit the initial sound or syllable. This might have impacted the ability to understand the child's production of the prefixes in the NCs (examples of this are provided in Table 40). Provision was made for the caregivers to select examples of words with these omissions. Figure 34 shows that NC4 (93%) and NC9 (94%) reached a higher mean percentage as "often" used by children in this sample. NC4 is a plural form of things – the word "*misisi*" [hair] was used. By 16 months, 100% of the children were reported to have achieved an accurate production of the word "*misisi*" [hair]. Its singular form is "*nsisi*" [hair] which is NC3 and achieved a reporting level of "often" used by 52.5% of the sample. NC9 is a singular form of animals or borrowed words. The word "*mbyana*" [dog] is a singular form and its plural is "*timbyana*" [dogs], which reached a mean reporting level of "often" used by 13.9% of the sample at 32 months. NC10 was observed to achieve high "not yet" reporting levels by 61.4% of the sample. Table 40 illustrates the mean

percentages of NC production by children in this sample reported to be using or omitting the NC morphology.

Table 40: Mean percentages of NC production by children reported as “not yet”, “sometimes”, “omission of the prefix”, or “often” ($n=99$)

NC	Not yet using NCs mean (%)	Omission of the prefix mean (%)	Sometimes using NCs mean (%)	Often using NCs mean (%)	Total yes
NC 1	8.9	28.7	32.7	29.7	62.4
NC 2	23.8	35.6	32.7	7.9	40.6
NC 3	2.0	17.8	27.7	52.5	80.2
NC 4	4.0	0	2.97	93.1	96.0
NC 5	23	23	0	54	54
NC 6	5.9	30.7	29.7	33.7	63.4
NC 7	2.0	11.9	25.7	60.4	86.1
NC 9	5.9	0	0	94.1	94.1
NC 10	61.4	24.8	0	13.9	13.9

NOTE: NC 8 was erroneously omitted from the original toddler form)

Plural forms were the NCs that reached higher mean percentages in the omission of the prefixes. For example, NC2 (illustrated by the word “*vavasati*” [women] with an omitted repetitive syllable) was recorded as produced as “*vasati*” by 35.6% in this sample. The same was observed with NC6 and NC10 which often omitted the initial sounds. The word “*mavoko*” [hands] was reported as “*avoko*” (30.7%) and “*timbyana*” [dogs] as “*imbyana*” (24.8%). The word “*imbyana*” can also mean [it is a dog] when the prefix “*i*” is used as the form of a copulative and there is a change in tone (copulative will be discussed in section 5.4.1.4 below). Xitsonga is a tonal language, but tone was not considered when asking caregivers to respond to these words. A rapid growth in NC production was observed between 23 and 26 months. Table 41 indicates the age in months at which 50% (“often”) reporting level was reached for the NCs.

Table 41: The age at which 50% or more of the children in each month's sample are reported to produce NCs ($n=99$)

NC	Mean age in months at which 50% ("often") criterion was reached	% achieved
NC 1	22	61%
NC 2	20	50%
NC 3	18	50%
NC 4	16	100%
NC 5	16	58%
NC 6	16	50%
NC 7	16	50%
NC 9	16	100%
NC 10	25	52%

NCs 4, 5, 6, 7 and 9 were observed to be produced the earliest (by age 16 months) by more than 50% of the children. In contrast, the NC10 prefix "*ti-*" was challenging as it was only produced by 52% of the children at 25 months. It also developed much later than its singular form NC9, because, with this word, the NC allows for a 'zero' prefix. Instead of using the prefix "*yi-*", the word "*mbyana*" does not carry a prefix. There was a statistically significant ($F [1,99] = 16.3$; $p < .001$; $r = .38$) linear growth in the production of NCs, with age accounting for 14% of the variance.

5.4.1.4. Production of copula morphology

Figure 35 outlines the variability in observations of children's production of the copula "*i*" in Xitsonga by children aged 16 to 32 months. Caregivers were asked how their children would respond if asked, "*i yini lexi?*" [what is this?]. The child should respond by saying "*i phepha*" [it is a paper], using the copula "*i*".

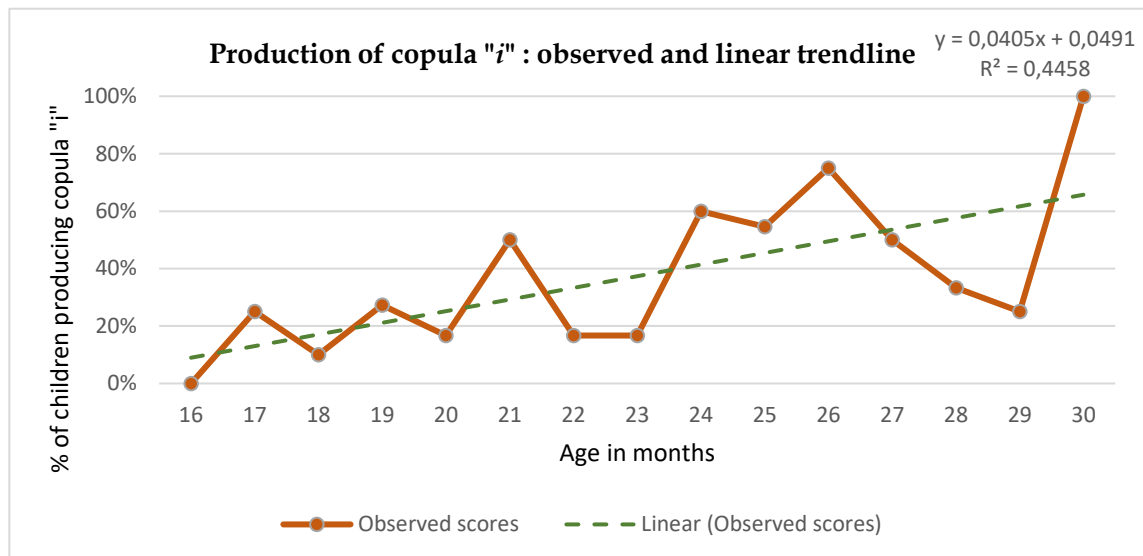


Figure 35: The mean percentages for the copula “i” production per age group ($n=99$)

In this sample, there was an observed growth spurt in the production of the copula “i” in Xitsonga children aged 16 to 32 months. At 16 months, no use of the copula “i” was observed. However, there was an increase to 50% using the copula “i” by 21 months and all children (100%) could use it by 30 months. There was a significant effect of age ($F [1,99] = 14.5; p < .001; r = .36$) on the production of copula “i”, with age accounting for 12.8% of the variance.

5.4.2. Syntactic development

The last section of the Xitsonga MB-CDI toddler form focuses on the development of syntax. The section looked at the children’s word combination, sentence length and sentence complexity.

5.4.2.1. Combining words

Sentence combinations were recorded by asking caregivers to report if their children are “not yet”, “sometimes”, or “often” using a combination of words when communicating. Most caregivers (63%) responded by selecting “sometimes” to report on observing their children’s combination of words. Figure 36 shows the percentages of Xitsonga-speaking children aged 16 to 32 months observed to be “sometimes”, “often”, and “sometimes and often” combining words.

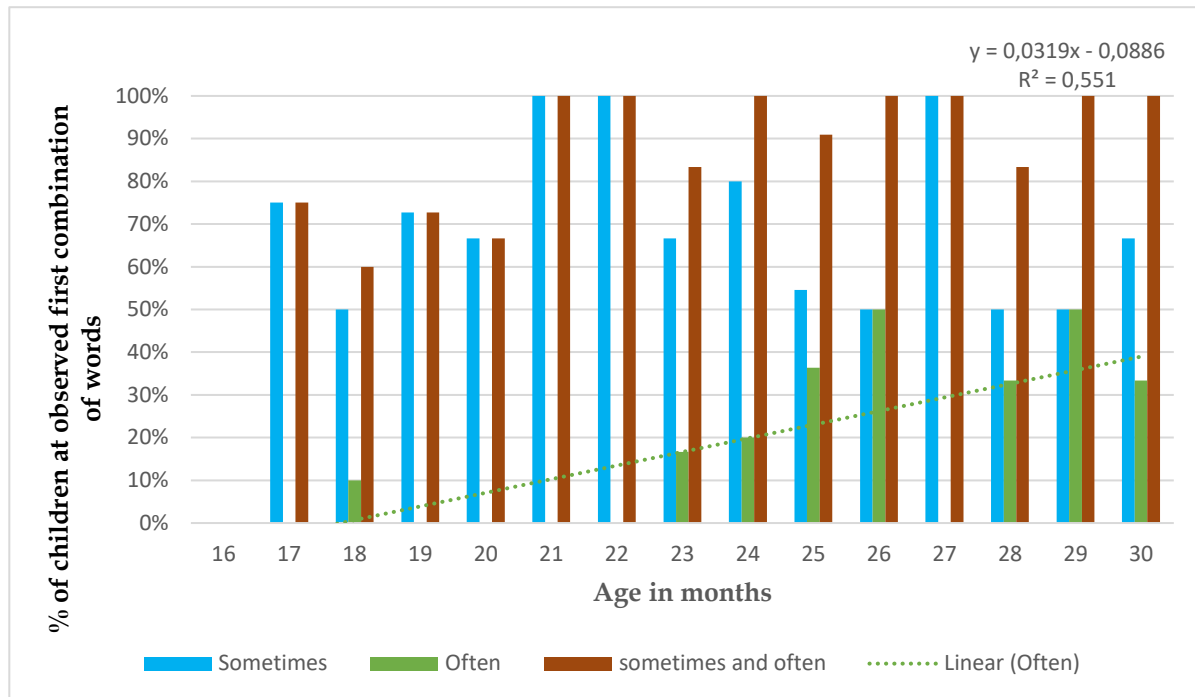


Figure 36: Percentage of children reported combining words at successive age levels ($n=99$)

Figure 36 shows an increase in the number of children observed to be combining words when the caregivers' responses of "sometimes" and "often" are merged compared to when the results are reported separately as "often" and "sometimes". At 18 months, 10% of the children in this study "often" combined words, increasing to 50% by 26 months. Although there was variability, the trend showed that word combination increased with age ($F [1,99] = 31.17$; $r = .49$; $p < .001$), and age accounted for 23.9% of the variance.

Caregivers were also asked to give three examples of the word combinations they had heard their child use recently. Most caregivers (83%) wrote down the three longest sentences they had heard from their child. It was observed that even when asked about combining words at 16 months, caregivers reported that their child had not yet started to do so. One parent wrote the three longest utterances that their child could say. Orthographically they were written as a single word. The utterances were written as "*adya*" [I eat], "*afamba*" [I walk/go] and "*ahlamba*" [I bath]. In adult form they should be "*ndza dya*", "*ndza famba*" and "*ndza hlamba*".

5.4.2.2. Sentence length

The MSLs using words (MSL-w) and morphemes (MSL-m) were calculated, and the average mean was used to plot the graphs in Figure 37.

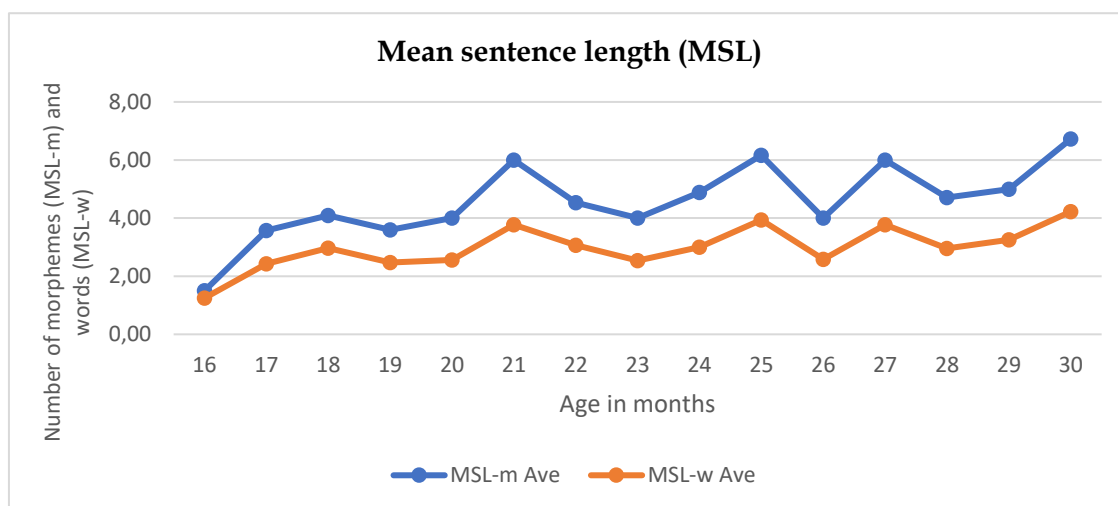


Figure 37: Children's MSL scores from the three longest sentences provided by the caregivers⁷ ($n=99$)

The sentence length of Xitsonga-speaking children at 16 months presented with an average of 1.25 MSL-w or MSL-m. The MSL-m and MSL-w followed the same trend, with some variability. There was an accelerated growth from 16 months (1 score) to 21 months (4 scores) for the MSL-w and 1.5 to 6 scores within the same age for MSL-m.

There was variability in the use of verb morphology. In some cases, for example, the final vowel was changed to show the imperative mood (as in using the final vowel “-e” on a noun, denoting a command for attention). Children in this sample were

⁷ NOTE: sentence length calculated MSL using words (MSL-w) and morphemes (MSL-m).

reported to say words such as “*mhane*” from “*mhani*” [mother] or “*kokwane*” from “*kokwana*” [grandma/grandpa].

There was an increase in the length of sentences used by children in this sample. Age showed an effect on both MSL-m ($F [1,99] = 21.6; p < .001; r = .43$) and MSL-w ($F [1,97] = 17.4; p < .001; r = .39$), accounting for 18.4% and 15.3% of the variance respectively. MSL-w showed fewer scores compared to MSL-m when used to measure children’s language production.

5.4.2.3. Sentence complexity

Xitsonga-speaking children aged 16 to 32 months use complex sentences by the age of 16 months; however, even by 30 months, they have not yet acquired the use of more complex sentences that are longer and contain conjunctions. Figure 38a and Figure 38b show the growth trend of the production of sentence complexity by Xitsonga-speaking children aged 16 to 32 months in this sample.

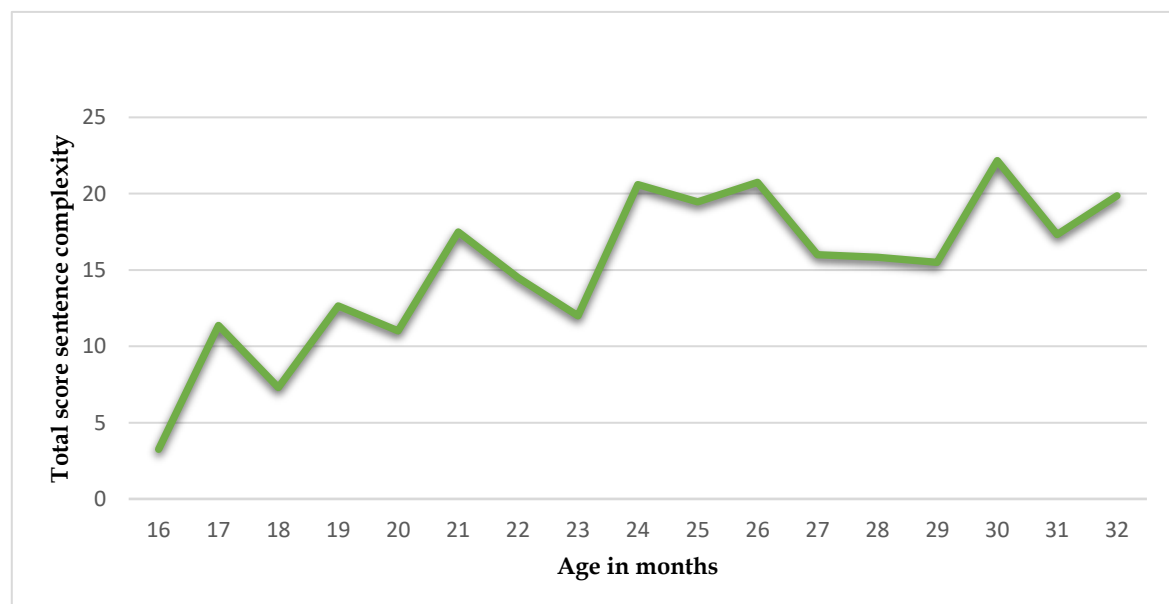


Figure 38a: Total scores of sentence complexity by Xitsonga-speaking children aged 16 to 32 months ($n=99$)

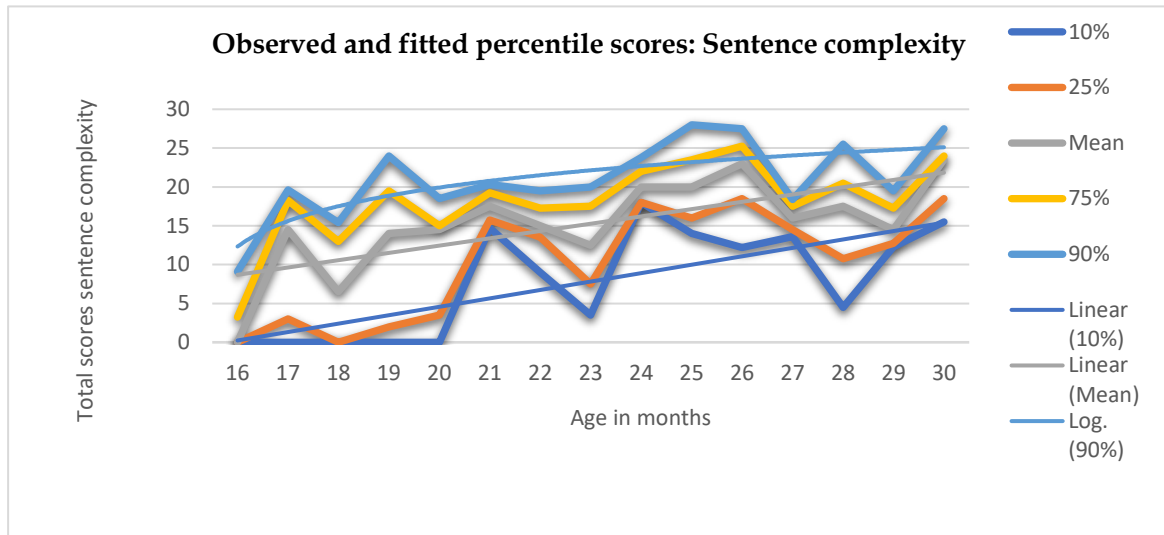


Figure 38b: Observed and fitted percentile scores of the sentence complexity ($n=99$)

The total score of the sentence complexity section was 33, and none of the lower 10% obtained 50% of the score until 24 months. For example, “*ndzi langutise loko ndzi tlanga*” [look at me when I play] was only reported to be used inconsistently at 19 months and used by 22% of the toddlers overall. Most participants (45%) reported that children would say “*ndzi langutise*” [look at me], and 36% reported that their toddler was not yet using this form of complex sentence. The production of sentence complexity showed both linear and accelerated growth between 16 and 21 months. A similar trend was observed with lexical development and could also be seen with MSL. Age had a significant effect on the production of sentence complexity ($F [1,99] = 24.6; r = .45, p < .001$) and accounted for 19.9% of the variance.

5.4.3. Morphosyntactic development

Scores from all six areas reported above (NC, verb morphemes, copula morphology, combining words, sentence length and sentence complexity) were combined to make up the total grammar score. Figure 39 shows the linear regression of age and morphosyntactic development.

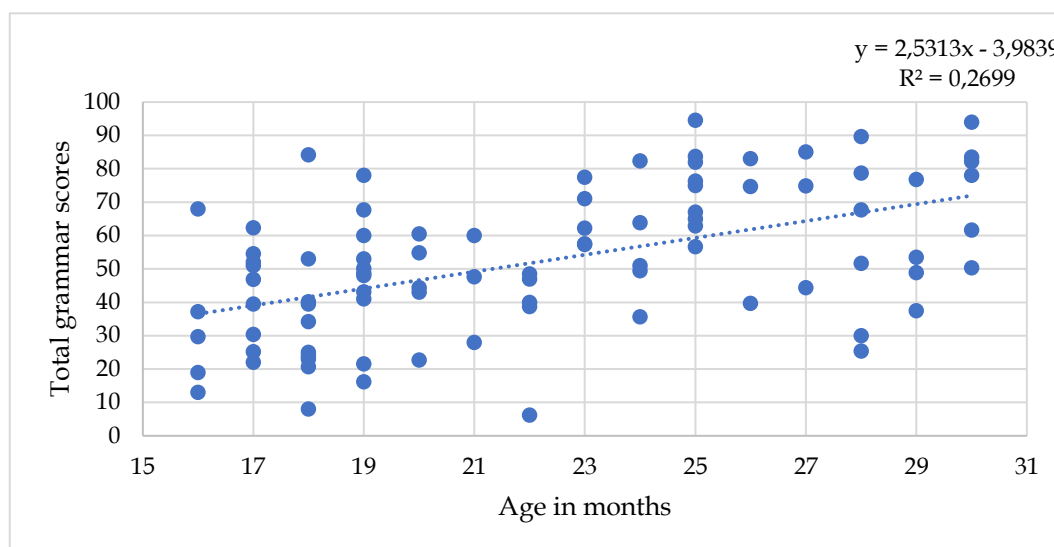


Figure 39: Age as an effect of grammatical development of Xitsonga-speaking children aged 16 to 32 months ($n=99$)

Age showed a significant effect ($r = .51$; $p < .001$) on the grammatical development of Xitsonga-speaking children aged 16 to 32 months in this study. The model was statistically significant ($F [1,97] = 33.2$; $p < .001$), with age accounting for 25.9% of the variance. This confirms that as children grow older, there is a significant impact on their morphosyntactic skills.

5.5. Trends in vocabulary and grammar development

As mentioned above, vocabulary size and grammatical development were measured in six different areas of the MB-CDI. However, only four sections were used to see their correlation with vocabulary and with each other. In the toddler form, these were combining words, MSL, sentence complexity and total grammar sections.

Table 42 shows the descriptive statistics of the five areas correlated for the toddler form.

Table 42: Descriptive statistics of the five areas correlated for the toddler form

	Mean	SD	<i>n</i>
Vocabulary	340.9	193.9	99
Combining words	1.0	0.6	99
MSL	3.4	1.5	99
Sentence complexity	14.9	8.9	99
Grammar	71.3	26.8	99

The results in Table 42 show that a mean vocabulary of 340.7 words had a relatively high *SD* of 193.9, indicating a wide variation in vocabulary size among the Xitsonga-speaking children in this study. The mean score for combining words was 1.0, with a *SD* of 0.61, suggesting that these children have a low level of proficiency in combining words effectively. A mean MSL score of 3.4, with a *SD* of 1.5, indicates a moderate variability in sentence length used by these children, with a tendency to use shorter sentences. The mean score of sentence complexity is 14.9, with a relatively high *SD* of 8.9, suggesting a wide range of variability in sentence complexity among these children. Some children used complex sentences while others preferred simpler structures. A mean grammar score of 71.3 with a *SD* of 26.8 shows that there is notable variability in grammar scores. The *SDs* for all five areas were relatively large, suggesting great variation in these children's scores. Table 43 outlines the statistical results of the intercorrelation between the five areas.

Table 43: Intercorrelation between the five areas of the Xitsonga toddler form ($n=99$)

Correlations						
		Word combination	Vocabulary size	Grammar	Average MSL	Sentence complexity
Word combination	Pearson correlation	1	.22*	.62**	.32**	.66**
	Sig. (2-tailed)		<.05	<.001	<.001	<.001
	N	99	99	99	99	99
Vocabulary size	Pearson correlation	.22*	1	.42**	.12	.41**
	Sig. (2-tailed)	<.05		<.001	.26	<.001
	N	99	99	99	99	99
Grammar	Pearson correlation	.62*	.42**	1	.23*	.93**
	Sig. (2-tailed)	<.001	<.001		<.05	<.001
	N	99	99	99	99	99
Average MSL	Pearson correlation	.32**	.12	.23*	1	.19
	Sig. (2-tailed)	<.001	.26	<.05		.06
	N	99	99	99	99	99
Sentence complexity	Pearson correlation	.67**	.42**	.93**	.19	1
	Sig. (2-tailed)	<.001	<.001	<.001	.06	
	N	99	99	99	99	99
*. Correlation is significant at the 0.05 level (2-tailed)						
**. Correlation is significant at the 0.001 level (2-tailed)						

Word combination had a significant correlation ($F [1,99] = 6.0; r = .24, p < .001$), with vocabulary size accounting for 5.8% of the variance when compared to MSL. The MSL-w and MSL-m varied in their scores, as can also be seen with the means and *SD*. The MSL-m yielded a higher score than MSL-w in Xitsonga. Both showed no correlation with vocabulary size ($r = .11; p > .05$ and $r = .10; p > .05$ respectively) but a weak correlation with sentence complexity ($r = .246; p < .05$ and $r = .20; p < .05$ respectively). As with other languages, similar trends in lexical and grammar development were observed in Xitsonga-speaking toddlers aged 16 to 32 months in

this study. However, the MSL-m proved to be a better predictor of total grammar development compared to MSL-w. In addition, vocabulary development showed a moderate correlation with sentence complexity ($r = .45$; $p < .001$) and total grammar development ($r = .40$; $p < .001$). These findings suggest that vocabulary size and grammatical development are closely linked, and that both are important areas of language development in toddlers.

5.6. Summary

This chapter reported the findings of the third and final phase of the study that aimed to describe the early lexical and grammatical development of monolingual Xitsonga-speaking children aged 16 to 32 months. This study examined the relationship between age and vocabulary size in Xitsonga-speaking children aged 16 to 32 months. Age was significantly associated with vocabulary growth. The Pearson correlation showed that age could predict vocabulary growth for this sample. There was a large degree of variability at each age level, with individual differences in vocabulary development observed. Geographic area significantly correlated with vocabulary development, highlighting the importance of considering multiple factors when examining variability. Common nouns make up the largest portion of the Xitsonga MB-CDI and their use was associated with larger vocabulary sizes. The relationship between vocabulary size and the production of bound morphemes was statistically significant, with children who produced more total bound morphemes tending to have larger vocabulary sizes. Vocabulary development showed a significant correlation with sentence complexity and total grammar development. These results provide insight into the lexical and grammatical development of Xitsonga-speaking toddlers.

CHAPTER 6: DISCUSSION

“Mahlo ya nkwahle ya tiva hi muyevuru”

[Eyes of a lizard are known by the hunter who removes the skin]

-A Tsonga idiom

The idiom quoted at the start of this chapter means that you do not know something until you experience it. Before this study, little or no information had been formally documented about the patterns of language development in Xitsonga-speaking children aged 16 to 32 months in Giyani, Limpopo province, South Africa. This study aimed to describe the patterns of early lexical and grammatical development of Xitsonga-speaking children by responding to the research question: “What are the patterns of early lexical development and the emergence of grammar in Xitsonga-speaking children between the age of 16 and 32 months?”

6.1. Introduction

The first step to achieving the aim of this study was to adapt a tool that would be suitable for collecting data on early language development in Xitsonga-speaking children. This process was described in CHAPTER 3: RESEARCH DESIGN AND METHODS and CHAPTER 4: RESULTS AND DISCUSSION OF THE ADAPTATION OF THE XITSONGA MB-CDI. The present chapter discusses the results obtained when the culturally and linguistically appropriate Xitsonga MB-CDI was administered to caregivers of 99 monolingual Xitsonga-speaking toddlers in the Mopani rural and semi-urban areas of Limpopo Province in South Africa. It focuses on early lexical and grammatical development in Xitsonga-speaking children aged 16 to 32 months, exploring the composition of their vocabulary, the relationship between vocabulary size and noun, predicate and function word categories and the use of action and descriptive words.

The chapter further discusses the comparison of nouns and predicates in vocabulary size and addresses the limitation of reliability in bias estimates. The trends in the production of bound morphemes and agreement markers, the role of verb morphology and NC production, and the relationship between word combination, sentence length, and sentence complexity are also explored. Lastly, the developmental trajectory of morphosyntactic skills is discussed to provide an understanding of vocabulary and grammar development in Xitsonga-speaking children aged 16 to 32 months.

6.2. Vocabulary development

Understanding the patterns of early language development is critical because they form the foundation of further language acquisition and communicative functioning used in identifying children with language disorders. In most cases, language is effectively mastered with ease and speed, despite the complexity of the task. The available literature on early language acquisition has confirmed, through the study of many languages from different language typologies, that certain patterns of language acquisition are universal (Caselli et al., 2012; Demuth, 2003; Fenson et al., 1994). It was essential to investigate whether Xitsonga language development exhibits similar patterns and trends.

6.2.1. Patterns in vocabulary development

Vocabulary development is not a uniform or linear process. There are several trends and patterns as seen in Figure 16 in section 5.2.1. The figure shows an overall pattern of linear growth but there were significant declines in scores at various points of development. For example, at 21 months, children on the 10th percentile had a productive vocabulary size of 41 words (when it was 245 words at 20 months), and those on the 90th percentile reported a vocabulary size of 284 words (when it was 601 words at 20 months). Similarly, a drop was observed at 29 months, with children at the 10th percentile reporting a vocabulary size of 187 words, and those at the median

having a productive vocabulary size of 246 words. Age was found to be a significant predictor of vocabulary development, implying that, on average, vocabulary size increased as the children grew older. This study shows similar patterns to other languages (for example, Bleses et al., 2008 for Danish; Kern, 2007 for French; Maital et al., 2000 for Hebrew; O'Toole and Fletcher, 2010 for Irish; Simonsen et al., 2014 for Norwegian). However, individual differences persisted, indicating that some children exhibited faster or slower vocabulary growth than others.

In the present study, a 'spurt' in the growth of expressive vocabulary was observed at 19 months. The 10th percentile vocabulary size was 62 words, with a median vocabulary size of 293 compared to 147 at 18 months. However, at 20 months, the vocabulary size was much higher, with a 10th percentile vocabulary size of 245, and a median score of 416. The vocabulary 'spurts' are better reported using the curve-fitting model. However, this model was not used for this study as it requires longitudinal data analysis to describe the vocabulary 'spurts' better (Ganger & Brent, 2004). The concept of a 'vocabulary spurt', has been a subject of considerable debate and study (Alcock, 2017; Fenson et al., 1994; Stolt et al., 2008; Tardif et al., 2008b; Vogt et al., 2015). Some researchers suggest that word production starts at a slow pace and rapidly increases so that, on average, children can produce 300 words by the time they are 24 months of age (Caselli et al., 2012; Fenson et al., 2000a; Fenson et al., 1994).

Findings from this study suggest that Xitsonga-speaking toddlers follow similar developmental trends observed with other languages, such as the languages outlined in Table 44 and Figure 40. These studies used descriptive statistics to describe the patterns and trends observed in young children. Using mean estimates in documenting early language development has its advantages. This can be helpful for comparing language development across different populations or tracking progress within a specific group over time.

Table 44: Productive vocabulary size per age group reaching 50%: a cross-linguistic comparison

Productive vocabulary size per age group reaching 50%					
Mean vocabulary size (in words)	Xitsonga (Current study)	Australian English (Kalashnikova et al., 2016)	Chinese (Beijing) (Tardif et al., 2008a)	Kigirama Wordbank data (Frank et al., 2021)	Italian Wordbank data (Frank et al., 2021)
50 - 99		69 at 17 months (F), 69 at 18 months (M)	49 at 16 months (F)	56 at 18 months	63 at 19 months
100-199	124 at 16 months	132 at 20 months (F), 122 at 21 months (M)	145 at 16 months (F), 137 at 18 months (M)	116 at 21 months	106 at 20 months
200-299	206 at 17 months	220 at 22 months (F), 230 at 24 months (M)	242 at 18 months (F), 247 at 20 months (M)	230 at 25 months	232 at 23 months
300-399	293 at 19 months	312 at 24 months (F), 305 at 26 months (M)	302 at 19 months (F), 317 at 21 months (M)	302 at 27 months	310 at 25 months
> 400	416 at 20 months	405 at 27 months	435 at 21 months	429 at 30 months	419 at 28 months

As observed in Table 44, Xitsonga follows similar patterns to Mandarin (Beijing). At 16 months, young children have a vocabulary range of between 100 and 199 words. Even though the range is different, at 19 months, Xitsonga-speaking children had a mean vocabulary production of 293 words, with 302 words recorded for the male Mandarin-speaking children (Beijing) of the same age. Figure 40 shows the developing trends of six normed languages, including Xitsonga's preliminary study results.

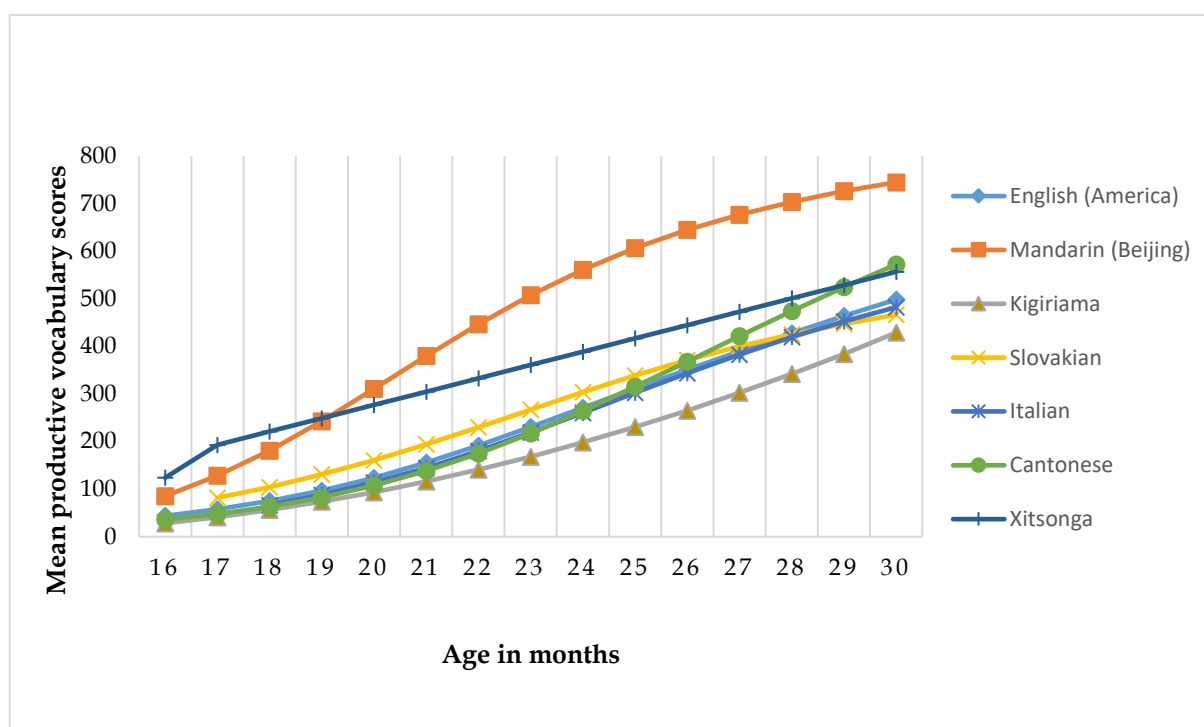


Figure 40: Median vocabulary scores from six normed languages and the preliminary scores of Xitsonga
NOTE: Using normative data obtained from Wordbank (2023)

The productive vocabulary of Xitsonga-speaking children is slightly higher compared to some of the studies conducted in African languages. For example, the Mozambican study showed that only at 25 months do children have an expressive vocabulary of 50 words (Vogt et al., 2015). At 16-18 months, Setswana-speaking children were reported to achieve a median score of over 61.1 words (Yalala, 2021). Kigirama-speaking children were reported to have a productive vocabulary of 56 words at 18 months (Alcock, 2017). Similar trends were observed for Indo-European languages, where American English scored 44 words (Fenson et al., 2007) and

Cantonese-speaking children scored 36 words, both at 16 months (Tardif et al., 2008a). Italian-speaking children were reported to have a productive vocabulary of 67 words at 18 months (Caselli et al., 2012).

In this study, Xitsonga-speaking children show similar patterns to Mandarin-speaking children of producing more than 100 words by the age of 17 months. Studies of Mandarin-speaking children reported productive vocabularies of 128 words by the age of 17 months (Frank et al., 2021) and Xitsonga-speaking children achieved a score of 193 words at the same age. There is an increase in the number of words children use as they get older. At 30 months, the European Spanish-speaking children achieved a median score of 463 words (Altares et al., 2007), and 483 words were achieved by Italian-speaking children. The Cantonese-speaking children scored very similarly to Xitsonga-speaking children at 533 words by 30 months (Tardif et al., 2008b). Cantonese-speaking and Xitsonga-speaking children's early vocabulary development appears to follow similar patterns, even though the only similarity between the two languages is that they are tonal. However, the Xitsonga sample was small. It would therefore be interesting to see if similar patterns are observed in a larger sample and also do comparison in other aspects such as gender and SES.

6.2.2. Vocabulary composition

Understanding the composition and distribution of these word types provides insights into language acquisition, semantic development, and syntactic complexity. In this sample, it was observed that nouns, in general, such as in the *"food and drinks"*, *"animals"*, *"transport"* and *"body parts"* categories, developed earlier than verbs in the categories of *"action words"* and *"games and routines."*

6.2.2.1. Noun bias in Xitsonga-speaking children's vocabulary composition

The findings of this study support the notion of a noun bias in the language development of Xitsonga-speaking children between the ages of 16 and 32 months. The prevalence of common nouns in their early vocabulary, comprising 44% of the total items, even with a limited vocabulary size of fewer than 50 words, highlights the

significance of nouns in Xitsonga language acquisition (see Figure 19). These findings align with previous research conducted in various language contexts, which also identified noun biases (Alcock, 2017; Bates et al., 1994; Fenson et al., 1994; Kim et al., 2000). The studies suggest that across different linguistic and cultural settings, children tend to prioritise the acquisition and production of nouns during the early stages of language development.

The study further demonstrates a relationship between the composition of different word categories and the total vocabulary size of Xitsonga-speaking children. Nouns constituted 50% of the vocabulary composition when children had an overall vocabulary size of more than 300 words, indicating a strong prevalence of nouns in their linguistic repertoire. On the other hand, function words reached a 50% composition only when the children's total production vocabulary fell within the range of 401 to 500 words. This suggests that the acquisition and production of function words lags behind that of nouns and predicates in the developmental trajectory of Xitsonga-speaking children. Similar patterns have been observed in studies conducted in African and European languages (Alcock, 2017; Caselli et al., 1999; Fenson et al., 1994; Vogt et al., 2015). This international data is presented in Figure 41 which shows the proportion of each lexical category produced by each child, as a function of the proportion of all vocabulary items produced by the child.

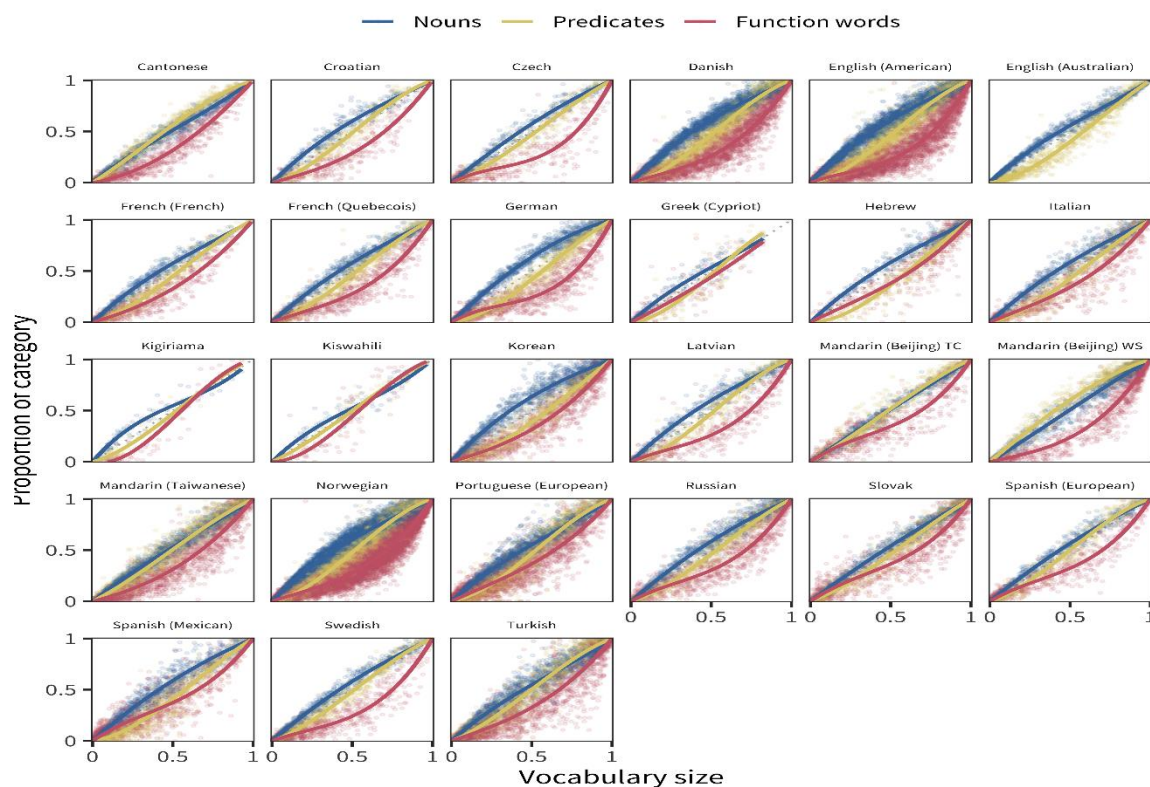


Figure 41: Cross-linguistic data showing proportion of each lexical category produced as a function of the proportion of total vocabulary size from Frank et al. (2021)

In most of the languages in Figure 41, noun bias is evident. Xitsonga-speaking children also show similar noun bias trends (see Figure 22) to languages such as Cantonese, Portuguese (European), Mandarin (Taiwanese) and Turkish as evident in Figure 41. However, it should be noted that the rate of noun acquisition slows down after the initial stage, while the growth of predicates and function words remains relatively fast. This observation raises questions about the factors influencing the developmental patterns of word categories. It is also worth mentioning that while there was a correlation between predicates and common nouns in this study, the correlation between function words and total vocabulary size was weaker. This indicates a greater emphasis on nouns and predicates in the early vocabulary development of Xitsonga-speaking children, with function words playing a lesser role. In The Wordbank Project report by Frank et al. (2021), similar findings were noted indicating a significant increase in the proportion of nouns in children's vocabulary as

their vocabulary increases to approximately 100 words. Once their vocabulary reaches around 300 words, however, the rate of noun acquisition appears to decline. Frank et al. (2021) attribute the decline to potential limitations in the assessment used.

Certain aspects of the MB-CDI form design mean that children may run out of nouns to learn. This suggests that children might be acquiring nouns that are not included in the CDI forms, leading to a decrease in the proportion of nouns reported. The MB-CDI has much value for cross-linguistic comparisons and has been widely adopted in research. Furthermore, the use of this checklist enhances the reliability and comparability of the results, strengthening the validity of the observed noun bias (Alcock et al., 2015). The agreement with previous research conducted in Estonian and Finnish contexts suggests that the noun bias is not solely dependent on morphological richness but is influenced by linguistic and cultural factors (Schults & Tulviste, 2016; Stolt et al., 2008).

The prominence of nouns and predicates in Xitsonga-speaking children's vocabulary suggests a focus on concrete objects and actions, which are crucial for expressing basic concepts and describing events (Bates et al., 1994). Function words, on the other hand, which include grammatical elements such as prepositions and pronouns, may have a less significant impact on vocabulary size and composition at this stage of development (Gentner & Boroditsky, 2001). It is worth noting that Xitsonga exhibits a system of prepositions almost entirely based on the representation of each noun by a pronoun identical in its origin with the derivative prefix of the nouns. According to Lyons (1981), a locative is a grammatical case that expresses the area of something in the sentence structure. [In], [on], and [by] are generally equivalent to the English prepositions [in,] [on top of,] [at,] and [by,] though not exactly. The prepositions used in the instances above are also used as locatives, and the reverse is also true. Zeller (2004, p. 1) reported "the most common method of deriving a locative from a non-locative noun in the African languages is through the employment of the class markers." This will be discussed in sections below when acquisition of NC and agreement markers are presented.

Findings from this study show the existence of a noun bias in the language development of Xitsonga-speaking children aged 16 to 32 months. The prevalence of common nouns in the early vocabulary of Xitsonga-speaking children, even when their vocabulary size is limited, emphasises the importance of nouns as a foundational category for language development. However, other studies have not observed the same bias in different language contexts (Gentner & Boroditsky, 2001; Tardif, 1999). While the agreement between these findings and previous studies conducted in diverse language contexts enhances the credibility of the identified noun bias, it is important to exercise caution when designing responsive assessment tools in this particular context. Wallentin and Trecca (2023) also reported that vocabulary composition was noted to be a stronger predictor of language development than vocabulary size.

6.2.2.2. Types of words

The analysis of word types used by children provides valuable insights into their vocabulary composition and the acquisition patterns of different word categories. In this study, the categories of “*body parts*,” (62%) “*food and drinks*” (58%) and “*transport*” (58%) demonstrated a higher representation within the noun category compared to other categories (see Figure 25). These findings highlight the salience and importance of concrete objects related to the human body, food, and transportation in children’s early lexical repertoire. The prominence of these categories suggests that they are frequently encountered in children’s daily experiences, leading to their higher production and acquisition. This agrees with what researchers (Bates et al., 1994; Fenson et al., 1994; Gentner & Boroditsky, 2001) in early child development reported, that the primary function of nouns and other open-class words (e.g., verbs, adjectives) is to represent perceived objects in the world. In contrast, relational words such as closed-class words (e.g., pronouns, prepositions and determiners) take their meaning from the linguistic connections among the referential words (Bates et al., 1994; Fenson et al., 1994; Gentner & Boroditsky, 2001).

The findings also revealed that the early words used by these Xitsonga-speaking children in this study were closely related to their immediate environment. For instance, by the age of 20 months, a considerable number of words in the common noun categories were reaching reporting levels of 50% or higher. Furthermore, at 20 months of age, a notable number of children (60% of the sample) had learned the word “*misisi*” [hair] from the “*body parts*” category. Similarly, at 17 months of age, a significant portion of children (60% in this study) had acquired the word “*huku*” [chicken meat] from the “*food and drinks*” category, while 73% had learned the word “*movha*” [car] from the “*transport*” category. This indicates that children in this sample were actively acquiring vocabulary related to familiar objects and entities in their environment.

This supports Tomasello’s usage-based perspective which argues that children learn language by analysing the statistical regularities of the language to which they are exposed (Tomasello, 2009). Children learn the frequency and distributional patterns of words and phrases and use this knowledge to build their linguistic knowledge. McMurray (2007) suggests that the distribution of word difficulty arises from various factors such as frequency, phonology, syntax, the child’s capabilities, and contextual cues. Children’s interests and the early cognitive availability of some concepts may influence the rate at which they learn new words.

Additionally, it is worth noting that some concepts may be more cognitively accessible to children than others, making them easier to learn (Waxman & Markow, 1995). The frequency of individual words in the input, the diversity of the contexts in which they appear, and the density and sparseness of the semantic connections between words in the input may all influence the rate at which children learn new words. For example, children are more likely to learn words that are frequently used in their environment and that appear in a variety of contexts (Goodman et al., 2008). Additionally, children may be more likely to learn words that are semantically related to other words that they already know (Goodman et al., 2008; Hills et al., 2010; Hurtado et al., 2008). These words are, thus, more linguistically dominant than nouns (Alcock, 2017; Bates et al., 1994; Bloom, 2001).

In this study, it was observed that the expressive vocabularies of the Xitsonga-speaking children were dominated by words with bilabial phonemes (/m/, /b/, /w/, /p/) and front vowels (/o/ and /u/) when compared to others. Table 45 shows that within the 10 frequently used words, six are words with bilabial phonemes and all the words except one have front vowels.

Table 45: Ten frequently used words by Xitsonga-speaking children aged 16 to 32 months with bilabial phonemes

Words	Age in months	% of monthly sample	Category
<i>Foni</i> [phone]	16	67%	small household
<i>Huku</i> [chicken]	17	67%	animals
<i>Bolo</i> [ball]	17	60%	toys
<i>Huku</i> [chicken meat]	17	60%	food and drinks
<i>Movha</i> [car]	18	73%	transport
<i>Hu hu</i> [woof woof]	20	60%	sounds effects
<i>Mhooo</i> [moo]	20	67%	sounds effects
<i>Mmmm</i> [yummy]	20	60%	sounds effects
<i>Wu wu wu</i> [woop woop]	20	60%	sounds effects
<i>Donki / mbongholo</i> [donkey]	20	50%	animals

Words starting with the /m/, /w/, and /b/ phonemes and initial syllables with /o/ or /u/ vowels dominate the list of early words used by Xitsonga-speaking children in this study. It appears as if these phonemes have a significant presence across different categories. For instance, there is “*foni*” in the “*small household*” category, “*huku*” in both “*animals*” and “*food and drinks*” categories, “*bolo*” in “*toys*”, “*movha*” in “*transport*”, and a range of “*sound effects*” starting with “*hu hu*,” “*mhooo*,” “*mmmm*,” and “*wu wu wu*.” According to an unpublished undergraduate research project conducted by Mphekgoane et al. (2022), Xitsonga-speaking children tend to use words with plosives, fricatives, and nasals as the initial phonemes in their early vocabulary. Although this viewpoint provides an intriguing alternative explanation, it is essential to consider factors such as cultural and linguistic influences, regional variations, and the specific context in which these words are used.

Stoel-Gammon (2011) reported that, for English-speaking children, the first words typically consist primarily of common nouns and short consonant-vowel words that are acquired in the earlier stages of phonological development, such as 'hi', 'no', or 'dada'. Without a more extensive analysis and a broader dataset, it is challenging to determine if there is a genuine dominance of bilabial phonemes and front vowels in various categories or if it is simply a chance occurrence. Further research is necessary to validate and compare these contrasting hypotheses and to gain a deeper understanding of the underlying mechanisms driving the vocabulary spurt in Xitsonga-speaking children's language acquisition.

6.2.2.3. Action words and descriptive words in Xitsonga-speaking children

The study reveals that the "*action words*" category comprised a larger number of items (136) compared to the "*descriptive words*" category (72). This disparity in item count suggests that action words were more prevalent or had a higher production rate than descriptive words in the language samples examined. The categorisation of action words exclusively as main verbs, excluding modals and auxiliaries, allows for a focused examination of verbs that directly express actions. This categorisation strategy ensures a clear distinction between different word types and facilitates a more targeted analysis.

Marchman and Bates (1994) reported that early in development, children's verb vocabularies are likely to contain a higher proportion of irregular verbs than regular verbs. However, this trend reverses as children get older, and regular verbs eventually come to dominate. They suggest that it may be more relevant to assess early verb production using developmental, rather than chronological, criteria. This is because the development of verb production is not a linear process, and children may reach different milestones at different ages. To further explore the relationship between vocabulary size and the use of action and descriptive words, a statistical model with third-order polynomials was used, following the approach recommended by Bates et al. (1994). The analysis revealed that Xitsonga-speaking children in this study exhibited a bias towards the production of action words compared to descriptive words. This finding suggests that action words play a more prominent role in early

language development, while descriptive words may take longer to emerge and become more prevalent. Furthermore, the analysis demonstrated a stronger relationship between vocabulary size and the number of action words used compared to descriptive words (see section 5.3.1).

Through an analysis of bias estimates, vocabulary size, and word categories, valuable insights into the composition and acquisition patterns of these word types are gained. The findings shed light on the developmental trajectory of action words and descriptive words, providing a deeper understanding of early language development. These findings align with previous research highlighting the early acquisition and prevalence of action words in children's vocabulary (Bates et al., 1994; Tardif et al., 2008b). Action words are closely linked to physical experiences and interactions with the environment, which may explain their early emergence. On the other hand, descriptive words require a deeper understanding of attributes and qualities, which may develop later in the language acquisition process (Tomasello & Merriman, 2014).

6.2.3. Variability in lexical development

Notable individual variability in vocabulary development was observed in Xitsonga-speaking children between the ages of 16 and 32 months in this study (see Figure 18). The children's productive vocabulary size ranged from 21 to 701 words. The mean vocabulary size of the participants was 335, with a *SD* of 192.8, indicating considerable differences in vocabulary acquisition rates among the children. The data suggest that 50% of this sample of Xitsonga-speaking toddlers will produce more than 100 words (median = 124) by 16 months and over 500 words (median = 547) by 30 months. This variation indicates that children acquire language at different rates, with some children demonstrating rapid vocabulary growth and others progressing more slowly.

Bronfenbrenner's bioecological model provides a valuable framework for understanding these individual differences. According to the model, language development is influenced by multiple levels of the environment, including the child's

cultural and linguistic context (Bronfenbrenner & Morris, 2007; Bruner, 2004; Cole et al., 1979). Some argue that the model does not adequately emphasise the active role of the individual in their own development (Berk & Winsler, 1995; John-Steiner & Mahn, 1996; Ültanır, 2012). It is essential to recognise that children are not passive recipients of their environment but actively engage in the learning process. This highlights the need for culturally and linguistically relevant assessment tools to evaluate a child's language abilities accurately within their specific context (Bronfenbrenner & Morris, 2007; Rosa & Tudge, 2013).

The findings of this study on Xitsonga-speaking children aged 16 to 32 months align with previous research investigating the potential impact of sex and geographic location on vocabulary development (Huttenlocher et al., 1991; Silva et al., 2017; Simonsen et al., 2014). While this study observed a trend of slightly larger vocabulary sizes among female participants compared to male participants, the difference did not reach statistical significance ($t(97) = -1.27, p > .05$). These results suggest that sex differences may not have a substantial influence on vocabulary development within this specific age range and language community. This is consistent with other studies which have also indicated that girls tend to have larger vocabularies than boys in the 16 to 32 month age range, but this discrepancy tends to diminish as children grow older (Frota et al., 2016; Huttenlocher et al., 1991; Simonsen et al., 2014). It is worth noting that Stolarova et al. (2016), in their study conducted with German-speaking toddlers, did not find a significant difference in overall vocabulary size between boys and girls, although they did observe variations in the types of words used.

Geographic area could have an impact on early vocabulary development in children. Studies have found that children growing up in different regions with varying linguistic environments may have different experiences and exposure to language, which can affect their language development (Alcock & Alibhai, 2013; Caselli et al., 1995; Fernald et al., 2013; Geiger & Alant, 2005; Soderstrom et al., 2018; Zhukova et al., 2020). This study found a significant association between geographic location and vocabulary development in the Xitsonga child participants. Those from semi-urban areas exhibited a larger vocabulary size compared to participants from

rural areas. This finding suggests that the linguistic environment and exposure to language resources in semi-urban areas may have a positive impact on vocabulary development in Xitsonga-speaking children. It highlights the potential influence of the surrounding linguistic context on children's language acquisition processes. Research has demonstrated that children from more affluent backgrounds tend to exhibit larger vocabularies and demonstrate faster vocabulary growth rates (Hart & Risley, 1995; Hoff, 2013). This individual variability emphasises the need to consider factors beyond age alone when studying vocabulary development.

6.3. Early grammar development

The development of grammar in early childhood language acquisition is a complex and dynamic process that involves the growth and organisation of vocabulary as well as the acquisition of various grammatical categories. One of the key findings in this study is the significant role of age in vocabulary development. As expected, vocabulary size tends to increase as children grow older, suggesting a positive correlation between age and vocabulary acquisition. However, it is important to note that individual differences persist, indicating that some children exhibit faster or slower rates of vocabulary growth than others. This variation highlights the unique developmental trajectories experienced by children during language acquisition. The development of grammar in early childhood language acquisition involves the interplay between vocabulary growth and the distribution of word categories.

The Xitsonga MB-CDI Part II assesses the development of morphology and syntax in Xitsonga-speaking children aged 16 to 32 months. The first half contains three sections which assess the production of bound morphemes and agreement markers, while the second half focuses on multiword utterances and sentence complexity. The aim of this section is to describe the grammar development of Xitsonga-speaking children aged 16 to 32 months. Bates and Goodman (1999) remarked that grammatical development appears sensitive to language differences, and even minor lexical differences could significantly impact research findings. There

are categories of words that have morphological properties. For example, nouns and verbs in Xitsonga permit attachments of different inflection, thus transforming them from lexical to morphosyntactic categories.

6.3.1. Morphology development

The investigation of noun and verb prefixes and suffixes provides valuable information about how children use these linguistic features to express specific grammatical forms and semantics. Understanding the patterns and conventions surrounding the use of affixes can shed light on the underlying mechanisms of word formation and the development of language skills in Xitsonga-speaking children.

The findings in this study indicate that complexity in the production of bound morphemes in Xitsonga-speaking children increased with age. At 16 months, these children were reported to be producing at least one of the bound morphemes; however, by 17 months, it had increased to 1.75 and continued to increase to 3 at 23 months and 4 at 24 months. The complexity continued to increase to 4.09 at 25 months, peaking at 4.5 by 26 months before decreasing slightly to 4 at 27 months. This suggests a developmental progression in acquiring and utilising these morphological features. The increasing complexity could be attributed to the expanding language skills and growing linguistic competence of the children as they are exposed to more language input and engage in language use with their caregivers and peers (Clark, 2017; Tsonope, 1988). The different areas investigated will be discussed further in the sections below.

6.3.2. NC development

In Xitsonga, nouns are classified into distinct groups according to their morphology by a prefix and the accompanying concord system (Kubayi, 2022; Zerbian, 2007). There was variability in the development of NC morphology between months in children from the study sample. For example, NCs 4, 5, 6, 7 and 9 were produced earlier by more than 50% of the children by 16 months. In contrast, NC 10 was only produced by 52% of the children at 25 months. This suggests that NC 10 was

particularly challenging for the children in this sample, requiring more time and effort to acquire compared to the other NCs.

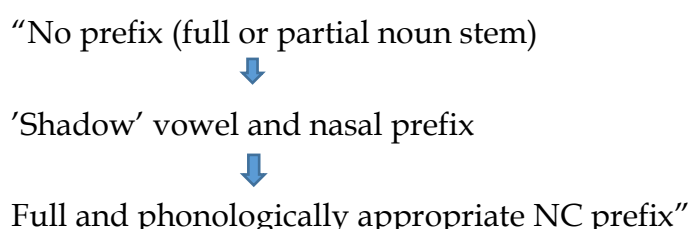
The acquisition of NCs in different African languages, including Xitsonga, exhibits interesting variations and patterns. Unlike isiZulu-speaking children who tend to use NCs 1/2 more frequently (Zawada & Ngcobo, 2008), Xitsonga-speaking children in this study showed a higher occurrence of NC 4, with all children using it by the age of 16 months. This suggests that the acquisition of NC 4 is relatively easier for Xitsonga-speaking children compared to other classes. When it comes to NCs 5, 6, and 7, the acquisition patterns were similar, reaching the 50% criterion at an average age of 16 months. However, there was variability in the percentage of children who achieved the criterion. For example, NC 5 showed a higher rate of 58% of the children using it, compared to 50% using NCs 6/7. This suggests that the acquisition of these NCs may have some individual differences, with NC 5 being slightly easier to acquire than NCs 6/7.

Suzman (1996) noted that in isiZulu, children acquire the NCs in a specific order. She claimed that before the age of two years, singular classes are acquired before plural classes. Yet she did not assign these NCs a preferential order. Furthermore, Demuth and Ellis (2009) noted that in all studies on African languages NC prefixes yielded similar findings. Both the singular and plural NC prefixes are first segmented as different morphemes early on. Neither plural morphemes nor NC prefixes wrongly attached to nouns are observed. However, in other studies, it was reported that there is no indication that the acquisition of plural NC prefixes is delayed, although singular nouns are more frequently used than plural ones in everyday language (Demuth & Weschler, 2012; Zawada & Ngcobo, 2008).

In this study, variability in the use of singular and plural form was seen with NC 4 (100%), a plural form, but NC 9, a singular form, was also observed to be used by 100% of participants. Ngcobo (2010) listed *“animals”*, *“people”*, *“body parts”*, and even *“household effects”* as categories represented in NC 9 with the highest frequency occurrences. Early acquisition of these lexical categories is recorded in studies that claim early acquisition of open class categories (Bloom et al., 1993; Gentner &

Boroditsky, 2001). Furthermore, the ‘zero’ prefix in “*mbyana*” might account for the early acquisition reported in other languages such as Sesotho and Setswana. On this basis, Suzman (1996) and Demuth and Ellis (2009) noted that the phonological pattern of the filler syllable (e-) in Sesotho and Setswana might represent an overgeneralisation of NC 9. They questioned whether children’s choice of these filler syllables shows an attempt to group nouns into a single ‘class,’ or if it is simply a morphological replacement. This should also be further investigated in the acquisition of Xitsonga as all the children in this sample were using NC 9. Xitsonga-speaking toddlers in this study might grouping nouns into a single NC.

The omission of the prefixes was also noted in plural forms. For example, NC 2 (illustrated by the word “*vavasati*” [women] with an omitted repetitive syllable) was recorded as produced as “*vasati*” by 35.64% in this sample. Many studies have demonstrated that when children shorten words, they keep stressed syllables and any syllables that make a prosodic unit (Demuth & Weschler, 2012; Ngcobo, 2010; Suzman, 1996; Tsonope, 1988; Zawada & Ngcobo, 2008). Demuth (2003, p. 5) reported three partially overlapping stages in the development of the NCs. These are:



These stages are observed in Xitsonga-speaking children with the omission of the prefix “*va-*” in “*vavasati*”. Tone also plays a crucial role in languages such as Xitsonga. This omission of the prefix was also explained by observations of Sesotho-speaking children (Demuth & Ellis, 2009). They noted that young Sesotho-speaking children would keep the NC prefix when tone assimilated part of a disyllabic word with a monosyllabic stem. Demuth and Weschler (2012) hypothesised that the early deletion of African language NC prefixes in children is related to phonology and grammatical agreements. These omissions may also be influenced by the adults modelling the language to the child (Demuth & Ellis, 2009). Most African noun stems

are disyllabic, and as a result many NC prefixes will be omitted until roughly 30 months, consistent with African indigenous language acquisition data (Demuth, 2003).

6.3.3. Verb morphology development

Fenson et al. (1994) reported variability in the acquisition of verb morphology. Even though Xitsonga verb morphology differs from that of English, a similar trend was observed in this study. There was significant variability of scores observed with individual children between 16 and 32 months, even though an exponential nonlinear growth was observed with the median scores. Table 46 illustrates the verb morphology acquisition ages of Xitsonga in contrast with English and African indigenous languages.

Table 46: Verb morphology acquisition

Suffixes	English-speaking children using the affix (Fenson et al., 1994)	African indigenous languages using affix (Demuth, 2003)*	Xitsonga-speaking children using the affix
Past tense	>90% by 30 months	>90 % by 33 months	<71 % by 32 months
Possessive 's/ agreement marker	>90% by 28 months	>90% by 30 - 36 months	<82% by 32 months
Applicative	N/A	>90% by 24 - 36 months	<67% by 30 months

*NOTE: languages are Siswati, isiZulu, isiXhosa, Setswana, Sesotho, Chichewa, Sangu

Table 46 provides a cross-linguistic comparison of the ages at which children acquire specific verb affixes. It suggests that Xitsonga-speaking children acquire these verb affixes at a later age than English-speaking and African indigenous language-speaking children. One possibility is that the grammatical structures of Xitsonga and English differ in ways that make it more difficult for Xitsonga-speaking children to acquire these affixes. For example, Xitsonga has a more complex verb morphology

system than English, which may make it more difficult for Xitsonga-speaking children to acquire the possessive/agreement marker. The most common affixes in a language such as Xitsonga are represented by suffixes “-a”, “-e”, “-i”, “-ile” and “-anga” (Kiso, 2012; Matsinhe, 1994; Nurse, 2008; Nurse & Devos, 2019).

6.3.3.1. Acquisition of tenses

The acquisition of tense markers occurred gradually, with age playing a significant role in the development of morphosyntactic skills. The production of subject markers and agreement markers posed challenges for Xitsonga-speaking children, and their accurate usage improved with age. Table 47 shows a comparison of the development of tense aspects and agreement markers in Xitsonga-speaking children aged 16 to 30 months.

Table 47: Development of tense aspects and agreement markers in Xitsonga-speaking children aged 16 to 30 months

Tense/aspect	Marker	Age of acquisition
Present tense	“-a”	16 to 18 months
Past tense	“-ile”	17 to 21 months
Present continuous tense	“-isa”	22 to 25 months
Future tense	“-ta-”	25 to 30 months
Object agreement marker	-	25 to 30 months
Subject marker	-	23 to 25 months

Xitsonga-speaking children acquired the present tense form earlier than the other tense markers, with the perfect future tense acquired later. About 20% of Xitsonga-speaking children in this sample used correct verb morphology by the age of 16 months. By 26 months, all the children used NC prefixes and present tense suffixes. More than 50% of the Xitsonga-speaking children had accurate production of the past tense marker “-ile” by 21 months. By 27 months, all were reported to have acquired the past tense marker. This is earlier than what has been reported in other languages such as Sesotho. The use of past tense suffixes was also reported to develop

around 25 months in Sesotho-speaking children though there were sometimes phonological errors (Deen, 2005; Demuth, 2003).

Fenson et al. (1994) observed the same pattern where the production of past tense markers emerged slowly and stabilised later. Bloom and Capatides (1987) documented the early use of the verb inflections *-ing*, *-s*, and the irregular past (by English-speaking subjects between 22 and 28 months of age). They showed that these were limited to different clusters of verbs, depending mainly on the semantic characteristic of the verb. Alcock and Alibhai (2013) noted that the acquisition of tense and agreement markers on verbs has been heavily debated in the field of language acquisition. The findings from this Xitsonga study agree with the literature by showing that there are variations in the acquisition of verb morphologies even in languages that have rich and complex morphology.

6.3.3.2. Acquisition of copula “i”

English copula is mainly seen through the form of a helping verb “be” (is, are, am, was, were), and it is simple to recognise in sentences. In Xitsonga, the copula has the form “i” or “hi”. The copula “i” can be used with determiner phrases (DP) that have an overt noun as their head, while “hi” is used with DPs that have a nominal modifier as their head. Copula form could change the sentence into an interrogative using the subject to respond to the question (Demuth, 1989; Malungana, 2014). In Xitsonga, children were observed not to use the copula “i” at 16 months; however, it increased to 50% by 21 months, and all children (100%) could use it at 30 months. Similar findings were recorded for Sesotho-speaking children (Demuth, 2003). By comparison, 50% of English-speaking children were observed using [is] at 29 months and [was], and [were] only at 30 months, with a mean percentage of 12.5 and 7.3, respectively. These differences are supported by Clark (2017). She stated that children acquiring highly inflected languages are more likely to use their morphosyntactic knowledge correctly compared to less inflected languages such as English. Copula verbs are ambiguous on their own.

6.3.3.3. Acquisition of negative commands

The negative command uses a final vowel “-i” on the verb and an agreement marker “-nga-” when the subject Determiner Phrase is in NC 1. For example, using the same word as above – “*raha*” [kick] – it becomes “-*rahi*” [not kick], a negative command. In Xitsonga, the SM for negative present tense will also have a final vowel “-i”. When used in the 1st person, it will be “*a ndzi rahi*” [I do not kick]. For the 2nd / 3rd person, it will have the SM agreement “-nga-” as in “*a nga rahi*” [she/he does not kick or he/she must not kick] or [he/she will not kick] (depending on the tone used) or “*u nga rahi*” [do not kick / you must not kick], compared with “*a nga raha*” [he can kick] or “*u nga raha*” [you can kick]. Half the children in this sample used the final vowel “-i” to show a negative command by 17 months. Only 25% could use the correct subject agreement “*ndzi*” (findings are discussed in 6.3.3.4 below). This is similar to what was reported by Demuth (2003). She reported that in a study by Chimombo and Mtenje (1989), Chewe-speaking children used different forms of negation by the time they were two years old. She found that children learning African indigenous languages may have a basic understanding of negation and some grammatical means by which it is represented by the age of 24 months.

Similar findings were noted by Grinstead (1998) that negative commands in Spanish develop later. He observed that the children only use ‘no, no’ always to express a negative command. In Spanish, a “suppletive” form is employed where the negative particle “no” is combined with the subjunctive form of the second person to give negative commands. He found that Spanish-speaking children cannot use more grammatical expressions to form a negative command before learning subjunctive morphology, observed at 26 to 30 months. He noted that these examples demonstrate that individuals can use the indicative form, which may be phonetically reduced (Grinstead, 1998). Alcock and Alibhai (2013) concur, noting that the development of negative markers varied among the three children they studied. Just as with the acquisition of noun morphology in African languages, negative verb markers are often omitted in immature language.

6.3.3.4. Acquisition of subject and object markers

In this study, Xitsonga-speaking children were observed to use demonstrative markers by 23 months. However, all the children in this sample used demonstrative markers by the time they were 24 months old. It has been observed that the development of subject markers in African indigenous languages follows a pattern very similar to that of the evolution of NC prefixes (Demuth, 2003). In this study, no children used object agreements by 16 months and only 67% achieved object agreement production at 30 months. This late development may suggest that the production of the object agreement is more complex. It was observed in this study that by 30 months, all the children accurately produced the SM *"ndza"* when used in the present tense. However, at 16 months, only 25% could use the correct subject agreement *"ndzi"* when used in the past tense. The other 25% omitted the SM agreement and used *"a lavi"* [I not want] instead of *"a ndzi lavi / a ndzi swi lavi"* [I do not want them]. There is rapid growth between 24 and 25 months (from 25% of the children using the SM agreement at 24 months to 64% at 25 months). The use of SM agreement is a challenge because even at 30 months, not all children use it, although, by that stage, its use has increased to 83%. Demuth (2003) described studies in which children had difficulty with the rules of verb-root and verb-SMs. Smouse et al. (2012) also noted that the acquisition of SM agreement is delayed whether the subject is present or omitted.

Half the Xitsonga-speaking children in this study omitted the initial phoneme *"ndz-"* on the SM. Instead, they used the correct final vowel *"a"* to indicate the present tense. By 17 months, all the children were using the SM, although 71% were still omitting the initial phoneme *"ndz-"*. The omission of the initial syllable of the SM was also observed where children were reported to say *"-i rahile"* instead of *"ndzi rahile"* [I kicked]. The omission of initial morphemes could change the meaning, depending on the tone used for the word or phrase. For example, in this case, *"i rahile"* can mean [she/he kicked]; thus, *"i"* is used as a copulative. However, there is consistency in omitting *"ndz-"* in all the tenses. Demuth and Weschler (2012) argued that this

omission could be due to phonological skills rather than syntactic skills. Alcock and Alibhai (2013) agreed that the omission of markers correlates with linguistic maturity.

6.3.4. Development of syntax

Following Fenson et al.'s (1994) reporting of results for word combinations, the responses "often" and "sometimes" were combined in the researcher's analysis. Simonsen et al. (2014) noted that the "often" and "sometimes" answers were interpreted as a 'yes'. The results showed a linear growth in the use of word combinations, longer sentences, and more complex structures as children got older; however, there was also variability amongst the children.

6.3.4.1. Combining words

The Xitsonga-speaking children in this study were reported to start combining words at 17 months, with 75% reported to be "sometimes" combining words. Although there is variety in children's ability to combine words across studies, a similar trend can be observed with approximately 85-90% of children in this study combining words by the age of 24 months (Bleses et al., 2008; Feldman et al., 2000; Kuvač-Kraljević et al., 2021; Simonsen et al., 2014). Most children begin to combine words when their collective word knowledge is between 50-100 words (Bates & Goodman, 1999; Fenson et al., 2007; Rescorla et al., 2005). According to Bates et al. (1994), typical word combinations are observed between 18 and 20 months, but it is difficult to link the emergence of word combinations to chronological development. The correlation between word combinations and vocabulary size is considerably more significant than between word combinations and age (Bates & Goodman, 1999; Fenson et al., 2007; Rescorla et al., 2005). Although these correlations between vocabulary and grammar are quite strong, Thal et al. (1996) believe they are insufficient evidence to support the causation suggested earlier. Furthermore, they suggested that analysing the potential for disruption of the correlational ties between domains could help to support such a conclusion. Other scholars believe these differences between studies

might be due to the morphological structures of a language (Smouse et al., 2012; Tedeschi, 2017).

As is the case with Xitsonga-speaking children in this study, word combination shows a stronger correlation with age ($r = .489; p < .0001$) than with vocabulary size ($r = .224, p < .05$). The disparity in the findings between word combination and age versus word combination and vocabulary size can be attributed to several factors. According to Fenson et al. (1994), children's speech in the age range studied often lacks certain linguistic features, such as inflectional markers, tense, plural, and agreement marking. However, their speech tends to be content-rich. It is important to note that African indigenous languages, including Xitsonga, are known for their complex verbal morphology, which means that children learning these languages may acquire and comprehend these intricate rules at an earlier stage compared to children learning languages with simpler morphology, such as English.

Caselli et al. (2012) and other researchers have emphasised that by the age of 36 months, children should be able to produce multiword utterances, comprehend prepositions, and employ basic inflections and function words to describe scenes or events they have experienced (Caselli et al., 2012; Fenson et al., 1994; Yurovsky, 2018). This suggests that vocabulary size alone may not fully capture the syntactic complexity and developmental milestones of Xitsonga-speaking children. Instead, these researchers emphasis on word combination skills aligns with the understanding that children in these African indigenous language contexts may exhibit earlier syntactic development due to the intricate verbal morphology present in their linguistic environment.

6.3.4.2. Emergence of syntactic patterns in Xitsonga-speaking children

The findings regarding the MSL in Xitsonga-speaking children aged 16 to 32 months provide insights into the developmental patterns of sentence length in this population. The data indicate that both MSL-m and MSL-w followed a similar trend of an increase in sentence length as the children grow older. The average MSL at 16 months was reported to be 1.25 for both MSL-m and MSL-w. This suggests that at this

early age, Xitsonga-speaking children are starting to produce short sentences with one or two morphemes or words on average. The accelerated growth in MSL from 16 months to 21 months showed the scores increasing from 1 to 4 for MSL-w and from 1.5 to 6 for MSL-m. The increase in MSL values with age has been reported in other languages (Bleses et al., 2008; Caselli et al., 1999; Demuth, 2003; MacWhinney, 1998).

The variability in the use of verb morphology is another significant observation. The example provided below of changing the final vowel “-e” on a noun to indicate the imperative mood shows that Xitsonga-speaking children exhibit early syntactic abilities in manipulating morphological markers for meaning. For example, children in this sample were reported to say words such as “*mhane*” from “*mhani*” [mother] or “*kokwane*” from “*kokwana*” [grandma/grandpa]. This demonstrated the children’s understanding and use of morphological features in their sentences. Additionally, the data reveal that MSL-m tended to have higher scores than MSL-w, indicating that the morpheme measure captures more complexity in the children’s sentence structures. This finding implies that the use of morphemes provides a more detailed analysis of syntactic development, as it considers the specific morphological features present in sentences. In contrast, MSL-w, which focuses on word count, may not fully capture the intricacies of sentence structure in Xitsonga-speaking children. This is supported by Oosthuizen and Southwood (2009) who raised a cautionary note that using MLU-w may present the risk of underestimating a child’s language capabilities when it comes to diagnostic evaluations. Therefore, for diagnostic purposes, MLU-m would be a more suitable choice.

This study has noted that differences in dialect should be considered too. For example, the word [food] can be expressed as either “*swodya*” or “*swakudya*,” with each form consisting of two and three morphemes, respectively. In this case both words are correct; however, one child might be recorded as obtaining a higher score than the other. This might explain the variability in the MSL-w and MSL-m scores. The MSL-m yielded a higher score than MSL-w in Xitsonga. Both showed no correlation with vocabulary size ($r = .11$; $p > .05$ and $r = .10$; $p > .05$, respectively), but a significant correlation with age (MSL-m ($F [1,99] = 21.6$; $p < .001$; $r = .43$) and MSL-w ($F [1,97] =$

17.4; $p < .001$; $r = .39$). The MSL-m proved to be a better predictor of total grammar development when compared to MSL-w. Alcock et al. (2015) suggest that typologically diverse languages should be examined to determine whether counting words or morphemes would be preferable.

6.4. An overlap between lexical and grammar development

Findings in this study showed that vocabulary size had a significant correlation ($r = 0.22$, $p < 0.05$) with combining words, indicating that children with a larger vocabulary tended to be more proficient in combining words effectively than those with smaller vocabularies. Though there was variability amongst the children, the findings are supported by studies showing that a correlation exists between vocabulary size and the emergence of word combinations (Fenson et al., 1994; Paul & Norbury, 2012; Stolt et al., 2009). However, combining words has an even stronger relation with overall grammar development ($r = 0.62$, $p < 0.001$) than with vocabulary size. This means that Xitsonga-speaking children in this study who were more proficient in combining words tended to demonstrate better overall grammar development than their less proficient peers. At the same time, the correlation between vocabulary size and overall grammar development was also significant ($r = 0.42$, $p < 0.001$), although it was weaker than the correlation between combining words and grammar.

MSL showed a relatively weak correlation with combining words ($r = 0.32$, $p < 0.001$) and no correlation with vocabulary size ($r = 0.12$, $p > 0.05$) or sentence complexity ($r = 0.19$, $p > 0.05$). This suggests that sentence length does not strongly influence vocabulary development and that children with longer sentences may not necessarily exhibit more complex syntactic structures. Ndhambi et al. (2022) reporting other findings from this study, noted that, for Xitsonga-speaking children in this study, MSL-m did not demonstrate the ability to predict vocabulary development and sentence complexity. However, it is important to note that variations in the relationships between MSL and other language variables can be anticipated across

languages due to differences in orthographic and morphological complexity (Restrepo et al., 2010). Xitsonga stands apart from the other three languages studied thus far by the Southern African CDI team (Sesotho, Setswana and IsiXhosa) because it uses a combination of conjunctive and disjunctive orthographic systems, despite being primarily disjunctive (Spaull & Pretorius, 2019).

Sentence length and complexity are crucial for comprehending children's language development as they have demonstrated predictive value for reading outcomes and academic achievement (Restrepo et al., 2010). With Xitsonga-speaking children in this study, sentence complexity showed significant correlations with combining words ($r = .67, p < .001$), vocabulary size ($r = .42, p < .001$) and overall grammar development ($r = .93, p < .001$). This suggests that as children develop more advanced grammatical structures and vocabulary, they are likely to produce sentences with greater complexity. It implies a relationship between syntactic and lexical development, where a richer vocabulary contributes to more complex sentence constructions. The strongest correlation observed was between sentence complexity and overall grammar development ($r = .93, p < .001$). This indicates a strong positive relationship between sentence complexity and overall grammar skills. Children who demonstrate more complex sentence structures tend to have better overall grammar development.

Overall grammar development had a strong correlation with combining words ($r = .62, p < .001$), vocabulary size ($r = .42, p < .001$), MSL ($r = .23, p < .05$) and sentence complexity ($r = .93, p < .001$). This finding suggests that as children improve their proficiency in their grammar skills, their combining of words, expansion of vocabulary, and sentence length and complexity also tend to develop. It highlights the interconnected nature of these language components and suggests that they mutually influence one another. Gutiérrez-Clellen et al. (2000) conducted a comprehensive examination of sentence length and grammaticality across various studies. Grammaticality refers to the identification of grammatical errors divided by the number of utterances (Restrepo et al., 2010) or the percentage of utterances that exhibit correct grammar (Fiestas & Peña, 2004). Gutiérrez-Clellen et al. (2000) discovered that

overall sentence length, measured in words, served as a developmental language measure for Spanish speakers. Assessing grammaticality skills is an important clinical tool for identifying language impairment through language sample analyses. Restrepo et al.'s (2010) study demonstrated that combining her measure with sentence length and parent concern enabled the accurate identification of Spanish-speaking children with language impairment, achieving an accuracy rate of over 90%. As this is the first study to document early language development in Xitsonga, the difference between MSL findings and its effect on vocabulary development and sentence complexity with other studies will need to be further investigated.

The findings of this study collectively support the view that vocabulary size, combining words, MSL, sentence complexity, and overall grammar development are interrelated aspects of language development in Xitsonga-speaking children. They suggest that vocabulary knowledge provides a foundation for syntactic development, and as children acquire more vocabulary, they are better equipped to construct more complex and grammatically accurate sentences. However, it is important to note that these correlations do not imply causation. Further research is needed to explore the underlying mechanisms and developmental trajectories of these language components. Additionally, the specific findings presented here are based on the context of Xitsonga-speaking toddlers aged 16 to 32 months of a relatively small sample, and caution should be exercised when generalising these results to other contexts and dialects.

6.5. Conclusion

In conclusion, the results showing a wide range of vocabulary sizes highlight the individual variability in vocabulary development among Xitsonga-speaking children in this study. The knowledge that these children follow similar developmental trends to other languages can inform the future development of assessment tools and intervention strategies that are culturally and linguistically relevant. Additionally, the observed 'vocabulary spurt' in expressive vocabulary growth around 19 months can

serve as a significant reference point for SLPs during assessments. If a child's vocabulary growth aligns with this pattern it can be considered indicative of typical development. On the contrary, the absence of such a spurt or the presence of atypical patterns may suggest the need for further evaluation and targeted intervention.

The prevalence of common nouns in Xitsonga-speaking children's early vocabulary, even with a limited vocabulary size, highlights the significance of nouns in language acquisition. The acquisition and production of function words lagged behind nouns and predicates in the developmental trajectory of these children. It was noted that the rate of noun acquisition slowed down after the initial stage, while the growth of predicates and function words remained relatively fast. Even though this differential developmental trajectory highlights the robustness of the noun bias, it also calls attention to the distinct pattern of word category acquisition. Further investigations with larger samples are needed to better understand noun bias and acquisition of verbs in Xitsonga-speaking children. The same is true for vocabulary composition of the function word category in Xitsonga. This observation raises questions about the factors influencing the developmental patterns of word categories. While this study provides strong evidence for the existence of a noun bias in Xitsonga-speaking children, it is essential to consider methodological factors and the influence of cultural and linguistic characteristics. The use of a reliable assessment tool like the MB-CDI enhances the validity and comparability of results. It is worth noting that other studies, such as previous research conducted in Estonian and Finnish contexts, suggest that the noun bias is not solely dependent on morphological richness, but is influenced by various linguistic and cultural factors.

By recognising the individual variability, considering developmental trends, and identifying vocabulary spurts, SLPs can gain valuable insights into Xitsonga-speaking children's vocabulary development, allowing them to provide appropriate assessment and intervention. These results underline the importance of considering multiple factors, including environmental influences, when studying vocabulary development. While individual characteristics, such as sex, may have limited impact, contextual factors, such as geographic area, can significantly shape vocabulary

acquisition. It is also important to recognise individual variability in the acquisition of morphosyntactic features among Xitsonga-speaking children. This emphasises the need for comprehensive assessments that account for this variability and provide personalised intervention based on individual needs.

Xitsonga-speaking children in this study showed a later development of verb affixes, such as past tense and possessive markers, compared to English-speaking and other African indigenous language-speaking children. This highlights that SLPs might need to exercise caution and consider additional support when assessing and providing intervention to facilitate the acquisition of Xitsonga grammatical features. The acquisition of tense markers, subject markers, and object agreement markers followed a gradual developmental pattern, presenting challenges for children in this study. Further research is required to gain a better understanding of the development of copula verbs in Xitsonga and its relation to syntax and semantics. Additionally, the potential impact of phonological errors in the omission of initial morphemes on the meaning of utterances should be considered by SLPs and further research should be conducted.

The comparative analysis of vocabulary size, combining words, MSL, sentence complexity, and overall grammar development provides insights into their interrelationships. The strong correlations observed between sentence complexity and overall grammar development demonstrate the potential of assessing sentence complexity as a clinical tool. SLPs can use language sample analyses to assess grammaticality skills and identify language impairment accurately. These findings also underscore the need to consider language-specific factors, such as orthographic and morphological complexity, when assessing and intervening in language development. This study contributes to the understanding of early language development in Xitsonga-speaking children. It emphasises the need for further investigation into the differences observed in MSL and its impact on vocabulary development and sentence complexity compared to other studies. Additionally, future research should explore the underlying mechanisms and developmental

trajectories of vocabulary size, combining words, MSL, sentence complexity, and overall grammar development in diverse populations and language contexts.

The adaptation of the Xitsonga MB-CDI and the findings of this research study hold significant novelty and importance. The study not only enhances the reliability and validity of the Xitsonga MB-CDI as an assessment tool but also contributes to its applicability for further research and norming studies. By adapting the MB-CDI for Xitsonga-speaking children, the research provides a valuable resource for assessing language development in this specific linguistic and cultural context. The use of the Xitsonga MB-CDI in this study expands its reach and demonstrates its effectiveness in capturing important aspects of early language development. The findings obtained through this adapted tool add to the body of knowledge on language acquisition and provide insights into the unique patterns and characteristics of Xitsonga-speaking children's language development. This not only benefits clinicians working with Xitsonga-speaking children but also contributes to a broader understanding of language acquisition across diverse linguistic backgrounds.

Furthermore, the reliability and validity of the Xitsonga MB-CDI establish its suitability for norming studies. The MB-CDI has been extensively utilised in many languages and cultural contexts, making it a widely recognised and accepted tool in the field of language assessment and research. By employing this tool in the study of Xitsonga-speaking children, the researcher has expanded the scope of norming studies and provided a foundation for future investigations in this specific language group. The use of a reliable and valid assessment tool, such as the Xitsonga MB-CDI, is crucial for conducting comprehensive research on language development. It ensures that the data collected are accurate, consistent, and representative of the target population. The adaptation of the Xitsonga MB-CDI and the subsequent findings not only validate its applicability but also pave the way for future research in the field of Xitsonga language development.

Overall, this study was a response to the importance of investigating the emergence of early lexical comprehension and production, as emphasised by Kunene and Ahmed (2016). It contributes to the current understanding of language

development and plays a vital role in identifying children who may be experiencing difficulties in language acquisition. The findings of this research are particularly valuable in the context of South Africa, a multilingual and multicultural country, where SLPs face challenges in differentiating between language differences influenced by environmental context and language impairments. The study further acknowledges the significance of contextual relevance and responsiveness in language assessment and intervention, as emphasised by de Abreu et al. (2013), Hernández et al. (2020), Khoza-Shangase and Mophosho (2018), Mdlalo et al. (2016), and Pascoe et al. (2018). It directly addresses these concerns by focusing on the language development of Xitsonga-speaking children in South Africa. By adapting the Xitsonga MB-CDI and conducting a comprehensive analysis of early language acquisition patterns in this specific linguistic and cultural context, the study provides SLPs with valuable insights to better understand and support language development in Xitsonga-speaking children.

The study contributes to the growing body of knowledge on language development in South Africa and addresses the specific challenges faced by SLPs in accurately identifying and supporting children with language difficulties. The adaptation of the Xitsonga MB-CDI provides a reliable and valid tool for assessing language development, while the findings shed light on the unique patterns and characteristics of language acquisition in this specific linguistic context. The research study serves as a foundation for developing culturally sensitive assessment protocols and intervention strategies that consider the unique linguistic and cultural context of Xitsonga-speaking children.

CHAPTER 7: CONCLUSION

“Ku dya ngopfu a hi ku hlula ndlala.”

[To eat more does not defeat hunger]

-A Tsonga idiom

The idiom reflects the ongoing need for further exploration and research in early language development of Xitsonga. This preliminary study aimed to investigate the patterns of early lexical development and the emergence of grammar in Xitsonga-speaking children aged 16 and 32 months. This chapter concludes the thesis by summarising the key contributions, clinical implications, limitations and future recommendations.

7.1. Summary of the main findings

The early acquisition of Xitsonga, an official but minority language in South Africa, was investigated in this study. There are limited resources in terms of books, language assessment tools and even human resources in the form of experts in Xitsonga psycholinguistics, SLPs and academics in the field of child language development. Thus, to the researcher's knowledge, this was the first project to investigate children's acquisition of the language systematically. As such, the process of cross-cultural adaptation of the MB-CDI was crucial. The role of the experts, parents or caregivers with experience in child language yielded valuable information that contributed to the adaptation process that would not have been achieved by translations alone. The focus group sessions created opportunities for first language speakers of Xitsonga to share their expertise in the language and to learn from the experiences of parents/caregivers with children between the ages of 16 to 36 months. The perceptions of the focus group participants on language development and the language assessment tools helped prepare the researcher and the fieldworkers to communicate effectively and efficiently with participants from different contexts in

this study. In addition, it assisted the researcher in understanding the various transitions of Xitsonga has gone through over time and the significance of language revitalisation for diminishing languages.

In cross-cultural studies, it is crucial to understand the core values of the communities investigated and gain the trust of the leaders and participants. The involvement of fieldworkers from the local communities allowed access to the participants and ensured their willingness to participate. The MB-CDIs rely on parent knowledge of their child's current and emerging language and communication skills rather than on long-term memory of the child's behaviour. In this study, some caregivers compared their children's language development with their peers. This might have created some form of bias if the peers were developmentally delayed or "fast talkers". Parental response biases may present differently in populations with diverse language, socioeconomic, and cultural backgrounds and across different inventories.

Early expressive vocabulary often consists primarily of nouns, which is true for many of the languages that have been investigated in the literature. Xitsonga's lexical and grammatical development followed similar trends to these other languages. It was also noted that there was variability in the development of NC morphology in Xitsonga-speaking children between 16 and 32 months. Common nouns developed earlier than verbs and had a significant correlation with age. Xitsonga grammar is complex, and there is little literature on its acquisition. The findings of this study were compared to other languages from similar linguistic families, such as isiZulu, Setswana and Sesotho. Present tense morphology is acquired earlier than past tense morphology. Though Xitsonga-speaking children in this study did not show errors in using agreement markers, the acquisition of SM agreement was delayed whether the subject was present or omitted. Some omissions of the agreement markers might be due to phonological development. Thus, more research is needed on the acquisition of phonology in Xitsonga.

In this study, age was a good predictor of early lexical and grammatical development. Xitsonga has similar trends and variability with other languages, with

sex not a strong predictor of language development. However, the geographic area was a stronger predictor of vocabulary development than of grammar. It is worth noting that the acquisition of tense and agreement markers on verbs, as highlighted by Alcock and Alibhai (2013), has been a subject of extensive debate within the field of language acquisition. The findings of this study contribute to this ongoing discussion by demonstrating the presence of variabilities in the acquisition of verb morphologies, even in languages that exhibit rich and complex morphological structures. These findings challenge the notion that the acquisition of verb morphologies follows a uniform pattern across languages and emphasise the importance of considering language-specific factors in understanding the development of tense and agreement markers.

The study investigated the relationships between vocabulary size, combining words, MSL, sentence complexity, and overall grammar development in Xitsonga-speaking children. The findings demonstrate that vocabulary size and combining words are positively correlated, suggesting that children with larger vocabularies are more proficient in combining words effectively. MSL showed limited correlations with other language variables, while sentence complexity emerged as a strong predictor of overall grammar development. Overall grammar development was strongly correlated with all the other language components, indicating their interconnected nature. However, the specific findings should be interpreted within the context of Xitsonga-speaking toddlers aged 16 to 32 months. Further research is needed to explore these relationships in different contexts and dialects.

7.2. Implications of the findings

In this section, the researcher discusses the study's potential impact on guidelines for working with diverse populations, on training curricula, parent reports, and the future development of assessment tools. Here, she aims to provide insights into the practical relevance of the study and how it can inform clinical practice and future research. Although this study is considered preliminary, its significance lies in

the advancement of assessment tools and its potential influence on the development of guidelines and curricula for working with linguistically and culturally diverse children, particularly within the South African context. While caution should be exercised in generalising the findings to a larger population, this research represents a significant stride towards addressing the needs of diverse populations and informing future practices in the SLP profession and other areas, such as psycholinguistics.

The significant association between geographic location and vocabulary development indicates that the linguistic context and exposure to language resources can influence language skills in Xitsonga-speaking children. When conducting assessments, it is important to consider the geographic location of the child and their access to a language-rich environment. SLPs should be mindful of potential variations in vocabulary skills based on the different linguistic contexts, particularly between rural and semi-rural areas. It is essential to recognise the individual variability observed in vocabulary development within the studied age range. This underlines the need to consider factors beyond age alone when evaluating language skills. It is thus important that the language environment is established when obtaining a case history of a child.

It has been suggested in this study as well as many others that the context plays a role in early child language development. Children in rich language environments tend to have higher vocabulary scores. However, a rich language environment does not necessarily mean a higher SES. Southwood et al. (2021) noted in their South African study that SES has no significant correlation with vocabulary development. Another study by Rowe (2012) found that parenting behaviours, such as responsiveness and cognitive stimulation, were stronger predictors of children's language development than SES. The study found that children who received high levels of cognitive stimulation from their parents had better language development, regardless of their family's SES.

Given the delayed acquisition of verb affixes, such as tense and agreement markers, in Xitsonga-speaking children compared to English-speaking and other

African indigenous language-speaking children, it is important to include a thorough assessment of verb morphology in the evaluation process. The Language Assessment, Remediation, and Screening Procedure (LARSP, Crystal, 1979) framework provides a systematic way to analyse and describe an individual's grammatical abilities based on the stages of language development. The LARSP considers the grammatical structures that typically develop in a specific order and provides a detailed analysis of an individual's language skills. It evaluates language abilities by analysing language samples and categorising the observed grammatical structures into different stages or levels. Each level represents a range of grammatical complexity, and by identifying the highest level achieved by an individual, clinicians can assess their language skills and plan appropriate intervention strategies (Crystal et al., 1989). Table 48 presents initial assessment domains for Xitsonga-speaking children, based on a LARSP-type format, which potentially could be adapted for other languages with a similarly rich morphology to Xitsonga. More research and consultation are needed to qualify these suggestions.

Table 48: Preliminary assessment domains for production of morphosyntactic affixes in Xitsonga-speaking children

Instruction to the SLP: Tick “yes” if the child is using this affix always or sometimes or “no” if not yet using the affix				
Expected age of emergence	Tense aspect	Example	Yes	No
16-18 months	Present tense	-a : “ <i>famba</i> ” [go]		
17-21 months	Past tense	-ile : “ <i>fambile</i> ” [went]		
22-25 months	Present continuous tense	-isa : “ <i>fambisa</i> ” [make it go]		
25-30 months	Future tense	-ta- : “ <i>ndzi ta famba</i> ” [I will go]		
Expected age of emergence	Agreement markers	Example	Yes	No
17-18 months No data	Subject marker 1 st person present/ past tense	-ndza- : “ <i>ndza famba</i> ” [I am going] -ndzi- : “ <i>ndzi fambile</i> ” [I am not going]		
23-24 months	Demonstrative	-dya : “ <i>dya famba</i> ” [a big thing is going]		
25-26 months	Negative command	-i- : “ <i>a ndzi fambi</i> ” [I am not going]		
30-32 months	Object marker	-ta- : “ <i>ta famba</i> ” [they are going]		

Table 48 provides information on the expected age of emergence for certain grammatical features in Xitsonga-speaking children. Xitsonga has more than 16 verb morphology affixes. However, not all were investigated in this study due to the limitation of the tool used. The table above is a preliminary design for SLPs to assess whether a child is using specific affixes or markers at different stages of language development. Grammar was found to be the strongest predictor of sentence complexity in this study. As such, this information can provide valuable information on the diagnosis of possible delay in emergence of complex sentences. It could serve as a guideline for SLPs to assess a child’s acquisition of specific grammatical features in Xitsonga. It can also be adapted for other languages with similar rich morphology to facilitate language assessment and intervention.

Due to variations in language and culture, a simple questionnaire translation may result in misinterpretation. Cross-cultural adaptation and validation are required, in addition to translation, when using questionnaires established in different nations and languages. Adapting a tool to suit local contexts and languages is a crucial step towards ensuring effective and culturally appropriate service delivery. However, the lack of baseline measures to assess early lexical and grammatical development of Xitsonga-speaking children was challenging for the current research. Though there are several guidelines written on the adaptation of assessments tools in diverse contexts (Dowling & Whitelaw, 2018; Pascoe & McLeod, 2016; Ronski et al., 2018), nothing was available for Xitsonga. There is limited literature on Xitsonga language development and there are no language development norms for Xitsonga-speaking children. This is a challenge not only with assessment and intervention of Xitsonga-speaking children with speech and language delays or disorders, but is also a problem when teaching and training the professionals who will be providing services to these children. There are biases in the development of assessment tools and even in the curricula, especially in marginalised languages such as Xitsonga.

The Health Professions Council of South Africa (HPCSA) provides guidelines on developing culturally and linguistically appropriate tools. The guidelines recognise the importance of developing assessment tools, conducting research and developing curricula that align with the diverse cultural and linguistic South African context (Pascoe et al., 2018). The theoretical framework that underpinned this study could be used as a reference for the HPCSA to encourage SLP professionals, researchers, curriculum developers and policy makers to ask relevant questions and choose appropriate paradigms and methodologies. By doing so, they could create projects that are culturally and linguistically responsive to the context. It could play a vital role in defining and operationalising linguistic and culturally relevant key concepts and constructs, thereby shaping the paradigms. The framework for an adaptation of a culturally and linguistic responsive language assessment tool is discussed in Section 2.2. However, it is important that the professionals who will be providing services to these children (and those who will be training these professionals) and conducting

research in this field are given guided training. Figure 42 illustrates how the framework could be adapted in SLP curriculum development.

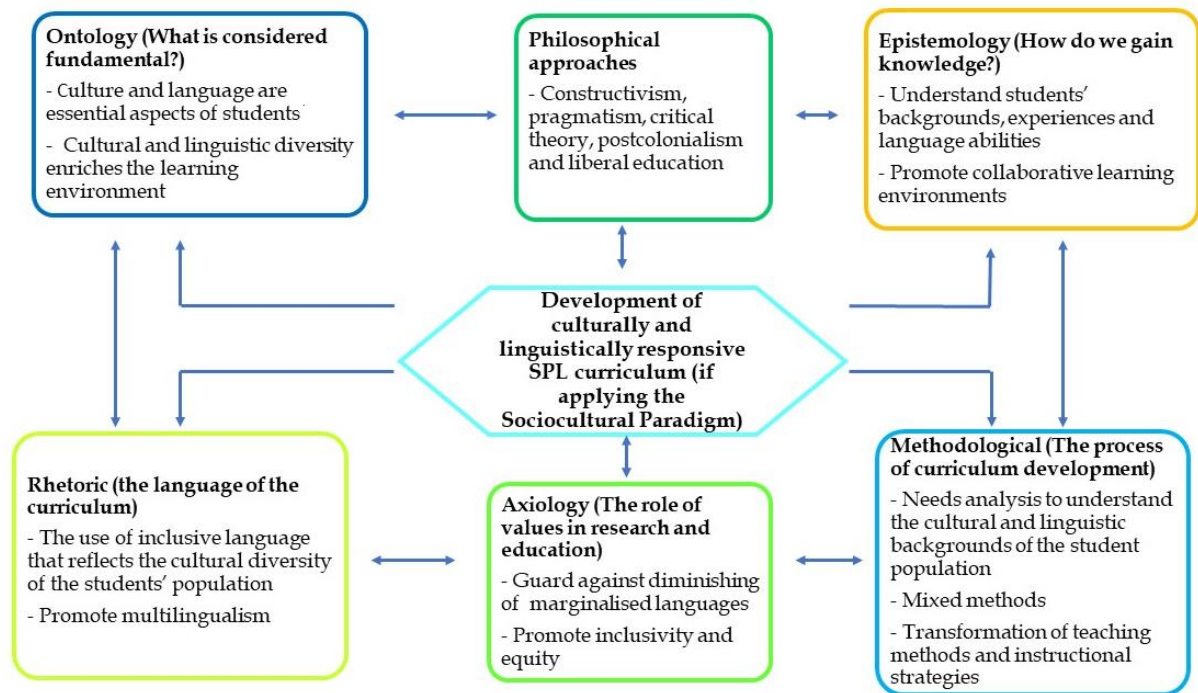


Figure 42: Framework for the development of a linguistically and culturally responsive SLP curriculum (adapted from Kivunja, 2018)

According to the framework, the philosophical approach of the curriculum must be practical, equipping students with the necessary skills to cater to the diverse needs of individuals with communication disorders. Drawing from the principles of pragmatism, it needs to focus on real-life scenarios, case studies, and evidence-based interventions that promote cultural sensitivity in practice (Walker, 2022). It should recognise that students actively construct knowledge based on their experiences. To develop cultural competence, the curriculum should encourage students to engage with diverse cultural communities and learn from their perspectives. According to Pillay and Kathard (2015), imperialism, colonialism, and apartheid have led to many professions primarily catering to the needs of White South Africans, while facing significant challenges in adequately serving the majority of Black South Africans. Thus, the curriculum should incorporate diverse cultural practices and perspectives while acknowledging the historical impact of colonisation. It should embrace diverse

communication styles and language preferences. With these approaches, the framework should be able to guide curriculum development that will be responsive to the paradigms outlined in Figure 42. SLP professionals and researchers could use this as a blueprint to guide their adaptation of speech and language assessment tools in a linguistically and culturally diverse context.

The guidelines further suggest that assessment tools should be developed using a collaborative approach that involves experts from different fields and that takes into account the views and perspectives of the target population. They also recommend that assessment tools should be pilot tested and evaluated for cultural and linguistic sensitivity and validity (Pascoe et al., 2018). This study has shown that collaboration with other language experts and caregivers could yield better results when developing tools. Section 2.1.3.5.3 fully discusses the adaptation process of this study. In summary, it highlights the following:

- The selection of translators was crucial as Xitsonga has different dialects, which might have resulted in biases or false negatives if a different dialect was used for the items.
- Consultations with Xitsonga academics and researchers yielded valuable insights, guidance and sensitisation regarding the use of loan words while safeguarding marginalised languages from further diminishment.
- Engaging fieldworkers from local communities ensured convenient accessibility and instilled a sense of meaningful contribution to their communities.
- Workshops with international researchers specialising in child language development and the adaptation and validation of the MB-CDI offered valuable guidance, enabling the team to make informed decisions, minimise errors, and achieve evidence-based findings efficiently, especially in resource-limited situations.
- Working in a team with multiple languages being investigated also brought about robust discussions and experiences that were diverse and contributed significantly to the project.

The importance of these meetings and workshops cannot be overstated. The study strongly recommends that anyone involved in adapting an assessment tool should engage various stakeholders in such collaborative efforts. These interactions offer numerous valuable lessons and evidence-based practices that can significantly enhance the adaptation process.

There are further implications specific to intervention and the SLP profession. English is a primarily analytic, stress-timed language with a complex orthography. It differs from the Southern African indigenous languages such as Xitsonga because they are agglutinating, syllabic languages with transparent orthography. They have a rich and complicated morphology in which noun (N) and verb (V) roots are modified with prefixes, infixes, and suffixes. The verbal aspects of a sentence are particularly complex, as they distinguish between a subject (SUBJ) and object (OBJ) noun classes (NCs) but do so in slightly different ways across language family clusters. The rich morphology, complicated syntax, and tonomorphology of Xitsonga are often the focus of language studies, rather than early development. As a result, the intervention strategies employed for Xitsonga-speaking children diagnosed with language disorders or delays will be different.

SLPs should always ensure that identification of children with difficulties is followed by intervention. Thus, understanding the typical language milestones for Xitsonga-speaking children helps set appropriate intervention goals and targets based on their age and stage of language development. This study shows the importance of considering a child's cultural and linguistic environment and encourages SLPs to use strategies that align with the child's daily experiences and interactions, thus enhancing the relevance and effectiveness of interventions. Emphasising the role of social interactions and cultural practices in language learning guides SLPs to incorporate culturally relevant materials and promote communication in contexts meaningful to the child. Analysing language use in social activities and cultural contexts will further enable SLPs to implement strategies that align with the child's cultural background and experiences.

There is a great need for intervention programmes for children in South Africa, especially in poorly resourced areas and minority languages. Thus, the Xitsonga MB-CDI provides SLPs (even those who are not Xitsonga speakers) with a guide to identify typical and atypical language development in this population. This will improve diagnosis in Xitsonga-speaking children in those contexts lacking SLPs competent in Xitsonga, and with limited resources to access services. As assessment and intervention tools continue to be enhanced, there is a simultaneous requirement to increase the number of competent SLPs proficient in Xitsonga and serving rural communities. Involving local fieldworkers inadvertently promoted the profession in these regions, resulting in two learners from those villages being accepted and enrolled in universities.

7.3. Limitations of the study

This research project was a preliminary study of early lexical and grammatical development in Xitsonga-speaking children and has several limitations. This section aims to discuss the limitations encountered during the research and provide recommendations for future studies.

Limited literature on early language development in Xitsonga: There is limited literature on Xitsonga grammar, and the segmental and prosodic phonology of the language. The lack of research in Xitsonga segmental phonology is a knowledge gap that needs further investigation to understand typical and atypical phonological and language development. The rich morphology, complicated syntax, and tonomorphology of Xitsonga are often the focus of studies in adult language rather than early language development. Having a limited body of Xitsonga literature on which to draw made many aspects of this research challenging as there were no normative data, assessment tools or previous studies with the same population. This study could be a gateway to encourage scholars to investigate how Xitsonga-speaking children learn the rules of the complex morphology, such as NC, agreement markers

and whether these children have similar errors to English, such as overgeneralisation of verb forms.

Methodological limitations: The study used convenience sampling, snowball sampling, and purposive sampling methods, leading to potential selection biases and limited generalisability of the findings to the broader population of Vatsonga in South Africa. The study followed a cross-sectional methodology, meaning that observations of different children at each age interval were used to construct the developmental trajectory. This design has inherent limitations as it does not follow the same cohort of children over time, which may result in limited insights into individual developmental trajectories. A longitudinal approach would have provided a more comprehensive understanding of how individual children's vocabularies develop over time. The distribution of participants across age groups, contexts (rural and semi-urban), and sexes was unequal, which may have influenced the balance of the sample and potentially impacted the generalisability of the findings within specific subgroups. There is an increased number of multilingualism, especially in urban areas. This was a limitation in the recruitment of monolingual Xitsonga-speaking children.

Cultural influence: Another aspect that merits attention is the expertise and cultural influences that could have affected the study. The linguistic differences present among the various dialects of Xitsonga necessitate thorough review by a panel of experts. Additionally, the dynamics within focus group discussions might have been influenced by cultural norms and hierarchical structures, potentially impacting the contributions made by individual participants. Furthermore, the level of expertise held by translators and child language development experts may have varied, which could have had implications for the quality of the translation and validation processes. While the study acknowledges the presence of individual differences in vocabulary development, it did not explore potential sources of variation, such as caregiver-child interactions, exposure to language, or cultural influences. Understanding these factors could provide a more comprehensive picture of the variability observed in vocabulary development.

Incentives, such as food vouchers, were offered to participants, which could have influenced their willingness to take part, possibly attracting individuals motivated by compensation rather than genuine interest in the study. Furthermore, the COVID-19 pandemic brought about significant changes to the study's data collection methods, necessitating a shift from in-person to online surveys. This transition might have influenced participants' responses or the quality of the data collected, introducing potential inconsistencies between the two data collection approaches.

Reliability and validity: An important consideration in any research involving language assessment tools is the reliability and standardisation of the tools. This study faced limitations in this regard due to the lack of standardised language assessment tools available for Xitsonga. As a result, the assessment of the reliability of the Xitsonga MB-CDI was restricted. The translation of the English MB-CDI into Xitsonga was challenging, particularly for words that lacked direct equivalence in the language. This, along with the potential inclusion of culturally irrelevant or unfamiliar items in the assessment tool, could have introduced biases that affected the results. In addition, the adaptation of the grammar section of the Xitsonga MB-CDI relied on caregiver reports and suggestions from previous studies, potentially overlooking unique aspects of Xitsonga grammar. Caregiver biases and variability in studies from different contexts could impact the accuracy of results. Collaboration with experts in African languages, Xitsonga, cognitive psychologists, psycholinguists, and speech-language pathologists is indispensable in the development of reliable language assessment tools.

Validation of Xitsonga MB-CDI: Some of the findings, such as geographic area not having a significant correlation with grammar development, require further investigation. Further studies investigating individual and sociocultural factors should be conducted to understand these differences better. The MB-CDI has not yet been validated with monolingual Xitsonga-speaking children. Validation studies should be done for the MB-CDI to ensure it is a reliable tool for norming and future

use in other clinical and research contexts. The validation will also assist in knowing how reliable the parent report is in the South African context.

7.4. Future research

Understanding of Xitsonga-speaking children's language development has been enriched by the insights obtained through this research. The findings shed light on aspects of early language acquisition, ranging from vocabulary growth to syntactic development. While this study marks a significant step in comprehending language development in Xitsonga-speaking children, there remain numerous unexplored avenues and unanswered questions requiring further investigation.

7.4.1. Investigation of other language domains

The MB-CDI toddler form only assesses receptive and expressive language skills. It does not provide a comprehensive assessment of a child's language abilities. For example, it does not assess a child's pragmatic language skills (i.e., the ability to use language appropriately in social situations, which is very important in Vatsonga culture) or their phonological awareness (the ability to recognise and manipulate the sounds of language). Furthermore, Xitsonga has a two-way tonal contrast of high (H) tone and toneless (Ø). Its TBU is the syllable. The tone is used both for lexical and grammatical distinctions. Thus, there is a need for further research and the development of new tests (as opposed to adaptations) that will assess these complexities.

7.4.2. Language development norms

It is challenging to identify language disorders in children without a relevant tool, particularly if the tool is without developmental norms. Without a baseline for typical language development, it may be harder to determine whether a child's language abilities are delayed or disordered. It is therefore crucial to prioritise a project aimed at establishing Xitsonga language development norms. Norming

studies will assist in establishing appropriate age-related benchmarks, allowing for accurate identification of language delays and impairments in Xitsonga-speaking children.

7.4.3. Phonology development in Xitsonga-speaking children

The predominant early words used by Xitsonga-speaking children in this study were those beginning with the /m/, /w/, and /b/ phonemes, as well as initial syllables containing /o/ or /u/ vowels. These preliminary findings suggest further potential lines of enquiry into the patterns of phonological development in Xitsonga.

7.4.4. Development of Xitsonga assessment tools and intervention strategies

Based on the findings and limitations of this study, there is a critical need for the development of culturally and linguistically appropriate assessment tools and intervention strategies for the population in question. Developing a comprehensive and culturally responsive assessment tool for Xitsonga-speaking children is of utmost importance. This tool should account for the unique linguistic and cultural characteristics of Xitsonga, including its complex verbal morphology and word category acquisition patterns.

7.4.5. Increase in SLPs involved in Xitsonga child language research

Efforts should be made to increase the involvement of SLPs in Xitsonga child language research. SLPs play a crucial role in the assessment, diagnosis, and intervention of language disorders and delays in children. Their expertise in language development, communication disorders, and therapeutic interventions positions them as valuable contributors to the field of child language research. SLPs should receive specialised training and professional development in Xitsonga language and culture. This includes understanding the phonological, morphological, and syntactic features of Xitsonga, as well as the cultural differences that may impact language use and communication. Ongoing training and workshops can equip SLPs with the

knowledge and skills needed to provide high-quality services to Xitsonga-speaking children. To gain a deeper understanding of the developmental trajectories of Xitsonga-speaking children's language skills, longitudinal language development studies are recommended. These studies can track language development over an extended period, observing how vocabulary size, word combinations, and syntactic structures evolve as children age.

7.5. Conclusion

In conclusion, this research has provided valuable insights into the early language development of Xitsonga-speaking children. Xitsonga follows similar trajectories for early lexical and grammatical development to other languages. However, there is some variability with the types of words learned earlier, the development patterns and the correlations with different language domains. This observation underscores the need for further research to understand the patterns of early language development in Xitsonga. Moreover, the study emphasises the urgency of establishing Xitsonga language development norms and creating culturally sensitive assessment tools and intervention strategies. By recognising the individual variability, considering developmental trends, and identifying vocabulary compositions and grammatical patterns of development, SLPs can better assess and support language development in Xitsonga-speaking children. However, the study also acknowledges its limitations and highlights the importance of involving more SLPs in child language research to further enrich the understanding of language acquisition in diverse linguistic contexts. Overall, this research contributes to the broader field of language development and lays the groundwork for future investigations that can ultimately benefit Xitsonga-speaking children and their language development outcomes.

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APPENDIX A1: Permission CDI Board

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RE: Application to adapt the MB-CDI for Xitsonga

17 August, 2017 22:15

From: Philip Dale

To: Mikateko Ndhambi

Cc: Larry Fenson marchman@stanford.edu

Dear Mikateko Ndhambi,

On behalf of the CDI Advisory Board, I am pleased to grant you and your team full, Level I authorization for the development of adaptations of the CDI:WG and CDI:WS, including short forms if feasible, for Xitsonga. You have assembled an excellent team, and I appreciate the consideration you have given my suggestions.

Please inform us how you would like contact information to be listed on our website.

With best wishes for this important project.

Philip S. Dale, Professor Emeritus
Speech & Hearing Sciences
University of New Mexico

Appendix A2: Ethical Clearances from UCT



UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee



Room ES3-46 Old Main Building
Groote Schuur Hospital
Observatory 792
Telephone (021) 406 649
Email: pumvab.arietien@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/form

21 May 2019

HREC REF: 166/2019

A/Prof M Pascoe
Communications Sciences & Disorders
Health & Rehab Sciences
F-45, OMB

Dear A/Prof Pascoe

PROJECT TITLE: EARLY LEXICAL AND GRAMMATICAL DEVELOPMENT OF XITSONGA SPOKEN IN GIYANI, LIMPOPO USING THE ADAPTED XITSONGA MACARTHUR-BATES COMMUNICATIVE DEVELOPMENT INVENTORY: A PRELIMINARY STUDY (PHD CANDIDATE- MS M NDHAMBI)

Thank you for your response letter, addressing the issues raised by the Human Research Ethics Committee (HREC).

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year until the 30 May 2020.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.

(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

We acknowledge that the student: Ms Mikateko Ndhambi will also be involved in this study.

Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely


PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE

Appendix A3: Permission from Limpopo Department of Health



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

Ref: LP_201905_015

Enquires : Dr Ramalivhana NJ
Tel : 015-2936206
Email : Naledzani.ramalivhana@dhsd.limpopo.gov.za

MIKATEKO NDHAMB
UCT

PERMISSION TO CONDUCT RESEARCH IN DEPARTMENTAL FACILITIES

Your Study Topic as indicated below;

Early lexical and grammatical development of xitsonga spoken in Giyani, Limpopo using the adapted xitsonga macarthur-bates communicative development inventory: a preliminary study

1. Permission to conduct research study as per your research proposal is hereby Granted.
2. Kindly note the following:
 - a. Present this letter of permission to the institution supervisor/s a week before the study is conducted.
 - b. In the course of your study, there should be no action that disrupts the routine services, or incur any cost on the Department.
 - c. After completion of study, it is mandatory that the findings should be submitted to the Department to serve as a resource.
 - d. The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.
 - e. The approval is only valid for a 1-year period.
 - f. If the proposal has been amended, a new approval should be sought from the Department of Health
 - g. Kindly note that, the Department can withdraw the approval at any time.

Your cooperation will be highly appreciated


Head of Department
Dr Mhlongo TF


Date

Private Bag X9302 Polokwane
Fidel Castro Ruz House, 18 College Street, Polokwane 0700. Tel: 015 293 6000/12. Fax: 015 293 6211.
Website: <http://www.limpopo.gov.za>

The heartland of Southern Africa – development is about people

APPENDIX B1: INFORMATION SHEET

Title of Study: Early Lexical and Grammatical Development of Xitsonga Spoken in Giyani using the MacArthur –Bates Communicative Inventories: a Preliminary Study

What is the study about?

Researchers are trying to discover which Xitsonga words and gestures young children understand and say. We are doing this to adapt an English language form known as the MacArthur-Bates-Communicative Development Inventory (MB-CDI) for toddlers. It will also assist us in identifying the type of early words and sentences in Xitsonga language development. Though the adaptation has been done in other African languages, this will be the first in the Xitsonga and will greatly impact our knowledge of early word and grammatical learning. It will also enable professionals to pick up on problems more easily in future by comparing a child's progress against national averages. We are asking caregivers of Xitsonga-speaking children aged 16 to 30 months to tell us about the words and sentences their children understand and say, as they know far more about their children than any test could ever reveal.

What does taking part in the study involve?

Caregivers who are interested in taking part in the study will be asked to fill in a consent form. Caregivers of children whose speech will be recorded, will fill in a separate form to say that they agree to take part in the study. After signing this form, the child must also accept to participate.

What is the importance of the study?

There are currently no culturally relevant speech and language assessment tools for the Xitsonga language that can be used to assess children. Therefore the purpose of this study is to develop an assessment tool that is culturally relevant to Xitsonga-speaking children that speech language pathologists like myself can use in their work.

This tool will help speech language pathologists identify any language delays earlier and help the children earlier.

What will happen if I take part?

If you decide that you want to get involved, we ask you to do two things. First we ask you to fill in our consent form. This is a form that says that you as a parent/guardian agree to take part in the study.

Second, we ask you to fill in a Family Questionnaire. This asks questions about your education, occupation and home circumstances, as well as about any difficulties your child may have experienced. We are asking these questions because researchers are interested in how different circumstances might affect language learning. If you do not wish to answer any of these questions, you can simply leave the question blank. We will never reveal your or your child's name or identify information in any publications that we produce and all our data are stored securely.

Do I have to take part?

No! You are free to say no at any time. If you change your mind during the study, or at any time afterwards, just let us know. You are free to withdraw at any time without having to give us any explanation. In addition, there is a procedure that you can access if you have a complaint. It is very important to us that you are comfortable with this and that you feel confident filling in the forms. If you have any questions, however trivial, please call us on 012 521 3089 or email mikateko.ndhambi@smu.ac.za. We are also happy to talk you through the checklists on the phone – in this case we will phone you back, so you do not have to pay for the phone call.

What will happen to me or my child after participating in this study?

There are no risks to the children participating in this study. Nothing will happen to you and no one except the researcher will know that you took part in this study. The information you provide will be used to help develop a very useful tool for speech language pathologists' to assess all children who speak Xitsonga in South Africa. This tool will help identify children who need extra help with talking, as this can affect their academic performance. The children will be able to get assistance early if identified early.

□Signature

Ms Mikateko Ndhambi (Researcher)

Tel: 012 521 3089

Email: mikateko.ndhambi@smu.ac.za

Prof Michelle Pascoe (Supervisor)

Tel: 021 406 6043

Email: michelle.pascoe@uct.ac.za

Prof Heather Brookes (Co- Supervisor)

Tel: 021 650 2039

Email: heather.brookes@uct.ac.za

Professor M. Blockman at:

The University of Cape Town, Faculty of Health Sciences Human Research
Ethics committee

Tel: 021 406 6492

Room: E52.24 Old Main Building

APPENDIX B2A: LETTER 1 (ENGLISH)

Letter to Parents/Guardian

Dear Parent/Guardian

My name is Mikateko Ndhambi, I am currently doing my Doctor of Philosophy degree in Speech Language Pathology with the University of Cape Town. As part of the requirement to complete my studies, I am conducting a research supervised by A/Prof Michelle Pascoe and A/Prof Heather Brookes. The title of the study is:

“Early Lexical and Grammatical development of Xitsonga Spoken in Giyani, Limpopo Using the Adapted Xitsonga MacArthur-Bates Communicative Development Inventory (MB-CDI): A Preliminary Study.”

The MB-CDI: “*toddler*” is an assessment tool that has been developed to assess English language development of children who speaks English who are one year and four months (16 months) to two years and six months (30 months) old. The study aims to cross-culturally adapt the MB-CDI as a tool to use in assessing the type of early words and sentence development with Xitsonga-speaking toddlers. I will like to invite you to help me by volunteering to participate. Participants are expected to complete the MB-CDI: “*toddlers*” form. Your information and identities will be protected by using a coding system that will not be directly linked to you for identification. All documents will be stored in a private area with a protected password for access. The study is voluntary and any person can decide to pull out without any penalties or judgement.

Please read the information sheet attached to this letter to help you understand better about what this research is all about. Please feel free to ask me or my supervisor any questions that you may have about this research project.

Or if you have any questions about your rights or welfare as a parent of a participant please contact:

Ms Mikateko Ndhambi (Researcher)

Tel: 012 521 3089

Email: mikateko.ndhambi@smu.ac.za

A/Prof Michelle Pascoe (Supervisor)

Tel: 021 406 6043

Email: michelle.pascoe@uct.ac.za

A/Prof Heather Brookes (Co- Supervisor)

Tel: 021 650 2039

Email: heather.brookes@uct.ac.za

Professor M. Blockman at:

The University of Cape Town, Faculty of Health Sciences Human Research
Ethics committee

Tel: 021 406 6492

Room: E52.24 Old Main Building

NB: please complete and sign consent form on next page

Consent form

Declaration	Yes	No
I have read through the information sheet and understand it's content		
I understand that my consent is required		
I understand that participation is voluntary and I can withhold my consent without any consequences		

Declaration	Yes	No
I understand that I will not be personally identified should this research study be published		
I consent to participating in this research study of my own free will		

Signed: _____/_____/_____

Participant

_____/_____/_____

Researcher

APPENDIX B2B: LETTER 1 (XITSONGA)

PAPILA RO KOMBELA MPFUMELELO EKA VATSWARI KUMBE
VAHLAYISI VA VANA

Eka Vatswari kumbe Vahlayisi va Vana

Vito ra mina hi mina Mikateko Ndhambi, eka nkarhi wa sweswi nile ku yiseni ti dyondzo ta mina emahlweni. Ndzi dyodela vu dokodela byo pfuna vanhu lava tikerika ku vulavula no dya (Speech language pathology) na xikolo xa lehehla xa Cape Town. Ku ni kota ku fikelela emakumu ya ti dyondzo ta mina ndzi fanerile ndzi endla vulavisisi. Valanguteri va mina lava nyikaka swi solo na swi buma bumelo I Prof Michelle Pascoe na Prof Heather Brookes. Nhloko mhaka hile yi ngo:

“Ku kambisisa nkari lowu lulameleke ku va n’wana wa mutsonga a va a kota ku vulavula ririmi ra Xitsonga kahle etikwini ra Giyani exifundzeni xa Limpopo ku ta tirhisiwa buku ya Xitsonga MacArthur-Bates Commmunicative Development inventory (MB-CDI)”

MB-CDI “Toddlers” I fomo leyi yi tsariweke hi ririmi ra xinghezi yi tirhisiwa ku kambela vana va lembe na mune wa ti n’hweti ku fika ka malembe mambirhi na ntsevu wa ti n’hweti. Xikongomelo xa vulavisisi lebyi I ku yisa buku ya MB-CDI eka ririmi ra Xitsonga leswaku yi ta kota ku tirhiseka eku lavisiseni marito ni swi vulwa leswi nwana wa mutsonga a faneleke ku va a swi tiva eka lembe na mune wa ti n’hweti ku fika ka malembe ma mbirhi ni ntsevu wa ti n’hweti..Ndzi tsakela ku mi rhamba leswaku mi ni pfuna hi ku tsakela ka n’wina ,ma pfumeleriwa ku ala loko mi nga swi tsakeli na kona mi nga ti humesa eka vulavisisi lebyi nkarhi un’wana na un’wana.Vu xokoxoko bya n’wina byi ta va byi hlayisekile ,leswi a swi nge yi eka swiya ni moya hambe kuri mapepha hungu ku va ntsena ku endla vulavisisi swi helela kwalaho.

Mi komberiwa ku hlaya mahungu eka papila leri landzelaka leswaku mi ta kota ku twisisa leswaku vulavisisi i bya yini. Ti tweni mi ntsuxekele ku vutisa swi vutiso kumbe mi nga vutisa va languteri va mina ma yilena ni mindzavisiso leyi

Loko miri na swi vutisa tani hi vatswari kumbe va vahlayisi va vana mi nga swi kongomisa eka:

Manana Mikateko Ndhambi (mulavisisi) A/Prof Michelle Pascoe (Mulanguteri)

Foni: 0125213089

Foni: 021 406 6043

Email: mikateko.ndhambi@smu.ac.za

email: michelle.pascoe@smu.ac.za

A/Prof: Heather Brookes (mupfuneti wa mulanguteri)

Foni: 021 650 2039

Email: heather.brookes@uct.ac.za

Mi nga ti hlangani na Prof Marc Blockman Murhangeri wa Faculty of Health science Human research committee loko mi ri na swivilelo mayelana na ti fanelo ta n'wina kumbe n'wana eka vulavisisi lebyi boxiweke laha henhla, eka ti nomboro leti 012 406 6338

NB: Mi komberiwa ku tata fona ka papila leri landzelaka mi tlhela mi sayina

Papila ro kumbela mpfumelelo

Hi mina _____ ndzi nyika pfumelelo wa ku va xiphemu xa vulavisisi lebyi boxiweke laha henhla, Ndzi twisa xikongomelo xa vu lavisisi nakona dzi hlamuseriwile nkoka wa vu lavisisi lebyi.

Ndza swi twisisa leswa ku:

Vulavisisi lebyi byi ni lava leswaku ni va xiphemu xa tlawa wa va vatswari kumbe vahlayisi va vana va n'wani,leswa ku a ndzi sendzisiwi ku nghenelela ka vulavisis lebyi.Ku va xiphumu a ndzi nge kumi hakelo yo karhi kambe ku va ku tsakela ka mina na kona ndzi nga tshika nkarhi wihi kumbe wihi ni nga kumberiwa ku nyika xivangelo xo tshika.vuxokoko hi kwabyu lebyi ni nga ta byi nyika byi ta tshama byi ri xihundla na kona vito ra mina ari nga paluxiwa eka vulavisisi lebyi handlaka loko no nyika pfumelelo.

Pfumelelo	Ina	Ee
Ndzi hlayile ndzi tlela ndzi twisisa mahungu lama nga la ha hehla		
Ndza swi twisisa leswaku pfumelelo wa minw wa lavaka		
Ndza swi twisisa leswaku ku va xiphemu xa vulavisisi leby no ti nyimismwela na kona a kuna hakelo yo karhi leyi ni nga ta yi kuma,ndzi nga tihumesa eka vulavisis lebyi karhi un'wana nan'wana ni nga nyikanga xi vangelo.		
Ndza swi twisisa leswaku vito ra mina a ri nga boxiwi loko vulavisisi lebyi byo tshuka byi hangalasiweli		
Ndzi ti ghenisa eka vulavisisi lebyi hiku swi tsakela nakoan a ndzi sendzisiwanga.		

Sayina:_____/_____/_____
Vangheneleri

Sayina:_____/_____/_____
Mulavisisi

APPENDIX B3: LETTER 2

Letter to Parents/Guardian

Dear Parent/Guardian

My name is Mikateko Ndhambi, I am currently doing my Doctor of Philosophy degree in Speech Language Pathology with the University of Cape Town. As part of the requirement to complete my studies, I am conducting a research supervised by A/Prof Michelle Pascoe and A/Prof Heather Brookes. The title of the study is:

“Early Lexical and Grammatical development of Xitsonga Spoken in Giyani, Limpopo Using the Adapted Xitsonga MacArthur-Bates Communicative Development Inventory (MB-CDI): A Preliminary Study.”

The MB-CDI: “*toddler*” is an assessment tool that has been developed to assess English language development of children who speaks English who are one year and four months (16 months) to two years and six months (30 months) old. The study aims to cross-culturally adapt the MB-CDI as a tool to use in assessing the type of early words and sentence development with Xitsonga-speaking toddlers. I will like to invite your child to help me by volunteering to participate. Children will be audio recorded and later the recording will be transcribed. The information and identities will be protected by using a coding system that will not be directly linked to your child for identification. All documents will be stored in a private area with a protected password for access. The study is voluntary and any person can decide to pull out without any penalties or judgement.

Please read the information sheet attached to this letter to help you understand better about what this research is all about. Please feel free to ask me or my supervisor any questions that you may have about this research project.

Or if you have any questions about your rights or welfare as a parent of a participant please contact:

Ms Mikateko Ndhambi (Researcher)

Tel: 012 521 3089

Email: mikateko.ndhambi@smu.ac.za

A/Prof Michelle Pascoe (Supervisor)

Tel: 021 406 6043

Email: michelle.pascoe@uct.ac.za

A/Prof Heather Brookes (Co- Supervisor)

Tel: 021 650 2039

Email: heather.brookes@uct.ac.za

Professor M. Blockman at:

The University of Cape Town, Faculty of Health Sciences Human Research
Ethics committee

Tel: 021 406 6492

Room: E52.24 Old Main Building

NB: please complete and sign consent form on next page

Consent form

Declaration	Yes	No
I have read through the information sheet and understand it's content		
I understand that my consent is required		

Declaration	Yes	No
I understand that participation is voluntary and I can withhold my consent without any consequences		
I understand that I nor my child will not be personally identified should this research study be published		
I consent to my child participating in this research study of my own free will		

Signed:

_____/_____/_____
Parent's signature Date

Child's name

_____/_____/_____
Researcher Date

Assent



YES



NO

APPENDIX B4: LETTER 3

Letter to Panel /Focus Group

Dear

RE: Research Study Information

My name is Mikateko Ndhambi, I am a Speech-Language Pathologist currently doing my Doctor of Philosophy degree in Speech Language Pathology with the University of Cape Town. As part of the requirement to complete my studies, I am conducting a research supervised by A/Prof Michelle Pascoe and Prof Heather Brookes. The title of the study is:

“Early Lexical and Grammatical development of Xitsonga Spoken in Giyani, Limpopo Using the Adapted Xitsonga MacArthur-Bates Communicative Development Inventory (MB-CDI): A Preliminary Study.”

I am inviting you to participate in the study as part of a focus group that will review the translated tool and give input for the adaptation of the MB-CDI. The MB-CDI: “*toddler*” is an assessment tool that has been developed to assess English language development of children who speaks English who are one year and four months (16 months) to two years and six months (30 months) old. The study aims to cross-culturally adapt the MB-CDI as a tool to use in assessing the type of early words and sentence development with Xitsonga-speaking toddlers.

Please read the information sheet attached to this letter to help you understand better about what this research is all about. Should you have any questions or concerns about the study you may contact the researcher or the supervisor:

Ms Mikateko Ndhambi (Researcher)

A/Prof Michelle Pascoe (Supervisor)

Tel: 012 521 3089

Tel: 021 406 6043

Email: mikateko.ndhambi@smu.ac.za

Email: michelle.pascoe@uct.ac.za

A/Prof Heather Brookes (Co- Supervisor)

Tel: 021 650 2039

Email: heather.brookes@uct.ac.za

Professor M. Blockman at:

The University of Cape Town, Faculty of Health Sciences Human Research Ethics committee

Tel: 021 406 6492

Room: E52.24 Old Main Building

NB: please complete and sign consent form on next page

Consent form

Declaration	Yes	No
I have read through the information sheet and understand it's content		
I understand that my consent is required		
I understand that participation is voluntary and I can withhold my consent without any consequences		
I understand that I will not be personally identified should this research study be published		
I consent to participating in this research study of my own free will		

Signed: _____/_____/_____
Participant

_____/_____/_____
Researcher

APPENDIX B5: LETTER 4

Letter to the Provincial Department of Health and Wealth

Authorisation from institution

Investigator: Mikateko Ndhambi

University of Cape Town

Department of Health and Rehabilitation Sciences

Division of Speech Language Pathology

Supervisor: A/Professor Michelle Pascoe

University of Cape Town

Department of Health and Rehabilitation Sciences

Division of Speech Language Pathology

Title of study: "Early Lexical and Grammatical development of Xitsonga Spoken in Giyani, Limpopo Using the Adapted Xitsonga MacArthur-Bates Communicative Development Inventory (MB-CDI): A Preliminary Study."

My name is Mikateko Ndhambi, currently doing my Doctor of Philosophy degree in Speech Language Pathology with the University of Cape Town. As part of the requirement to complete my studies, I am conducting a research supervised by A/Prof Michelle Pascoe and A/Prof Heather Brookes.

The study aims to cross-culturally adapt the MB-CDI as a tool to use in assessing lexical and grammatical development with Xitsonga-speaking toddlers. The study requires parents/guardian of children between the ages of 16 months and 36 months staying in the Greater Giyani district. Parents will be required to fill in a case history form and complete the MB-CDI reporting on the words their children are

understanding and use. The parents will be recruited from the clinics and health centres in Giyani and the surrounding villages.

There are no risks to the children participating in this study. Nothing will happen to the children and no one except the researcher will know that the participants took part in the study. The information provided be kept confidential and only will be used to help develop a very useful tool for speech language pathologists' to assess all children who speak Xitsonga in South Africa. This tool will help identify children who need extra help with talking, as this can affect their academic performance. The children will be able to get assistance early if identified early.

Should you have any questions or concerns about the study you may contact the researcher or supervisor.

Ms Mikateko Ndhambi (Researcher)	A/Prof Michelle Pascoe (Supervisor)

Tel: 012 521 3089

Tel: 021 406 6043

Email: mikateko.ndhambi@smu.ac.za

Email: michelle.pascoe@uct.ac.za

A/Prof Heather Brookes (Co- Supervisor)

Tel: 021 650 2039

Email: heather.brookes@uct.ac.za

Professor M. Blockman at:

The University of Cape Town, Faculty of Health Sciences Human Research Ethics committee

Tel: 021 406 6492

Room: E52.24 Old Main Building

Declaration	Yes	No
I give consent from the institution allowing the researchers to conduct the above mentioned study at..... (Name of institution).		

Signed: Name_____ Signature_____ / / _____

Designation: _____ / / _____

Researcher

APPENDIX C1: FAMILY BACKGROUND QUESTIONNAIRE

A baby's health and family life can have a big influence on the words and gestures they learn. So we would like to ask a few questions about these. Please feel free to leave out any questions that you don't want to answer.

Please do not write your name or address on any part of this questionnaire so that the information is anonymous and confidential. Please remember to fill in this questionnaire for the same child you are filling in the UK-CDI for.

PRELIMINARY INFORMATION

Date: _____

Your relationship to child (Parents/guardian) _____

Province where you live: _____

City/Town/Village where you live: _____

A. ALL ABOUT YOUR CHILD'S DAY

1. Who looks after your child? Please tell us about everyone who looks after your child for at least half a day in a typical week.

Child's mum	☐	Child's dad	☐	Other carer or carers		☐
2. If you have told us about other carers, are they:						
Family	☐	Childminder	☐	Age of child	Nursery	☐

				minder _____		
3. If other carers, how many hours in total do these other carers look after your child in a typical week?						
1-20 hours	☐	21-35 hours	☐	36+ hours	☐	
4. If other carers are family members please describe their relationship to the child (sister/brother, grandmother/father, aunt/uncle, big mother/father, small mother/father) and who they are and their ages		1. 2. 3. 4. 5.				
5. What is the main language in the child's home? (please specify)						
6. Does your child regularly hear another language or languages at home?	Yes ☐		No ☐			
7. If your child hears additional languages in the home, for how many hours does your child hear this other language in a typical day? (Please specify)						
8. If yes, what language or languages?						
9. Does your child attend a day-care, crèche, play group or preschool?	Yes ☐			No ☐		
10. If yes, what language(s) is/are spoken in the day-care, crèche, play group or preschool?						
11. How many hours a day does your child attend the day-care, crèche play group or preschool?						

B. YOUR CHILD'S HEALTH AND DEVELOPMENT

1. At what week of pregnancy was your child born?	Week 33 or before ☐	Week 34 to 36 ☐	Week 37 or later ☐
2. How much did your child weigh at birth?			

Less than 2.5kg O 2.5kg to O More than O
4.5kg 4.5kg

3. Has your child had an ear infection / glue ear for longer than 3 months, 4 to 6 ear infections within a 6 month period, or another identified hearing problem (e.g. at newborn hearing screening).	Yes O	No O
If yes please give details here:		
4. Is there anyone in the child's immediate family (brothers/sisters/parents only) with a speech / language difficulty or dyslexia?	Yes O	No O
If yes please give details here:		
5. Does your child have a developmental disability (e.g. Cerebral Palsy, ASD, Fragile X syndrome, Muscular dystrophy, Di George syndrome, Down's syndrome, Williams syndrome)?	Yes O	No O
If yes please give details here:		
6. Does your child have a hearing impairment?	Yes O	No O
If yes please give details here:		

7. Does your child have a visual impairment	Yes O	No O
If yes please give details here:		
8. Have you or anyone else had any concerns about your child’s hearing or communication?	Yes O	No O
If yes please give details here:		

C. YOUR CHILD’S FAMILY

1. How many siblings does your child have?

0
1
2
3
4 or more

O
O
O
O
O

(include full and half siblings)

2. Is this child the first child of his or her mum (i.e. does mum have any older children)?

Yes
No

O
O

If no, how many older children does mum have?

1
2
3 or more

O
O
O

3. Is your child a twin/multiple birth?

Yes
No

O
O

4. How long does your child spend at your home address?

Less than half the year
About half the year
More than half the year
All year

O
O
O
O

5. Which other people over 18 years old live in this home with you and your child?

Mum
Dad
Grandparent /s

O
O
O

Other related adults (please say how many)	0	1	☐	☐	2	☐	3	more	☐

Please state how you are related

6. How many other children live in your home with you? (please say how many in each age range)	Children 0-18 months	0	1	☐	☐	2	☐	3	more	☐

Children 19 months-3 years	0	1	☐	☐	2	☐	3	more	☐

Children 4-11 years	0	1	☐	☐	2	☐	3	more	☐

Children 12 - 17 years	0	1	☐	☐	2	☐	3	more	☐

7. How many bedrooms are in your home?	0	1	☐	2	☐	3	☐	4	☐	5+	☐

Please only answer questions 8-11 if your child lives at another home for part of the year

8. How long do they spend at this other home address?	Less than half the year	☐	About half the year	☐	More than half the year	☐

9. Which other people over 18 years old live in this <u>other</u> home with your child?	l um	☐	Dad	☐	Grandparent/s	☐

Other related adults	0	1	☐	☐	2	☐	3	more	☐

(please say
how many)

Other
non-related
adults
(please say
how many)

0 1 2 3 more

10. How many other children live in this other home? (please say how many in each age range)

Childre
n

0- 18 months

0 1 2 3 more

Childre
n

19 months- 3 years

0 1 2 3 more

Childre
n

4- 11 years

0 1 2 3 more

Childre
n

12- 17 years

0 1 2 3 more

11. How
many bedrooms
are in this other
home?

0 1 2 3 4 5+

Child's Mum
is....

12. Child's mum's age

Up to 20 years old

21-25 years old

26-30 years old

31-35 years old

36+ years old

13. How old was
child's mum when her
oldest child was born?

Up to 20 years old

21-25 years old

26-30 years old	☐	31-35 years old	☐	36+ years old	☐

14. Mum is...		Married/Civil Partnered	☐	Living with partner	☐
Sing le	☐	Separated/Divo rced	☐	Widowed	☐

15. Mum's highest education is...		No education	☐	Primary incomplete	☐
Primary complete	☐	High school incomplete	☐	High complete	☐
More than high school	☐				

16. Mum's work status is... (current job or last paid job)		Never worked, have only been in training or education	☐		☐
An employee	☐	Self- employed (with employees)	☐	Self- employed (without employees)	☐

17. Mum's current/last job title: (please be specific)					

Child's Dad is...		Up to 20 years old	☐	21-25 years old	☐
26-30 years old	☐	31-35 years old	☐	36+ years old	☐

19. Dad is...		Married/Civil Partnered	☐	Living with partner	☐
Sing le	☐	Separated/Divo rced	☐	Widowed	☐

20. Dad's highest education is...		No education	☐	Primary incomplete	☐
Primary complete	☐	High school incomplete	☐	High complete	☐
More than high school	☐				

21. Dad's work status is... (current job or last paid job) ☐ Never worked, have only been in training or education ☐

An employee ☐ Self-employed (with employees) ☐ Self-employed (without employees) ☐

22. Dad's current/last job title: (please be specific)

23. Choose which category best describes the amount of money your household gets in a year?

R0 ☐ R19 200 - R307 ☐ R19 200 - R307 ☐ R307 or more ☐

24. How much money in a month do you spend on food in your household?

You have finished!

You have helped to complete the first large-scale RSA-wide study on children's early word learning

Thank you very much for your time and effort.

APPENDIX C2: XITSONGA FAMILY BACKGROUND
QUESTIONNAIRE

Nongonoko wa swivutiso swa ndyangu

Rihanyo ra n`wana na vutomi bya ndyangu swi nga va na nkucetelo wukulu eka marito na tigestures leti va ti dyondzaka.

Hikwalaho hi tsakelaka ku mi vutisa swivutiso hi mhaka leyi. Titweni mi tshunchekile ku tshika swivutiso leswi mi nga tsakeliki ku swi hlamula.

Hi ku titsongahata u nga tsali vito ra wena helo eka nongonoko wa swivutiso leswaku mahungu/timhaka leti boxiweke ti va xihundla. Tsundzuka ku tata foromo leyi ya swivutiso u tatela n`wana loyi u n`wi hlawuleke eka foromo ya CDI.

MAHUNGU YO RHANGA

Siku ra namunthla: ____/____/____ Siku ra ku velekiwa ra
n`wana ____/____/____

Vuxaka bya wena na n`wana (Mutswari/muhlayisi)

Phorovhinsi leyi u tshamaka eka yona: _____

Doroba/tikoxikaya laha u tshamaka kona: _____

A. HINKWASWO HI SIKU RA N`WANA

1. I mani a hlayisaka n`wana wa wena? Hi byela hi vanhu hinkwavo lava hlayisaka n`wana wa wena ku ringana kwalomu ka hafu ya siku evhikini.					
Mhani wa n`wana	O	Tata na wa n`wana	O	Muhlayisi kumbe vahlayisi van`wana	O
2. Loko u hlawule muhlayisi/vahlayisi, xana i:					
Xaka	O	Mu hlayisi wa n`wana	O	Malem be ya muhlayisi wa n`wana	K hirech e O
3. Loko ku ri na vahlyisi van`wana, va hlayisa n`wana tiawara tingani evhikini?					
1-20 wa tiawara	O	21-35 wa tiawara	O	36+ wa tiawara	O
4. Loko vahlayisi lavan`wana va ri va ndyangu, komba vuxaka bya vona na n`wana (sesi/buti, kokwana/tatana, hahani/malume, mhanihulu/tatanahulu, mhanintsongo/tatanantsongo) naswona i vamani na malembe ya vona.		1. 2. 3. 4. 5.			
5. Hi rihi ririmi leri ri vulavuriwaka ngopfu ekaya? (hlamusela)					
6. Xana n`wana wa wena u pfa a twa ririmi rin`wana kumbe ririmi ra le kaya ke?		Ina O	E-e O		
7. Loko n`wana a swi kota ku twa ririmi rin`wana ekaya, xana u ri twa tiawara tingani esikwini?					
8. Loko nhlamulo ku ri ina eka 6, xana i ririmi rihi kumbe tindzimi tihi?(Boxa)					
9. Xana n`wana u nghena vuhlayisi-bya-siku, khireche, ntlawa wo huha kumbe		Ina O	E-e O		
10. Loko nhlamulo ku ri Ina eka 9, hi rihi ririmi kumbe tindzimi leti vulavuriwaka eka vuhlayisi-bya-siku, khireche, ntlawa wo huha kumbe					
11. N`wana u tshama tiwara tingani eka vuhlayisi-bya-siku, khireche, ntlawa wo huha kumbe					

B. RIHANYU RA N`WANA NA NHLUVUKO

2	1. N`wana u velekiwe						
hi	mavhiki kumbe tin`hweti	Vhiki	ra 33	Vhiki		Vhiki	
tingani u ri emirhini?		kumbe	O	ra 34	ku fika	O	ra 37
		emahlweni		36			
							kumbe
							endzhaku

2. Hi wihi ntikelo wa n`wana loko a heta ku velekiwa?

Ehansi ka 2Kg O 2.5kg to O Ku
4.5kg hundza 4.5Kg

3. Xana n`wana wa wena u tshama a va na ntlulelo wa vuvabyi bya tindleve/ glue ear ku hundza tinhweti ti3	a	In O	E-e O
Loko swi ri tano, nyika vuxokoxoko lahawani:			
4. Xana ku na un`wana endyngwini wa n`wana (buti/sesi/vatswari ntsena) a nga na ku tekiriwa ka xipchi/ririmi?	a	In O	E-e O
Loko sw ri tano, nyika vuxokoxoko lahawani:			
5. Xana n`wana wa wena u ni vutsoniwa byo hluvuka (Xik.. Cerebral Palsy, ASD, Fragile X syndrome, Muscular dystrophy, Di George syndrome, Down`s syndrome, Williams syndrome)?	a	In O	E-e O
Nyika vuxokoxoko lahawani:			
6. Xana n`wana wa wena u ni vutsoniwa byo twa xana?	a	In O	E-e O
Loko nhlamulo ku ri ina, nyika vuxokoxoko lahawani:			

7. Xana n`wana wa wena u ni vutsoniwa byo vona xana?	a	In O	E-e O
Loko nhlamulo ku ri ina, nyika vuxokoxoko lahawani:			
8. Xana u tshama kumbe un`wana munhu a va ni ku khumbeka eka vutsoniwa bya n`wana byo twa no vulavula?	a	In O	E-e O
Loko nhlamulo ku ri ina, nyika vuxokoxoko lahawani:			

C. NDYANGU WA N`WANA WA WENA

1. Xana
n`wana wa
wena u na
vamakwavo
vangani?
(katsa va ngati
na lava va nga
ri ki va ngati)

1 2 3 4
O O O O
kumbe
ku
hundza O

2. Xana n`wana
loyi i mativula eka
manana wa yena xana
(hileswaku, manana
wa yena u ni n`wana
lonkuku xana)?

Ina O E-e O

Loko swi nga
ri tano, manana u
ni vana lavakulu
vangani?

1 2 3
O O O
kumbe
ku
hundza
O

3. Xana n`wana wa wena i
hahlwa/ u velekiwe xikan`we ni
van`wana vana?

Ina O E-e O

4. Xana n`wana wa wena u dzumba nkarhi wo tanihi kwihi emu

E Ku Ku Lem
hansi ringana hundza be
ka hafu hafu hinkwaro
hafu ya lembe

y a lembe	ya lembe

5. I vamani van`wana vanhu lava nga na malembe yo hundza 18 va tshamaka na wena na n`wana wa wena?

Mana	T	
na	atana	
Wa	W	Kokwana/
n`wa	a	Vakokwana
na	n	O
	`wana	

Maxaka								
man`wana	0	1	2	3				
vakulukumba								
(Nyika nhlayo)								

Komba
vuxaka bya
n`wina

6. i vangani van`wana vana lava tshamaka emutini wa wena? (komba nhlayo eka vukhale byin`wana na b yin`wana)

Swihlang								
i	0-18	1	2	3				
wa								
tin`hweti								

Swihlang								
i	19	1	2	3				
tin`hweti -3								
wa								
malembe na 11								
wa								
tin`hweti								

Vana								
4-11	1	2	3					
malembe								

Vana								
12-17	1	2	3					
malembe								

7. Yindlu
ya ka n`wina
yin a
makamara
mangani

	1	2	3	4	5+
	O		O	O	O

8.

Kuna									
makamara									
mangani yo		1		2		3		4	5
etlela	☐		☐		☐			☐	+
emutini wa									☐
wena?									

Hi ku titsongahata, hlamula swivutiso swa 8-11 loko n`wana wa wena a tshama emutini wun`wana ku ringana xiphemu xo karhi xa lembe

9. U heta nkarhi wo tanihi kwihi emutini lowun`wana?

Ehansi	ka		Hafu	ya		Ku	hundza
hafu ya lembe	☐		lembe	☐		hafu ya lembe	☐

10. I vamani van`wana vanhu lavakulu lava hanyaka na n`wana wa wena eka muti lowun`wana?

M			
anana			
W	Tatana		
a	Wa	Kokwana/	☐
n	n`wana	Vakokwana	
`wana			

Maxaka							
man`wana	☐	1	☐	2	☐	3	☐
vakulukumba							
(Nyika nhlayo)							Ku hundza

Van`wan							
a vanhu	☐	1	☐	2	☐	3	☐
vakulukumba							
vo ka va nga ri							Ku hundza
xaka.							

11. Ku na vana van`wani vangani emutini lowun`wana? (komba nhlayo eka vukhale byin`wana na byin`wana)

Swihlang							
i	☐	1	☐	2	☐	3	☐
0-18 wa							
tin`hweti							Ku hundza

Swihlang							
i	☐	1	☐	2	☐	3	☐
19 wa							
tin`hweti -3							Ku hundza

wa
malembe na 11

wa
tin`hweti

Vana 4-11	wa	☐	☐	1	☐	☐	2	☐	3	More hundza	Ku ☐

Vana 12-17	wa	☐	☐	1	☐	☐	2	☐	3	More hundza	Ku ☐

12.
Kuna
makamara

mangani yo etlela	☐	1	☐	2	☐	3	☐	4	☐	5

emutini
lowun`wana
?

Manana wa
n`wana

13. Vukhale bya manana	☐	Ku fika ka 20 wa malembe na le hansi	☐	21-25 wa malembe
26-30 wa malembe	☐	31-35 wa malembe	☐	36+wa malembe

14. Manana wa n`wana a ri tanihi kwihi loko n`wana wa yena wo sungula a velekiwa?	☐	Malembe ya 20 na le hansi	☐	21-25 wa malembe

26- 30 wa malemb e	☐	31-35 wa malembe	☐	36+ wa malembe

15. Manana U tekiwile O tshama na xigangu U

A nga tekiw anga O U hambanile/ tharile/ thariwile O feriwiwile U

16. Dyondzo ya le henhla Ku hava dyondzo A nga hetangi O tidyondzo ta phurayimari

U hetile tidyondzo ta phurayimari A nga hetanga C tidyondzo ta xikolo xa le henhla U hetile O tidyondzo ta xikolo xa le henhla

U hundzisile tidyondzo ta xikolo xa lehenhla C

17. Ntirho wa manana... (wa sweswi kumbe wo hetelela) A nga se tshama a tirha u le ku dyondzeni O

I O Wa titirha (u na vathoriwa va yena) O Wa titirha (a nga na vathoriwa) O

muthoriwa

18. Ntirho wa manana wa sweswi/wo hetelela (kongomisa)

Tatana wa n`wana

19. Vukhale Ku fika 20 wa malembe O 21-25

26 O 31-35 wa malembe O 36+

-30 wa malembe

malem
be

20. U tekile O tshama na xigangu U
Tatana ...
A U hambanile/
nga tharile/ thariwile O
tekanga U feriwile

21. . Dyondzo ya Ku hava dyondzo A nga hetangi
le henhla O tidyondzo ta
U hetile A nga hetanga U hetile
tidyondzo ta C tidyondzo ta xikolo xa le O tidyondzo ta xikolo xa
phurayimari henhla le henhla
U
hundzisile
tidyondzo ta C
xikolo xa
lehenhla

22. Ntirho wa tatana wa sweswi/wo A nga se tshama a tirha O
hetelela (kongomisa) u le ku dyondzeni
I Wa titirha Wa titirha
muthori O (u na O (a nga na O
wa vathoriwa va vathoriwa)

23. Ntirho wa tatana wa sweswi/wo hetelela (kongomisa)

24. Hlawula xiphemu lexi hlamuselaka ntsengo wa mali lowu nghenaka emutini wa wena hi lembe

R O R1 - O 200 - R19 R307
0 O R19 200 O 200 R307 O 201 kumbe
ku hundza

25. U tirhisa mali muni ya swakudya emutini wa wena?

U gimitile!

**U pfunile eka ku tatisa xiphemu xikulu xo sungula xa RSA-xo anama xa
dyondzo yo sungula ya marito.**

Hi ba mandla hi vuyelela eka nkarhi na ku tikarhata ka wena.

APPENDIX D: XITSONGA ADAPTED CDI VERSION 1

khodi ya mungheneleri Tin'wheti ta n'wana



The Xitsonga Communicative Development Inventory (CDI): Words and Sentences (ages 16 – 30 months)

Nxaxameto wa marito na swivulwa (Exikarhi ka tin'hweti ta-16 na-30)

Mutswari/Muhlayisi wa n'wana

Lowu i nxanxamelo wa marito lawa vana va nga ma tivaka. I nxanxamelo wo leha na swona wu anamile wa marito lawa ma nga toloveleka, u nga vileli loko n'wana a tiva marito mantanana e ka nkarhi lowu, hikiva marito lawa ya fika e ka vana hi ku hambana-hambana ka malembe ya vona. u komberiwa ku hlaya swiletelo hinkwaswo na ku tiyisisa leswaku u tatile mapheji hinkwawo.

Ringeta ku tata nxanxamelo lowu loko u ri na le hansi ka timinete ta 30 u nga kavanyetiwi, ku fana na loko n'wana a etlele. A wu sindzisiwi ku tata nxanxamelo lowu hi nkarhi wun'we. Loko u nga kanganyisiwa, xo antswa i ku va u veka ehansi, u ta vuya u hetisa loko u ri ni nkarhi wo ringanela. Ringeta ku va u heta hi vhiki ri ri rin'we ntsena.

Ha nkhenza swinene!

swiletelo

1. loko n'wana wa wena a nga se ri tiva rito kumbe ku kota ku ri vula, siya xirhendeputana xi nga ri na nchumu (u nga tsali e ka xona).

Swiharhi	Wa twisisa	Wa twisisa na ku ri vula
xiharhi	0	0
berhe	0	0

2. Loko n'wana wa wena a ri tiva rito ni kota ku ri vula, tata xirhendeputana hi ndlela ley:

Swiharhi	Wa twisisa	Wa twisisa na ku ri vula
xiharhi	0	0
berhe	0	0
chela	0	●

Wa komberiwa ku va u tata xirhendeputana hi ndlela ley ● hikuva swi ta pfuneta muchini ku hlaya fomo ley ya CDI.

Wa komberiwa ku hoxa ntsena marito lawa n'wana wa wena a kotaka ku ma vula hi yexe (u nga hoxi marito lawa u ma vitanaka wena, ku fana na loko u ku " u nge xitimela")

3. Nghenisa marito lawa n'wana wa wena a ya tirhisaku hambi loko ya vula xilo xin'we.

Loko n'wana wa wena a tiva kumbe ku vula rito leri ri nga hambana wa komberiwa ku ata xirhendeputana lexi xi nga na rito leri ri nga rona (loko ri ri kona) kumbe u tsala rito leri mi ri tirhisaka. Wa komberiwa ku nghenisa na:

• Marito yo hambana, ku fana na "n'wana" e matshan'weni ya- "ximpompana"

ximpompana	0	0
xitsalu	0	0

• Marito lawa ya nga toloveleka ya vulaka xilo xin'we, ku fana na "mama" ematshan'weni ya-"manana"

mhani/manana/ mama	0	0

• Marito lawa ya tirhisiwaka hi vandyangu kambe ya vula xilo xin'we, ku fana na "koko" ematshan'wini ya-"kokwana"

- Marito ya n'wana (loko n'wana anga wa vuli marito lawa) ku fana na -"njwana" ematshan'weni ya -"mbyana"

mbuti	0	0
mbyana	0	0

- Wa komberiwa leswaku u nga ngenisi marito lawa ya nga riku ya Xisonga (ku fana na: "water" ematshan'weni ya -"mati").

4. E ka xiyenge 11 (Vanhu) vula vito leri n'wana wa wena a ri tirhisaka ku vitana munhu (ku fana na "Nyiko" e matshan'weni ya -"n'wana"). Wa komberiwa ku ngenisa mavito ya van'wana vanhu lawa n'wana wa wena a ya vitanaka, e ku heteleleni tsala leswaku hi vona va mani, tani hi leswi:

n'wana	0	0
mhanirtsongo	0	
mudyondzisi/tichar		
a/misithirese	0	

wa komberiwa ku tsala siku u sunguleke ku tata nxanxameto lowu (wa komberiwa ku va u hetisa ku tata nxanxameto lowu hi vhiki rin'we ntsena ku sukela e ka siku leri)

Siku ra ku velekiwa ka n'wana...../...../..... Siku ra namuntlha/...../.....

n'wana l nhwana/Jaha..... Vuxaka bya wena ni n'wana

A. NXANXAMETO WA MARITO

Wa komberiwa ku fungha laha ehansi swirhendevutana leswi swi nga e tlhelo ka marito lawa n'wana wa wena a ya tivaka kumbe a ya tiva ni ku ma vula.

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Mimpfumawulo ni					
mipfumawulo ya swiharhi	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
achu	O	khuchu khuchu	O	Piipiip	O
brr	O	kikiliki	O	tring tring	O
cwii cwii	O	kwa kwa	O	wu wu wu	O
grrr	O	mhee mhee	O	yowee	O
ham ham	O	mhooo	O	yho/yhuuu	O
hu hu	O	miyawu	O		
kiip kiip kiip	O	mmm	O		

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Swiharhi	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
xiharhi	O	mhinsi	O	pilipili	O
berhe	O	mhunti	O	pume	O

Wa tsundzuxiwa ku nghenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri rs tsiaweke.

Wa tsundzuxiwa ku nghenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri rs tsiaweke.

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Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Swakudya ni swinwiwa	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
apula	O	kofi	O	pyere	O
ayisi	O	kwembe	O	rhama/botoro	O
ayisikhirimi	O	lamula	O	rhayisi	O
ayisipopo/ khulthayim	O	machipisi	O	sipagheti	O
banana	O	madiriva	O	sitiroberi/ murubeyila	O
chepisi/ nchungama	O	makaroni	O	soseji	O
chizi	O	malekere	O	supu	O
chokoleti	O	mangwa	O	swakudya	O
chukela	O	masi/inkomazi	O	tamatisoso	O
dombholo	O	masimba	O	tandza	O
gwinya	O	mati	O	tihove	O
hambega	O	mihandzu	O	timanga/timongo	O
havhokhadi	O	miroho/ matsavu	O	tinyawa	O
herekisi	O	muchayeni	O	tivhitamini	O
hlampfi	O	mukapu	O	tiya	O
huku	O	munyu	O	vhiyana	O
jamu	O	muthotho	O	vhoroso	O
jeli	O	nkuwa	O	vuswa	O
juzi	O	nudulusu	O	xakunwa	O
kalavatla	O	nyala	O	xiculu	O
khasitadi	O	nyama	O	xifaki	O
khavichi	O	paloni	O	xikhekhana	O
khekhe	O	perekisi	O	xikontso	O
khereto	O	phayi	O	xinkwa	O
khodirinki	O	phinabatha phophkhon/	O	xitokosiwitsi	O
khoku	O	mbvacha	O	yogati	O
khonifleksi	O	pitsa	O	zambala/tapula	O

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Swiambalo	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
		ntanghu/			
baji/xilamba	O	masandhasi	O	xidloko/kepisi	O
bandi	O	pijama	O	xikafu	O
bibi	O	rhenikhoti	O	xikete	O
bokhathi	O	rhoko	O	xikipa	O

buruku	O	sandhasi	O	xikipa/hembe	O
jasi	O	silipasi	O	ximbhulele	O
jesi	O	sokisi	O	xingwavila	O
kinopo/nkunupu	O	swingwavila	O	xorhangisa/ phenti/joki	O
layere/phaphasi	O	thayiti	O	xoti	O
mabuntsu	O	vuhlalu	O	zipi	O
		vuhlau bya le			
manghilavhu	O	nkolweni	O	nceka	O
mathaputhapu	O	vusenga	O	xidukwana	O

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Swirho swa mirhi	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
katla	O	nhompfu	O	vele	O
khwirhi	O	nkava	O	voko	O
mbilu	O	nkolo	O	xandla	O
milomo	O	nomu	O	xifuva	O
minkondzo	O	n'wala	O	xikandza	O
misisi	O	rhama	O	xikunwana	O
ndleve	O	rintiho	O	xilebvu	O
nenge	O	ririmi	O	xinuma	O
ngati	O	switshamu	O	xinuma	O
nhamu	O	tiho	O	xisuti	O
nhloko	O	tino	O		
nhlolo	O	tsolo	O		

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Swibye					
leswintsongo swa le ndlwini	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
alamu	O	mali	O	swilotlela	O
ayini	O	maphilisi	O	thawula	O
bakiti	O	mbita	O	themomitha	O
basikiti	O	mencisi	O	thini	O
bebiwoka	O	mopo	O	thini	O
bikiri/khapu	O	mukwana	O	thireyi	O
bodlela	O	murhi	O	thixu	O
bokisi	O	ndhichi	O	thochi	O
burachi	O	ndhichi	O	thyaka	O
burhachi ya meno	O	nelitlipa	O	tliloko	O
CD	O	nghilazi	O	vhakhumu	O
chekasi	O	njhekixini	O	vhasilapi	O
cutex	O	nkukulu	O	wachi	O
dasibini	O	nkumba	O	xibamu	O

dinchi	O	n'wala	O	xifaniso	O
DVD	O	peni	O	xikamu	O
fon/riqingo	O	phayiphi	O	xikero	O
foroko	O	phefumu	O	xikhigelo	O
ganju	O	phepha	O	xikurufu	O
gasi	O	phoda	O	xilo	O
		rhadiyo/			
hamula	O	xiyanimoya	O	ximbhulele	O
hediraya	O	rhandi	O	ximilana	O
jara	O	rhedlipsi/lipstick	O	xinepe	O
ketlele	O	rhekerhe		xipaci	
kamera	O	rhimoti	O	xiponji	O
khandlela	O	rivoni	O	xisibi	O
lepula	O	semendhe	O	xolumeka	O
lip ayisi/ xotola					
nomo	O	sevhiyete	O	xidukwana	O
manghilazi	O	silothepi	O		

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Makamara ni nhundzu ya le ndlwini	Wa twisisa na ku ri vula	Wa twisisa na ku ri vula	Wa twisisa na ku ri vula
batlara	O	khompyuta	O
bavhu/ndhichi/ sabelo	O	khoto	O
		ko hlambela/ batirhumu	O
bence/bangisitulu	O		vheranda
			vuwiselo/ sithirhumu
chembara	O	ko oxela	O
dirowa/layiki	O	makhirowevhi	O
fasitere	O	matirasi	O
fene	O	mubedwa	O
		muchini wo	xihambukelo/ thoyilete
furiji/xigwitsirisi	O	hlantswa	O
		muchini wo	
garaji	O	omisa	O
gede	O	nyangwa/rivanti	O
hitara/mbawula/ ndzilo	O	ovheni	O
kamara/andlwini	O	sinki	O
kheteni	O	sofa	zingi
khixi/xitanga	O	switepisi	O

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Swilo swa le handle	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
barha	O	mujombhe	O	ribye	O
byasi/ritlangi	O	murhi/nsinya	O	ritlangi	O
dyambu	O	nghadi	O	sava	O
dyiribye/tamba	O	nhonga	O	tluka	O
giravhele	O	ntshava	O	xibatsheke	O
hoziphayphi	O	n'weti	O	xibhakabhaka	O
ku khida	O	nyeleti	O	xidan'wana/phulu	O
lwangu	O	nzhaku ka yindlu	O	xiluva/bilomu	O
mati	O	papa	O	xipedi	O
moya	O	patu	O	xitepisi	O
		phevimente/ko			
mpfula	O	sindiwa	O	xocheleta	O
muchini wo tsema					
byasi	O	rhavi	O		O
mujeko	O	rhoboto	O		O

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Tindhzawu leti nga endzeriwaka	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
doroba	O	khempe	O	purasi	O
ebichini/ribuwa	O	khirexe	O	rivala ro tlangela	O
		muvihi/			
ehandle	O	bayisikopo	O	sorokisi	O
emolweni/					
emavhengeleni	O	ndhawu	O	tiko	O
endyangu	O	nghadi	O	vhengele	O
enhoveni	O	ntirho	O	xikolo	O
garaji	O	ntlangu/phati	O	yindlu	O
kaya	O	phaka	O	Zu /ntanga wa swi	O
kereke	O	pikiniki	O		

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Mavito ya vanhu	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
buti	O	mulungu	O	papantsongo	O
dokodela	O	munghana	O	phorisa	O
hahani	O	munhu	O	ricece/n'wana	O
kokwana	O	mupfuni	O	sesi/tati	O
malume	O	mutimelandzilo	O	vanhu	O
mhani/manana/					
mama	O	muongori/nese	O	vito ra mupfuni	O
mhanihulu	O	nhwanyana	O	vito ra n'wana	O

mhanintsongo	O	n'wana	O	vito ra ximanga/mbyana	O
mudyondzisi/ticha					
ra/misithirese	O	papa/bava	O	wansati	O
mufana	O	papahulu	O	wanuna/malume	O

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Marito ya siku na siku ni mintlangu	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
a swi hlekisi	O	ka mina	O	tete/u wisa kahle tha-tha/	O
ahe	O	ketiketi	O	salani/bayi-bayi	O
ariyariya	O	khadi	O	tikento/khadi/	O
avuxeni	O	khekhe	O	ncuva	O
bolo ya milenge	O	ku lalela	O	timhavuri	O
E E/hayi	O	ku xaveni	O	tisa/ni nyike	O
famba huma/famba	O	ku xonganyana	O	tshika sweswo	O
famba tsakamisa	O	kusaseka	O	u na malembe	O
fihlula	O	languata/vona/	O	mangani	O
fonela	O	basopa	O	u va ni	O
ha ma cucubanga	O	mathumbhane	O	vukheta/basopa	O
hatlisa	O	miyela/wo whii	O	ukwini hiloyi	O
hay 5	O	na kombela	O	vakhithi	O
hepi bethdeyi	O	ndza khensa	O	wa swi vona	O
hlamba mavoko	O	ndzi ta ku kuma	O	wa swi voo	O
hlamba/inkarhi wo	O	nkarhi wa ku dya	O	xap	O
hlamba	O	nkarhi wo	O	xikulu	O
hundzuluka/jika	O	tlela/badama	O	xingulubyani	O
ina	O	pfuka	O	xo xawula	O
ixx	O	pfula swinene	O	xoo	O
		swakudya swa		yimanyana	O
		nhlikani	O	yooo	O
		swakudya swo		yoo-wee	O
		lalela	O		

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Marito ku endla	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
aka	O	khiya	O	ringeta	O
ambala	O	khoma	O	siya	O
avelana	O	khumba	O	sula/omisa	O
bana	O	khoma/gava	O	sula/thunyha	O
basisa	O	khudlunya	O	sungula	O

bebula	O	koka	O	susumeta	O
byela	O	kombisa	O	sweka	O
chaja foni	O	ku ti endlisa	O	tana	O
chayela/ dirhayivha	O	ku tiva	O	teka	O
chela	O	ku twa	O	thlambusa	O
cina/giya	O	ku va na	O	tirha	O
cukumeta	O	kukula	O	tisa	O
cukumeta/hoxa	O	kuma	O	tlakusa	O
damarheta	O	kuma/amukela	O	tlanga	O
dikilida	O	landzelela	O	tlula	O
dirowa/tsala	O	languta	O	tova	O
dyana	O	langutisa	O	tsakamisa	O
dyisa/phamela	O	lomba	O	tsakela	O
dzinginisa/ kucunga/dludla	O	luma	O	tsala	O
ehleketa	O	lumeka	O	tsema	O
endla	O	lunghisa	O	tshama	O
endzela/vhakacha	O	mamisa	O	tshova	O
etlela	O	nantswa	O	tsutsuma	O
famba	O	navela/navelela	O	tumbela	O
fananisa/mechisa	O	nghena	O	tumbeta	O
fika	O	ntluntlama	O	veka	O
fonela	O	ntsikwana	O	venga/vondzoka	O
furhetela	O	ntswontswa	O	vitana/huwelela	O
gija/huma/kaka	O	nwana	O	vona	O
gogondza	O	n'wayitela	O	vukarha	O
halatela	O	nyika	O	vula	O
hambanisa	O	oxa	O	vulavula	O
handzula	O	penda	O	vumbuluka	O
hatlisa	O	pfala	O	vunwa	O
heta	O	pfuka	O	vuya	O
hlambela	O	pfula	O	vuya a	O
hlanta/haza	O	pfuna	O	wana	O
hlantswa	O	pfuxa	O	wisa	O
hlawula/langha	O	phokotela	O	xava	O
hluvula	O	photosa/ tshikelela	O	xeka/tsema	O
hoxa	O	phutsela	O	xinepe/xifaniso	O
huma/siya	O	raha	O	yana	O
humesa	O	rhandza	O	yima	O
hundzuluxa/jikisa	O	rheta	O	yimbelela	O
jomba/chinginya	O	rhwala	O	yingisa	O
kasa	O	rila	O	xakunwa	O
khandziya	O	ringa	O	tiva	O
				xibantsheke	O

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Marito yo hlamusela	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
a xi kahle	O	lulamile	O	tima	O
antswa	O	lumeka	O	titimela	O
basa	O	lumekile	O	tivoneli	O
basile	O	miyela/miyerile	O	tiya	O
biraweni/ ribungwani	O	nkulu	O	torha	O
chava	O	nonoka	O	tsaka	O
damarhela	O	ntima	O	tsakama	O
damarherile	O	nyanganya /tsokombela	O	tsana	O
etlerile	O	olova	O	tshovekile	O
henhla	O	omile	O	tshwuka	O
herile	O	orenji	O	twa ndlala	O
hetelela	O	pfala	O	vabya	O
hi rivilo	O	pfukile	O	vaviseka	O
hisa	O	phephulu	O	vevuka	O
hlundzuka	O	pinku	O	vukheta	O
hoxile	O	ptshu/thuuu	O	vusiwana	O
huwa/pongo	O	rihlaza	O	wasi/blu	O
kahle	O	rimoya	O	xavava	O
karhele	O	sasekile	O	xi na huwa	O
khale	O	siringa	O	xinene	O
khudzehela	O	sungula	O	xintsanana	O
ku tika	O	swa antswa	O	xintshwa	O
kufumela	O	swarha	O	xintsongo	O
kule	O	swi herile	O	xinyami	O
kusuhi	O	swintsanana	O	xitshopana	O
leha	O	tele	O		
lonene/u lulamile	O	thyakile	O		

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Marito ya minkarhi	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
e ndzhaku	O	namunthla	O	nkarhi wo lowo	O
e ndzhaku ka nkarh	O	ni madyambu	O	siku	O
ku nga se	O	ni mixo/mpundzu	O	sweswi	O
ku sungula	O	ni ndzhenga	O	sweswi sweswi	O
mundzuku	O	nkarhi	O	tolo	O
				vusiku	O

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Maviti	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
		I swa n'wina/ya n'wina/ta			
_ ya mina/xa mina/ra mina	O	n'wina	O	ndzi	O
		I xa mina/swa mina/ ta			
_xilo/swilo	O	mina/ya mina	O	n'wina	O
		I xa wena/ya wena/ra wena			
hi hexe	O	wena/ra wena	O	swa vona/ta vona,	O
		I xa yena/swa yena/ta yena			
hi ndzexe	O	yena/ta yena	O	vona	O
		leswi/ leti/leyi/lawa			
hi voxo	O	leti/leyi/lawa	O	wena	O
		lexi/ leyi/leri/lowu			
hi wexe/hi n'wexe	O	leyi/leri/lowu	O	xa hina/swa hina/	O
		leswiya/letiya/la			
hi yexe/yena n'winyi	O	waya/liya	O	ya wena/xa wena,	O
		lexiya/leriya/			
hina	O	lowuya/liya	O	yena	O
I swa hina/ta hina	O	mina	O		

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Swivutiso	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
hikokwalaho ka yini	O	njhani	O	xihi/swihi/tihi/ yihi/rihi	O
kwihi	O	rini	O	yini/mani	O
mani/vahi	O				

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Vundhawu	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
e handle	O	hansi	O	kusuhi na	O
e henhla ka	O	hansi ka	O	kwala	O
e ka	O	henhla	O	lahaya	O
ekule	O	henhla ka	O	le/ka/ku/a	O
emahlweni ka	O	hi	O	na	O
endzhaku ka	O	hi le	O	ndzhaku	O
endzeni	O	leti/hi lawa	O	susa	O
		hi lexi/hi leyi/ hi			
endzeni ka	O	leri	O	tshega	O
ethlelo ka	O	kusuhi	O	xa/swa/ta/	O
handle	O				

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Maengeteri	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
a yi_/a ri_/a swi_	O	ku hava/Ee	O	swin'wana	O
ha xin'we ha xin'we	O	na	O	swotala	O
hi vumbirhi	O	na mina/na yena	O	xa fana/swa fana/	O
hinkwaswo	O	na yin'wana/na	O	xihelerile	O
		xin'wana/na		xin'wana na	
hinkwavo/hinkwer	O	tin'wana	O	xin'wana/xihi na	O
hu/hinkwenu		swintsanana		xihi/yihi na yihi/	
		swin'wana	O	rihi na rihi	

Wa tsundzuxiwa ku ngenisa marito hi ku hambanana ka wona lawa n'wana wa wena a ya tirhisaka kumbe lawa ya nga toloveleka ya vulaka xilo xin'we na leri ri tsariweke.

Mahlanganisi	Wa twisisa na ku ri vula		Wa twisisa na ku ri vula		Wa twisisa na ku ri vula
hikuva/					
hikokwalaho ka	O	loko	O	swi nga leswi	O
kambe	O	na	O		

B. SWIVULWA NA GIRAMA/MBULAVULO

Xiyenge (a)	Ina	E-e
1. Hi tirhisa vunyingi (n'wana ematshan'weni ya wena) ku kombisa nhlonipho loko hi vulavula na lava kulu eka hina. Xana n'wana wa wena wa tirhisa marito yo komba nhlonipho?	O	O
2. Loko hi tirhisa rito riri e ka vunyingi swa hambana na loko hi ri tirhisa riri e ka vun'we. Xikombiso, "n'wana" yi hundzuka yi va "vana", u-"ribye" ri hundzuka ri va "maribye", "mbyana" yi hundzuka yi va "timbyana". N'wana wa wena u sungurile ku vulavula hi mukhuva lowu?	O	O
3. Loko hi lava ku kombisa "mpimo" kume "vukulu" bya xilo hi tirhisa xirhangi "xi-" kumbe "dyi-" (ximbyanyana / dyimbyana). I N'wana wa wena u sungurile ku vulavula hi mukhuva lowu?	O	O
4. Loko hi vulavula hi migingiriko, e ku sunguleni vana va vula rito ro karhingi swangeti va lava leswaku u endla xo karhi, xikombiso, va ta ku "nghena, raha, veka" kambe e ku fambeni ka nkarhi va sungula ku vulavula hi leswi swi nga ku endlekeni. Xikombiso "ndza nghena, wa raha, wa veka". N'wana wa wena u sungurile ku vulavula hi mukhuva lowu?	O	O

5. Loko hi vulavula hi leswi swinga humelela khale, kumbe swi nga hundza, hi hundzuluxa "ndza" yi va "ndzi" na xilandzi "-ile (ndza famba → ndzi fambile). N'wana wa wena u sungurile ku vulavula hi mukhuva lowu? 0 0

Xiyenge (b)

Laha hansi ku ni marito yo hambanana, ni byele rito leri n'wana wa wena a ri tirhisaka kumbe ku ri vula e ka nkarhi wa sweswi. Loko n'wana wa wena a tirhisa swivulwa leswi switikaka ku tlula leswi nxanxametiweke laha, hlawula lexi xi nonohaka.

1. nsati	O	2. nana	O	3. nsisi	O
wansati	O	n'wana	O	misisi	O
I wansati	O	I n'wana	O	I misisi	O
4. rhi	O	5. pula	O	6. tluka	O
mirhi	O	lepula	O	matluka	O
I mirhii	O	I lepula	O	I matluka	O
7. tulu	O	8. mbyana	O	9. bolo	O
xitulu	O	timbyana	O	I bolo	O
I xitulu	O	I timbyana	O		

10. Loko n'wana wa wena a lava ku vulavula hi swilo leswi swi nga hundza, hi swihi leswi anga swi vulisaka swona?	11. Loko n'wana wa wena a lava ku vulavula hi swilo leswi swi nga hundza, hi swihi leswi anga swi vulisaka swona?	12. Loko n'wana wa wena a lava ku kaneta, hi yihi ndlela leyi a nga vulaka ha yona?
tsema	hi huma	lavi
tsemile	hi humile	a ndzi swi lavi
ndzi tsemile		
13. Loko n'wana wa wena a lava ku ku byela leswaku u nga endli xo karhi, u swi vula hi ndlela yihi?	14. Loko n'wana wa wena a lava ku vula leswi a faneleke ku swi endla, u swi vula hi ndlela yihi?	15. Loko n'wana wa wena a lava ku vula leswi swa ha ku humelelaka, u swi vula hi ndlela yihi?
famba	ndzi tlanga a handle	tshama laha
u nga fambi	ndzi ya tlangela e handle	a tshame laha
		ndzi ta tshama laha
16. Loko n'wana wa wena a lava ku vulavula hi leswi swi humelelaka sweswi, u swi vula hi ndlela yihi?	17.	18.
famba	susumeta	ndza rhandza
ndza famba	wa ndzi	ndza ku rhandza
wa famba	susumeta	

19. Loko u vutisa n'wana wa wena leswaku "I yini lexi?", u ta hlamula hi ndlela yihi?		20. Loko u vutisa n'wana wa wena leswaku "I yini lexi?", u ta hlamula hi ndlela yihi?		21. Loko n'wana wa wena a lava ku vulavula hi rito ro fana na "nsinya" kumbe "hanci", hi xihhi xirhang e la rito lexi a nga xi tirhisaka?	
bolo	O	n'wana	O	I nsiya	O
I bolo	O	I n'wana	O	I hanci	O

n'wana wa wena u sungurile ku hlanganisa marito, xikombiso "dyana swakudya"?

Ina O e-e O

LOKO N'WANA WA WENA A NGA SE SUNGUJA KU NIANGANISA MARITO KU ENDA SWIVUIWA, U NGA NAYI A MAHLWANI KU HLAMULA

xiyenge (c)

Tsala swikombiso swinharhu swa swivulwa leswi u nga twa n'wana wa wena a swi vula masiku lawa,

1.
2.
3.

Xiyenge (d)

E ka marito lama, hi wahi marito lawa ma tirhisaka hi n'wana wa wena e ka nkarhi lowu? Loko n'wana wa wena a tirhisa swivulwa leswi swi tikaka e ka leswi, hlawula lexi xa vumbirhi.

1. lava tiya O	2. tima rivoni. O	3. u nga khomi. O
ndzi lava tiya O	tima rivoni na etlela O	u nga khomi movha. O
mina ndzi lava tiya sweswi O	tima rivoni mina ndzi lava ku etlela O	a ndzi swi lavi u khoma movha lowu. O
4. tiya hisa O	5. ndza yi lava. O	6. ndzi lava xinkwa. O
tiya ya hisa O	ndza swi lava leswi u nga na swonao. O	ndzi lava xinkwa na xa kunwa. O
tiya leyi ya hisa O		
7. ndzi langutisi O	8. xi kwihi ximpompana? O	9. ha tlanga. O
ndzi langutisi loko ndzi tlanga. O	xi kwihi ximpompana xa mina? ximpompana xa mina Nyiko? O	mina na Tsakani hi tlanga swin'we. O

10. ndzi yimbelela O risimu. ndzi ku kombelela O risimu.	11. ndzi na swa O kunwa swimbirhi. ndzi na bodhlela mambirhi ya O swa kunwa.	12. bolo tafula. O bolo e henhla ka O tafula. bolo yi le henhla O ka tafula.
13. movha ya O mina. I movha ya O mina. I movha ya mina leyi. O	14. nhwanyana wa rila. O nhwanyana wa rila, u wile. O nhwanya wa rila hikuva u wile O	

I ku hela ka CDI ya Xitsonga

APPENDIX E1: TRAINING MANUAL



Training Manual for the Electronic Pilot 2 Data Collection of the SA -CDI

Contents

Initial correspondence with fieldworker	2
How to recruit participants	4
Tips for training sessions	6
CDI USER GUIDE	9

SUMMARY BY SEFELA YALALA

First I called the fieldworker and made Initial correspondence with fieldworker

Then I sent them the follow up email with an appointment for training session. This had the How to recruit participants guide, and their target sample which I previously worked out based on the participants we need and the participants they have access to. If they requested monetary payment from UCT, also attached the docs they need to complete.

Training happened with 2 fieldworkers at a time. For Zoom training I shared my screen and went through the questionnaire on my laptop. Whatsapp training was a video call and I had my phone camera trained on my laptop as I went through the questionnaire. It took about 2 hours per session to get through both the infant and toddler forms. Tips for training sessions

After training I sent them an email with the CDI Qualtrics links and the CDI USER GUIDE

They sent back details of the recruited participants, which I sorted and then sent them back their Figure 2 List of participants.

After that it was time for some phone interviews and then the real fun began.

Initial correspondence with fieldworker

If they work with children:

- 1a. Where do you work?
- 2a. What age range are the kids you work with?

If they do not work with children?

- 1b. Where are you going to find participants with children?
- 2b. Will you be able to recruit participants with children aged 0 to 3 years old, or in what age range?

Start recruiting participants. Find out the exact age of child and gender, and then if they need airtime/data for what network, and pnp or shoprite voucher. Complete the table in *Participant recruiting guide* and send it back.

3. When are you available for training?
4. Do you have access to zoom, skype, or whatsapp?
- 4.i. If whatsapp, do you need data for the session? And if so what network?
5. Payment preference of vouchers or money from UCT?

If voucher payment:

- 6a. Pick n pay or checkers/shoprite/usave?

If UCT payment:

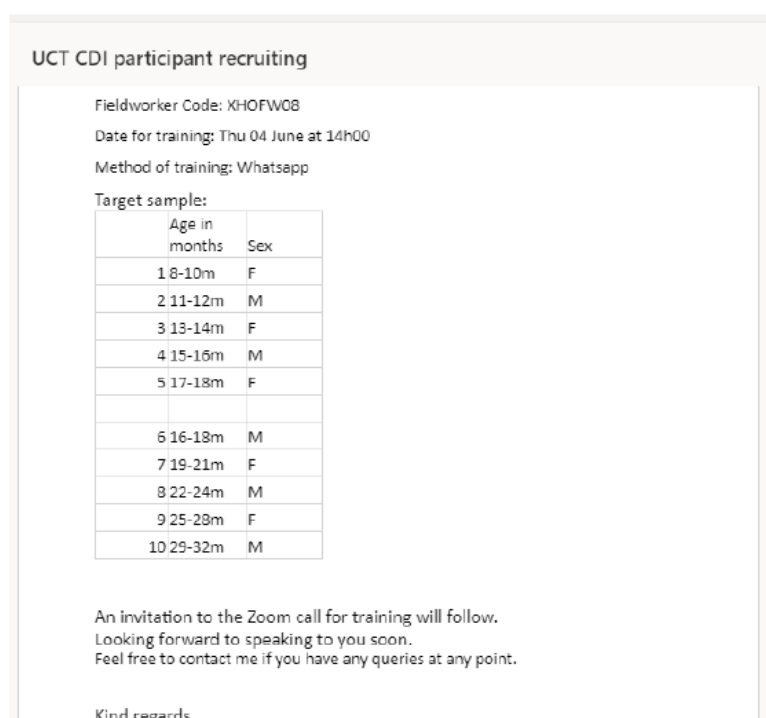
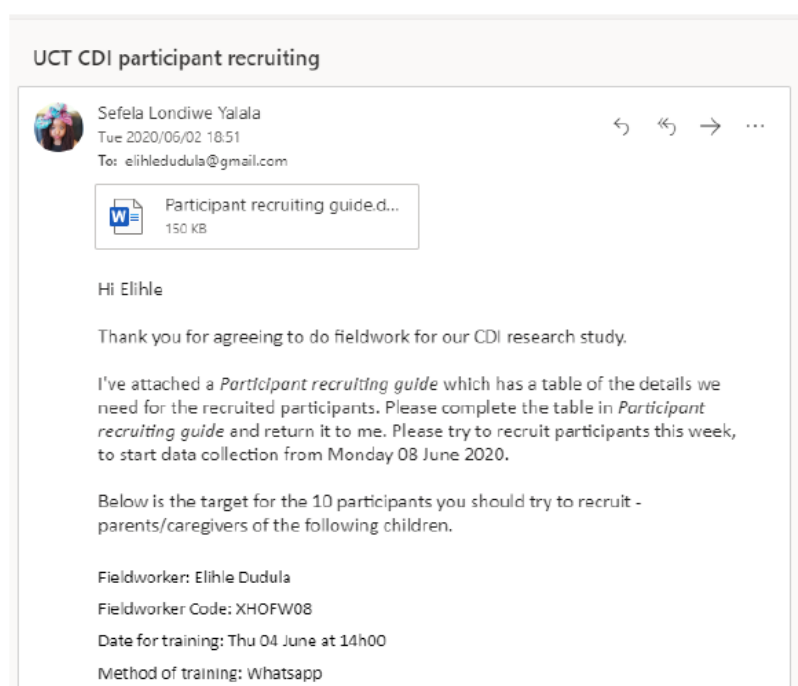
- 6b. Please send completed UCT forms hr101b, hr100, copy of ID and stamped bank statement.

To send to fieldworker after initial correspondence:

- Participant recruiting guide
- Target sample
- Link to zoom appt (if requested)
- Mobile data on the morning of training session

Example of follow up email sent after initial correspondence:

Figure 1 Follow up email





How to recruit participants

Below is an introduction you can give to potential participants to let them know what it is we do and what we are asking them to do. When you have introduced the study to them, ask them the following questions and complete the table below with each participant's details. Send a copy of the table back to the project coordinator.

The Child Language Africa research unit at the University of Cape Town is doing research to find out what young South African children between 0 and 3 years typically understand and say in their languages. We need parents or other caregivers to tell us about the gestures, words and sentences that their children know. We have developed a questionnaire called the CDI which we would like you to complete with the fieldworker, who will Whatsapp call you to interview you on a date and time you agree on. It takes about an hour to get through and we will send you data or airtime for you to use for this Whatsapp call. After you complete the questionnaire, we will send you a small token of thanks in the form of a R150 voucher that can be used at a grocery shop.

1. Do you agree to participate in this study?
2. How old is your child exactly?
3. Is your child a boy or girl?
4. When are you available for a call?
5. Do you prefer airtime or data for the call?
6. Which network do you use?
7. Which shop would you prefer a voucher for, pick n pay or checkers/shoprite/usave?

ISIXHOSA CDI RECRUITED PARTICIPANTS								
FIELDWORKER Name:						FIELDWORKER Code:		
	Name of participant	Age of child	Sex of child	Cell no.	Network	Data or airtime	Voucher preference	Set date for interview
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

*****END OF HOW TO RECRUIT PARTICIPANTS*****

Tips for training sessions

1. Start with the infant form, and then go onto the toddler form afterwards.
2. Select only some of the statements in the consent section to show them how the error message pops up if you skip a question.

Please answer this question.

Would you like to take part?

Please agree to the following by clicking on each statement below.

- I have read the information in this page
- I agree to take part in the study that was described here
- I am aware that if I have any questions, I can ask for information at any stage
- I understand that I can withdraw from the study at any time
- I understand that all data will be anonymous and will be treated as confidential
- I understand that the child and I will not be identifiable

3. Type in your name in the “Where you live” section so that the data is easily identifiable as junk data not for analysis.
4. There are some questions that only appear based on the answer you selected in a previous question. To prepare them for every possible scenario, you should select answers that will show them every possible question. Points 5 to 15 below are such questions.
5. Select “other caregiver” when asked who takes care of the child in a typical day, so that questions about who the caregivers are will appear.
6. Select “Yes” when asked if the child hears other languages, so that questions about what those languages are will appear.
7. Select “Yes” when asked if the child attends day care, so that questions about how long they are at day care will appear.
8. Select “Yes” when asked if the child has had an ear infection, so that questions about details of the infection will appear.
9. Select “Yes” when asked if a family member has a language related problem.
10. Select “Yes” when asked if the child has a developmental disability.
11. Select “Yes” when asked if the child has a hearing impairment.
12. Select “Yes” when asked if the child has a visual impairment.
13. Select “Yes” when asked if anyone has concerns about the child’s language.
14. Select “NO” when asked if the child is the first born so that questions about how many older siblings they have will appear.
15. Select “2” when asked how many homes the child has so that questions about the second home will appear (and the wording used to describe the main and other homes are introduced).
16. Explain that the “don’t know” option can also be used for “don’t want to say”.
17. Explain that “work status” is no inclusionary of work status during lockdown. I.e. if the participant is a teacher but is currently not working *only because of lockdown regulations*, then they should select “employed” instead of “not working”.

18. The “instructions” are for how to complete the form, which is what the fieldworker will be doing. Unlike the introductory paragraphs before each section, they don’t have to read these instructions to the participant.

1. Ukuba umntwana akaqondi okanye akathethi amagama, shiya izangqa zingabhalwanga, ungacofi nakweyiphi ibhokisi ecaleni kwegama.

	Umntwana uja...		Ukuba umntwana unegama elahlukileyo alisebenzisayo, libhale apha
	qonda	qonda-uyathetha	
ibhabhathane	☐	☐	
ibhadi / impuzi	☐	☐	
ibholwe	☐	☐	

2. Ukuba umntwana uyaliqonda igama kodwa akalithethi, cofa kwibhokisi ekwikhohlam yokuqonda.

	Umntwana uja...		Ukuba umntwana unegama elahlukileyo alisebenzisayo, libhale apha
	qonda	qonda-uyathetha	
ibhabhathane	☒	☐	
ibhadi / impuzi	☐	☐	
ibholwe	☐	☐	

19. The infant form starts with the phrases, then the gestures, then the words.
20. Remember to explain the difference between “understands” and “understands + says” and to occasionally prompt the participant to make that distinction.
21. Explain how you can fill in “synonyms” and give some examples. Remind them that they still need to select either “understands” or “understands + says” even if adding a synonym.
22. Explain semantic categories, and that part of the reason why the words are in such categories are to help jog the participant’s memory of other words in the category, and also to give context for words that have two meanings such as *noka* (which means ‘river’ in the outside places category, and ‘waist’ in the body parts category).
23. The word section is the only section where you can leave a question blank or unanswered, because if the child doesn’t know the word then you leave it blank.
24. When you get to the end of the questionnaire remind them to note down the date and time of completion for each participant.
25. When starting the toddler questionnaire, select the ‘wrong’ age on the welcome page so they can see how it redirects you to the infant form if the child is too young. This also works if you do it at the beginning of the infant form and show them how it redirects to the toddler form if the child is too old.

English ▾

Welcome to the South African Child Language Project

We want to know what young South African children between 0 and 3 years typically understand and say in their languages.
We need parents or other caregivers to tell us about the gestures, words and phrases that their children know.

Who may take part?

- Parents or caregivers of a child who know the child well.
- The child must hear English most of the time.
- The child must be 16 to 32 months.

Is the child younger than 16 months (between 8 and 16 months)?

Yes

No

26. Explain that the FBQ is the same for both forms. You can fill in your junk data quickly without as much explanation. Show them how some questions are just ‘skipped’ or don’t show up if you make a different selection. For example, how you won’t be asked about the details of an impairment if you select “No” for not having said impairment. You can also use this time to ask if they have any questions about the FBQ or infant form in general (some people are shy).
27. Explain how for toddlers there’s only a “understands + says” option, but otherwise the words are the same and in the same order, and the “synonyms” option is still there, and if they don’t know a word you leave it blank.
28. Go through the grammar section explaining the grammatical concept being asked for. If they can understand it, they can ask about it. Points 29 and 30 are about the grammar sections for the Bantu languages.
29. The prefix/suffix that is being asked about in the first section is in bold letters, which should help the fieldworker. But it doesn’t help the participant since they can’t see it, so enunciation and emphasis are important when phrasing the question.
30. The question about specific noun prefixes and shadow prefixes are not about the word. i.e. *sadi/osadi/mosadi* and *fazi/mfazi/umfazi* are not asking if the child knows the word for a woman. You need to explain to them how to give a different explanation to illicit an answer. Have them come up with another word with the same prefix in the case that a participant says the child doesn’t know that specific word. For instance to come up with another word that starts with the prefix [um-] or [mo-] etc.
31. When you get to the end of the form, remind them again to note down the date and time of completion for each questionnaire.

To send to fieldworker after training session:

- Links to the CDI for practice run
- CDI user guide



CDI USER GUIDE

What is the MacArthur-Bates Communicative Development Inventory (CDI)?

The CDI is a questionnaire that asks parents what gestures, words and sentences their child can understand and say.

We have CDIs in each of the following South African languages:

- XiTsonga
- Setswana
- Sesotho
- isiXhosa
- South African English
- Afrikaans

There are two questionnaires in each language. One for infants (8-18 months) and one for toddlers (18-30 months).

The infant questionnaire asks parents about the actions and gestures their child can do, the sentences they can understand, and the words they can understand or understand and say.

It is divided into three sections:

- Gestures: actions the child may do with their hands and/or body, in order to communicate something or while playing. To answer you can select the option "Yes", or the option "No". You cannot leave a question blank.
- Phrases: short sentences that the child may hear often and can understand. To answer you can select the option "Yes" or the option "No". You cannot leave a question blank.
- Words: a list of words in 22 categories, such as animals, toys, clothes etc. To answer you can select the option "Understands" (if the child can understand the word when they hear it but cannot say it themselves), or you can select the option "Understands+Says" (if the child can understand the word when they hear it and can

also say it themselves). You can leave a question blank (if the child cannot understand the word at all).

The toddler questionnaire asks parents about the words and sentences their child can say.

It is divided into two sections:

- Words: a list of words in 22 categories, such as animals, toys, clothes etc. To answer you can select the option “Understands+Says” (if the child can understand the word when they hear it and can also say it themselves). You can leave a question blank (if the child cannot say the word at all).
- Grammar: a list of sentences which the child can say. To answer you can select one of the options given with each question. You cannot leave a question blank.

The family background questionnaire is a section at the beginning of the CDI that asks about the child and his/her family. It is divided into six sections:

- All about the child’s day
- The child’s health and development
- The child’s family
- The child’s mother
- The child’s father
- The household

In every section, to answer you can select one of the options given with each question. In cases where the participant does not give an answer for any reason, you can select the option “Don’t know”.

The family background questionnaire includes questions which participants may not feel comfortable answering. If a caregiver does not want to answer a question, select the option “Don’t know” (when applicable) and move on to the next question. Do not ask them again or try to convince them otherwise, as they are under no obligation to answer any questions.

The parent will first answer the **Family Background Questionnaire** followed by either the **Infant CDI** or the **Toddler CDI**, depending on the age of the child for whom they are completing the CDI.

Please take some time to familiarise yourself with the questionnaire (links to the CDIs will be provided by the coordinator).

Go through the Infant CDI first and fill it in as if you have a child of between 8-18 months.

Go through the Toddler CDI and fill it in as if you have a child of that age of between 18-30 months.

NB: While trying out the questionnaire yourself as a test run, please write “FIELD WORKER (followed by your name)” when prompted for the area (city/town/suburb/etc) you live in, so that we know not to use the data you enter in our analysis.

If you have any questions as you try it out, please ask your coordinator.

Research ethics

As a field worker you will have access to confidential information pertaining to the research study. This includes (but is not limited to) their name, age, address, ID number, contact information and their child's personal information. Many participants will only reveal information to investigators because principal investigators have assured participants that every effort will be made to maintain confidentiality. That is why it is of the utmost importance to maintain full confidentiality when conducting a research study.

Below is a list of expectations you will be required to adhere to as a research assistant. Please carefully review these expectations.

EXPECTATIONS FOR A RESEARCH ASSISTANT

In order to maintain confidentiality, I agree to:

1. Keep all research information that is shared with me (e.g. observations, notes, transcripts, data, online forms, etc.) confidential by not discussing or sharing this information verbally or in any format with anyone other than the principal investigator of this study;
2. Hold in strictest confidence the identification of any individual that may be revealed during the course of performing the research tasks;
3. Ensure the security of research information while it is in my possession. This may include:
 - Keeping all documents and/or data related to the research study on the tablet/laptop/device only;
 - Closing any programs, documents, or data files related to the research study when away from the computer;
4. Not make copies of documents and/or data related to the research study unless specifically instructed to do so by the principal investigator;
5. Give all research information/data and research participant information/data back to the principal investigator upon completion of my duties as a research assistant;
6. After discussing it with the principal investigator, erase or destroy all research information that cannot be returned to the principal investigator upon completion of my duties as a research assistant.

How to administer the CDI – step by step

1. Explain the purpose of the study to the parent or caregiver and what is expected of them in the following way:

We want to know what young South African children between 0 and 3 years typically understand and say in their languages. We need parents or other caregivers to tell us about the gestures, words and sentences that their children know.

We need you to answer the questions truthfully, without thinking what answer we would like to hear. Please don't worry if the child is not yet talking all that much.

Young children will not know many words yet. Each child is different.

It will take about an hour to complete the questionnaire. You do not have to complete the questionnaire in one session. If you need to stop, you can complete the questionnaire later. It is okay to carry on when you have more time.

2. Make sure that the parent or caregiver is the one who knows the child best. You can ask other family members to help answer the questionnaire.
3. Explain that participation is voluntary. They are free to refuse to participate and they may decide to stop at any point during the questionnaire. They are under no obligation to complete it or give a reason as to why they have decided against participation. They will not be identified on the questionnaire.
4. Establish the age of the child. Ask the participant to find the child's birth certificate, clinic card, or any other document which contains the child's date of birth and read it out to you. Confirm that you have seen the date of birth when prompted in the CDI.
5. Should the child be a twin, triplet, etc. then the caregiver should answer the question for only one child, chosen randomly at their discretion.
6. If the child is between 8 and 18 months, open the INFANT CDI form. If the child is between 16 and 33 months, open the TODDLER CDI form.
7. Go through the whole questionnaire with them and fill out the answers they give you. Except for the words section, you cannot leave a question blank, i.e all questions must be answered.
8. Once you have completed the entire questionnaire, note down the time and send it to your coordinator. Let the participant know they will receive their gift within 24 hours. If this does not happen, the participant should let you know and you should alert your coordinator immediately.

*****END OF CDI USER GUIDE*****

Once the fieldworker had returned the Recruited Participants table, I sorted it and sent it back with new columns, as in the example below. The column highlighted in yellow is to let the fieldworker know which CDI form to complete with each participant.

Figure 2 List of participants

FIELDWORKER Name:		Bathandwa Sothenjwa				FIELDWORKER Code:		XHOFW05					
Participant Code	Name of participant	Age of child (months)	CDI form	Sex of child	Cell no.	Network	Data or airtime	Voucher preference	Set date for interview	Date and time of completion	Phone Voucher received	Shop voucher received	Comments
XHOU001	MI	10months	infant	f		telkom	airtime	picknpay	11/06/2020				
XHOU002	LI	12months	infant	f		celic	data	picknpay	10/06/2020				
XHOU003	Ro	18months	infant	m		vodacom	airtime	shoprite	06/06/2020				
XHOUT001	No	20months	Toddler	m		vodacom	data	picknpay	06/06/2020				
XHOUT002	Inc	21months	Toddler	m		celic	data	picknpay	08 06 2020				
XHOUT003	Nw	24months	Toddler	f		celic	airtime	picknpay	08/06/2020				
XHOUT004	Qu	25months	Toddler	m		celic	airtime	picknpay	09/06/2020				
XHOUT005	Vu	30months	Toddler	m		telkom	data	picknpay	09/06/2020				
XHOUT006	Lut	31months	Toddler	f		telkom	airtime	picknpay	10/06/2020				
XHOUT007	No	32months	Toddler	f		celic	airtime	shoprite	11/06/2020				

Templates of the tables and separate word versions of the documents can be sent on request.

****END****

APPENDIX E2: SA-CDI PROTOCOL

Southern African Communicative Development Inventories

Protocol for Adaptation of Infants and Toddlers Inventories

PHASE ONE - ADAPTATION

A: Case history form/Family/Demographic questionnaire (share from previous studies; put on Vula) Deadline: 28 February 2017 for a complete draft of the demographic questionnaire.

B: Ethics (use Goitsone's consent forms)

Stage 1: Construction of first drafts (November 2016 – May 2017)

Step 1: Do the first 'translation' of the USA versions by THREE first language speakers, and then consult the UK, Dutch and KiSwahili infant and toddler versions, depending on the language for which the CDI is being developed.

Step 2: Minimum of ONE focus group with professionals – nurses and teachers (including day-care teachers) (6-8 people), who have children in the age range; check for words and alternatives; Audio record focus group(s) but not transcribe. (For Afrikaans, consult with colleagues in the Northern Cape and Gauteng; for isiXhosa, consult colleagues in Port Elizabeth; for SA English, consult with colleagues who are mother tongue speakers of Indian South African English.)

Step 3: Minimum of TWO focus groups with parents (4-6 per focus group) and/or minimum of EIGHT interviews with parents from different SES backgrounds. Audio record but not transcribe. (Start by saying, "We know you have experience with children as well as your own children – so you are the best people to tell us about what children know and can say. And of course you know your own child better than anyone else!")

Also ask the following, "Tell me the last 10 words that your child said", "What did your child say this morning?" "What sentence did your child say last?", "What

were the three longest sentences your child says in the past week?”, “What cute things does your child say?”, “What songs/prayers do you child know?”, “What does your child not say quite right yet?”

(Talk generally first and then complete the inventory with the parents.)

Add words to the list that were frequently reported by the parents and professionals, but do not remove any words unless the parents say that the words are highly offensive.

Step 4: Audio/video recordings of SIX children between 28 months and 36 months to check grammar and words: 35/36 month two children (boy and girl); 33/32 month two children (boy and girl); 29/30 month two children (boy and girl).⁸ Record minimum of 1 hour of speech by each child, either in one session or in shorter sessions on several days over maximum one week.

Workshop 2 - May 2017 (finalisation of instruments; data management training and prepare for Pilot 1 – demographic forms, instructions and inventory)

(Data management - Numbering of items: _Group Name; Word group letter; Number order (following alphabetic order); _Shortened form of the SA English and Bantu words. Sample format: *b7doginj*, where *b* = animals group, *7* = numerical order (alphabetical order in English in this case, though you can use alphabetical order in the language you are working in), *dog* = English gloss of isiXhosa word, *kur* = first 3 characters of isiXhosa word (*inja*) / *f10shosko*, where *f* = group of clothes, *10* = numerical order, *sho* = first three letters of English gloss of Afrikaans word, *sko* = first three letters of Afrikaans word (*skoen*).

⁸ This gender balance per age is the ideal, but it would also be acceptable to have three of each gender overall or four boys and two girls.

Stage 2a - Pilot 1 of adaptation (June 2017 – October 2017)

Participants

20 to 30 people per identified area and SES group for infants version⁹ – oral administration¹⁰

20 to 30 people per identified area and SES for toddlers² – oral administration³

Sample groups per geographical area and SES status

Setswana

1. South Africa: urban
2. South Africa: rural
3. Botswana: T (20) I (15) urban (Gaborone) [middle and low SES] I(15) peri-urban
4. Botswana: rural [low SES]

SeSotho T(20) I(20) + T(20) + I(20) = 80 people

1. South Africa: rural (QwaQwa) [low SES]

⁹ Ensure a balanced age distribution of children/parents across pilot groups. This does not need to be exact, but there should be more or less a 50/50 gender balance in the sample group as a whole, and not all the girls should be older than all the boys or v.v. Infant 8-18 months Toddler 16-30 months

8-13 months 10 (5b +5g) 14-18 months 10 (5b +5g)

16-23 months (5b+5g) 24-30 months (5b +5g)

¹⁰ For the Afrikaans and South African English versions, half of the administrations will be oral and the other half electronic. [Comment to the team: We would like to develop an electronic version for Afrikaans and South African English, in addition to the paper version. The Norwegians team did so with great success and at very low cost. We were advised to start piloting the e-version as early as possible so that teething problems do not occur only during data collection with the e-version for norming purposes.]

2. South Africa: urban (Free State -Edenburg/Trompsburg) [middle and low SES]

isiXhosa T(20) I(20) +T(20) I(20) = 80 people

1. Cape Town: urban [middle and low SES]
2. Eastern Cape (rural)

Afrikaans

1. Standard Afrikaans in Cape Town: urban [middle SES] T(20) I(20)
2. Kaaps in Cape Town: urban [low SES] T(20) I(20)
3. Rural (middle and low) T(20) I(20)

South African English -

1. Cape Town: urban [middle SES] T(20) I(20)
2. Cape Town: Cape Flats English [low SES] T(20) I(20)

Xitsonga

1. Semi-urban T(20) I (20) Giyani
2. Rural T(20) I (20) Elim

Stage 2b - Analysis of Pilot 1 (November - December 2017)

1. Identify which words and gestures nobody knew and which words everyone know (floor and ceiling effects - eliminate these and leave in 2 or 3 words that have a floor and ceiling effects, e.g. *mother, father* - but be careful of eliminating words to such an extent that your language version becomes difficult to compare to the original, because then you reduce the possibility of sensible crosslinguistic comparisons due to significantly different items)

2. Which words have a positive and significant correlation with age? If there are words that do not correlate, you have to decide whether to leave them in or not – if they are known in one area but never in another, for example, you might want to omit them. If the word gets known more as the children get older, then keep it. If the word is known because of area or specific context, then eliminate it.

3. Add in new words based on linguistic variety.

4. Compare pilot areas. If one area is doing worse, bias words towards the lower performing area (as they have less of an advantage) – one does not want a test that is biased against children from low SES backgrounds or children from rural areas.

5. Discuss how effective the instructions were and change them if necessary.

6. Finalise demographic form if changes need to be made.

Stage 3a - Pilot 2 (January 2018 – May 2018)

20-30 participants for infants and 20-30 for toddlers in the same areas or similar areas.

Collect the same data, and then combine the data of the two pilots, unless the data collected in a specific geographical area prove to be problematic or one area is not representative of the larger population.).

Stage 3b - Analysis of Pilot 2 (June 2018 – July 2018)

Words must improve with age and be internally reliable. Measure this using Cronbach's Alpha for the whole test, and the improvement in Cronbach's Alpha if the item is removed.

End of adaptation – could be the final instrument (final codes)

PHASE TWO – VALIDATION OF INSTRUMENT

100 children for each infant version

100 children for each toddler version

Validation with 10 to 20 children from above sample for each instrument:

- Infants: Elicit gestures; Words measured against test with objects
- Toddlers: CDI and language sample with each child at the same time to see whether there is a correlation between CDI and language sample.

Then we can construct the PiNG based on samples of approx. 100 children per age group.

PHASE THREE – NORMING

Sample – 1500 representative sample of the population of children for each language

Representative of:

1. Areas
2. Socioeconomic status
3. Age (works out at approx. 100 per month of age, 50 of each gender, but the total of 1500 is an oversampling to allow for removal of groups that were easier to recruit).
4. Ethnicity (but within monolingual families only)
5. Population of children with disabilities (must be included in the sample – children with hearing problems and Down syndrome etc.) thus ensuring the sample is representative of all the national population.

APPENDIX F: PILOT DESCRIPTIVE
STATISTICS OF LEXICAL CATEGORIES

B44liongh	43	.32	.471	.176	.19B9bugxif	43	.27	.447	.250	.063
B45liznko	43	.20	.401	.029	.830					
B46monnka	43	.23	.426	.120	.37C2ambamb	43	.304	.4640	.059	.667
B47mosnsu	43	.40	.494	.073	.59C10helhel	43	.18	.386	.210	.120
B49moukon	43	.29	.456	.111	.41C11motxit	43	.48	.504	.231	.086
B4beaber	43	.18	.386	.079	.56C13prapur	43	.46	.503	.182	.180
B51owlxin	43	.21	.414	-.016	.90C15taxthe	43	.45	.502	.395	.003
B53pigngu	43	.36	.483	.141	.30C16trater	43	.34	.478	.202	.136
B54ponxih	43	.20	.401	.026	.84C17traxit	43	.36	.483	.117	.389
B55pupxim	43	.32	.471	.016	.90C18trulor	43	.45	.502	-.073	.591
B56rabmpf	43	.23	.426	.026	.85C19whebar	43	.61	.493	.361	.006
B57ratmbe	14	.00	.000	.a	. C1aerxih	43	.21	.414	.070	.610
B58roonku	43	.30	.464	-.085	.53C3baxib	43	.34	.478	.173	.202
B59scoxip	43	.30	.464	.144	.29C4bicbas	43	.61	.493	.197	.146
B5beenyo	43	.34	.478	.081	.55C5boaxik	43	.38	.489	.085	.533
B60shenyi	43	.16	.371	.083	.54C6busbaz	43	.63	.489	.108	.430
B61snahum	43	.34	.478	.186	.17C7carmov	43	.70	.464	.199	.142
B62snanyo	43	.39	.493	.192	.15C8carxik	43	.20	.401	-.011	.934
B63spipum	43	.37	.489	.186	.17C9firxit	43	.16	.371	.000	.999
B64squmax	43	.14	.353	-.085	.533					
B65tedthe	43	.21	.414	.071	.60D10gamntl	43	.23	.426	-.093	.497
B66ticxig	43	.21	.414	.039	.77D11gludli	43	.20	.401	.004	.975
B68torxib	43	.27	.447	.216	.10D12penxit	43	.375	.4885	.142	.295
B69tural	43	.14	.353	-.034	.80D13penpen	43	.41	.496	.162	.234
B6birxin	43	.41	.496	.016	.90D14plavum	43	.30	.464	.053	.698
B72worxiv	43	.21	.414	.029	.83D15prenyi	43	.30	.464	-.199	.142
B73zebman	43	.21	.414	.003	.98D16puzpha	43	.20	.401	.191	.157
B7bucmhu	43	.24	.429	.003	.98D17stonts	43	.27	.447	.099	.466
B8bufnya	43	.27	.447	-.069	.61D18toytho	43	.43	.499	.294	.028

D1balbol	43	.73	.447	.196	.14E25	cus	32	.28	.457	.261	.149
D2balbal	43	.39	.493	.073	.59E26	dougwi	43	.52	.504	.230	.088
D3batbet	43	.21	.414	.103	.44E27	drixak	32	.250	.4399	.114	.534
D4blobil	43	.20	.401	.057	.67E28	dumdom	32	.25	.440	.170	.351
D5boobuk	43	.61	.493	.108	.43E29	egg	43	.46	.503	.266	.048
D6bubbab	43	.161	.3706	-.003	.98E2	avohav	43	.27	.447	.269	.045
D7chacho	43	.30	.464	.220	E30	fignku	14	.000	.0000	.a	.
D8crakhi	43	.27	.447	.365	.00E33	fishla	32	.50	.508	.137	.453
D9dolxim	43	.34	.478	.162	.23E34	fooswa	43	.43	.499	.061	.653
					E35	frumih	32	.38	.492	.049	.789
E1appapu	43	.750	.4369	.158	.24E37	gramad	32	.34	.483	.240	.186
E102vegmir	43	.30	.464	.079	.56E38	gramut	43	.48	.504	.153	.260
E103vievhi	32	.219	.4200	.267	.14E3	banban	43	.87	.334	.258	.055
E104vittiv	14	.000	.0000	.a	E40	hamham	43	.25	.437	-.029	.833
E105watmat	32	.69	.471	.222	.22E43	iceayi	43	.37	.489	.149	.273
E106yogyog	32	.500	.5080	.212	.24E44	iceayi	43	.48	.504	.066	.631
E10cabkha	32	.38	.492	.233	.20E45	iceayi	14	.333	.4880	.414	.125
E11cakkhe	32	.81	.397	.420	.01E46	jamjam	32	.47	.507	.189	.301
E12carkhe	32	.28	.457	.226	.21E47	jeljel	32	.16	.369	.136	.457
E13cerkho	32	.37	.492	.247	.17E48	juijuz	32	.66	.483	.320	.074
E14chechi	43	.43	.499	.085	E49	lolxit	14	.200	.4140	.583	.022
E15chihuk	32	.66	.483	.157	.39E4	beatin	43	.30	.464	.248	.065
E16chimac	32	.56	.504	.279	.12E50	macmak	33	.52	.508	.238	.182
E17chocho	43	.45	.502	.051	.71E51	manman	32	.38	.492	.300	.096
E18cofkof	32	.28	.457	.222	.22E54	meanya	43	.82	.386	.052	.706
E19cokkho	14	.133	.3519	.783	.00E55	melkal	32	.38	.492	.191	.296
E20cooxik	14	.200	.4140	.583	.02E57	mormuk	43	.34	.478	.026	.848
E21cookho	32	.56	.504	.070	.70E58	mufxik	32	.406	.4990	.094	.608
E22corxif	32	.375	.4919	.297	E59	noonud	14	.000	.0000	.a	.

E5boevho	32	.375	.4919	.186	.30E95	sugchu	43	.54	.503	.026	.849
E60nuttim	43	.37	.489	.146	.28E96	swemal	32	.63	.492	.124	.500
E62oninya	43	.41	.496	.236	.08E97	teatiy	43	.696	.4640	.014	.919
E63oralam	32	.47	.507	.359	.04E9	butrha	32	.44	.504	.114	.533
E65papvus	32	.625	.4919	.152	.406						
E66passip	43	.20	.401	.109	.42E10	earswi	43	.18	.386	.068	.616
E67peaper	43	.20	.401	.057	.67E11	gloman	43	.20	.401	.039	.774
E68peaphi	32	.28	.457	.271	.13E13	hatxid	43	.45	.502	-.037	.789
E69peapye	32	.28	.457	.380	.03E15	jacbaj	43	.286	.4558	.115	.398
E6brexin	32	.563	.5040	.241	.18E16	jeabok	43	.27	.447	.113	.407
E70peaher	43	.16	.371	.082	.54E17	jerjes	43	.54	.503	.112	.410
E71piepha	43	.29	.456	.091	.50E18	legtha	43	.27	.447	-.035	.796
E72pizpit	31	.32	.475	-.137	.46E1	banvus	43	.18	.386	.010	.943
E73polpal	43	.47	.504	.135	.32E20	naplay	43	.29	.456	.022	.873
E74poppho	32	.25	.440	.096	.60E21	necvuh	43	.21	.414	.016	.906
E77potzam	32	.34	.483	.343	.05E22	pajpij	43	.32	.471	.177	.193
E79pumkwe	32	.38	.492	.113	.53E23	panbur	43	.54	.503	.210	.121
E81ricrha	32	.47	.507	.318	.07E24	rairhe	43	.18	.386	.018	.896
E83salmun	43	.39	.493	.110	.42E25	rinxin	43	.20	.401	.088	.520
E84samtih	43	.29	.456	.104	.44E26	sanmat	43	.30	.464	.087	.526
E86sautam	43	.39	.493	.053	.69E27	scaxik	43	.27	.447	-.005	.972
E87sausos	14	.067	.2582	.450	.09E28	shixik	43	.43	.499	.129	.342
E88Simmas	32	.41	.499	.176	.33E29	shonta	43	.48	.504	.009	.950
E89sousup	43	.39	.493	.190	.16E2	beavuh	43	.27	.447	-.064	.637
E8bubche	43	.57	.499	.225	.09E30	shoxot	43	.29	.456	.004	.980
E90soumas	32	.47	.507	.162	.37E31	skixik	43	.38	.489	.080	.560
E92spimuc	43	.34	.478	.131	.33E32	slisil	43	.30	.464	.171	.208
E93stexic	14	.133	.3519	.783	.00E33	socsok	43	.70	.464	.136	.318
E94strsit	14	.067	.2582	.450	.09E35	tacsan	43	.30	.464	.253	.059

F39T_sxik	43	.52	.504	.268	.04629	penxin	43	.304	.4640	.304	.023
F40umbxim	43	.29	.456	.164	.2262	armvok	43	.714	.4558	.239	.076
F41undxor	43	.41	.496	.385	.00630	shokat	43	.464	.5032	.080	.557
F42zipzip	43	.30	.464	.199	.14631	thrsko	43	.429	.4994	.400	.002
F4belban	43	.43	.499	.237	.07632	toexik	43	.375	.4885	.155	.253
F5bibbib	43	.34	.478	.044	.74633	tonrir	43	.464	.5032	.271	.044
F6boomab	43	.29	.456	.232	.08634	tootin	43	.536	.5032	.193	.155
F7butkin	43	.23	.426	.234	.08635	tumkhw	43	.554	.5016	.257	.055
F8coajas	43	.36	.483	.106	.43636	vagxin	43	.321	.4713	.236	.080
F9drerho	43	.52	.504	.029	.83637	waixis	43	.304	.4640	.337	.011
					G3belnka		43	.429	.4994	.316	.018
G10chixil	43	.286	.4558	.174	.2064	blonga	43	.464	.5032	.064	.641
G11earndl	43	.732	.4469	.207	.1265	brevel	43	.500	.5045	.317	.017
G12eyetih	43	.411	.4964	.280	.0366	butswi	43	.304	.4640	.218	.107
G13facxik	43	.482	.5042	.132	.3368	cherha	43	.429	.4994	.255	.057
G14feemin	43	.304	.4640	.014	.9169	chexif	43	.321	.4713	.070	.610
G15finrin	43	.429	.4994	.217	.108						
G16haimis	43	.679	.4713	.232	.08610	camkha	32	.219	.4200	.259	.152
G17hanxan	43	.446	.5016	.116	.39611	canthi	32	.250	.4399	.215	.238
G18heanhl	43	.661	.4778	.058	.66612	cankha	32	.188	.3966	.015	.937
G19heambi	43	.339	.4778	.124	.36613	CD	43	.286	.4558	.245	.069
G1anknhl	43	.321	.4713	-.079	.56614	clotli	32	.250	.4399	.255	.159
G20knetso	43	.411	.4964	.141	.30615	coipen	32	.156	.3689	.141	.440
G22legnen	43	.696	.4640	.224	.09616	comxik	32	.375	.4919	.109	.552
G23lipmil	43	.518	.5042	.065	.63617	cupbik	43	.446	.5016	.151	.266
G24mounom	43	.571	.4994	.218	.10618	deophe	32	.188	.3966	.060	.743
G25nainw	43	.429	.4994	.055	.68619	disdin	32	.375	.4919	.171	.350
G26necnha	43	.339	.4778	.109		H1alaala	14	.067	.2582	-.119	.673
G27nosnho	43	.536	.5032	.268	.04620	DVDDVD	32	.219	.4200	.123	.504

H21elarhe	43	.321	.4713	.193	.15H4botbod	43	.482	.5042	.405	.002
H22facvha	32	.313	.4709	.182	.31H50nainel	32	.281	.4568	.125	.494
H23forfor	32	.500	.5080	.381	.03H51naicut	32	.313	.4709	-.223	.221
H25gasgas	32	.219	.4200	.052	.77H53papphe	32	.281	.4568	.216	.236
H26glangh	32	.313	.4709	.247	.17H54phofon	32	.406	.4990	.149	.416
H27glaman	43	.286	.4558	.107	.43H55phoxin	39	.333	.4776	.156	.342
H28gunxib	32	.313	.4709	.290	.10H56picxif	32	.281	.4568	.321	.074
H29haihed	14	.067	.2582	.450	.09H57pilxik	32	.281	.4568	.013	.945
H2basbas	43	.268	.4469	-.063	.64H58plaxim	39	.231	.4268	.139	.400
H30hamham	32	.250	.4399	.112	.54H59plasem	43	.125	.3337	.034	.801
H31hanxud	43	.214	.4140	.079	.56H5bowndh	32	.406	.4990	.291	.106
H32injnjh	32	.219	.4200	.246	.17H60plache	32	.344	.4826	.166	.364
H33iroayi	43	.393	.4928	.175	H61plandh	15	.267	.4577	.130	.643
H34jarjek	32	.313	.4709	.120	.51H62potmbi	43	.339	.4778	-.053	.698
H35ketket	41	.537	.5049	.256	.10H63purxip	39	.205	.4091	.050	.764
H36keyswi	43	.277	.4522	.183	.21H64radrha	32	.313	.4709	.310	.084
H37knimuk	43	.429	.4994	.015	.91H65ranrha	32	.281	.4568	.284	.116
H38lamriv	43	.375	.4885	.224	.09H66remrhi	43	.393	.4928	.255	.058
H3blanku	32	.469	.5070	.140	.44H67rubthy	32	.438	.5040	.200	.273
H40ligxol	43	.265	.4461	.093	.52H68scixik	32	.406	.4990	.273	.131
H41liplip	43	.393	.4928	.226	.09H69scrxik	32	.219	.4200	.073	.690
H42liprhe	32	.188	.3966	-.076	.67H6boxbok	43	.393	.4928	.312	.019
H43locgan	31	.323	.4752	.073	.69H70sersev	43	.170	.3799	.071	.637
H44makpho	32	.250	.4399	.215	.23H71soaxis	32	.344	.4826	.304	.091
H45matmen	43	.411	.4964	.154	.25H72spoxip	39	.385	.4929	.323	.045
H46medmur	32	.500	.5080	-.036	.84H73spolep	32	.438	.5040	.119	.515
H47monmla	43	.375	.4885	-.009	.94H74tabmap	43	.357	.4835	.315	.018
H48mopmop	43	.357	.4835	.029	.83H75tappa	32	.375	.4919	.330	.065
H49nainw	32	.219	.4200	.080	.66H76tapsil	43	.149	.3599	.089	.553

H77thethe	14	.000	.0000	.a	. I24	I24louvuw	43	.250	.4369	.136	.319
H78thixil	39	.205	.4091	.014		I25matmat	14	.133	.3519	.496	.060
H79tinthi	14	.200	.4140	.751		I26micmak	14	.133	.3519	.496	.060
H7bronku	32	.406	.4990	.258	.15	I27oveovh	43	.232	.4260	-.027	.841
H80tisthi	32	.281	.4568	.164	.37	I29porvhe	43	.357	.4835	.114	.402
H81toobur	43	.304	.4640	.245	.06	I2batbav	43	.429	.4994	.130	.339
H82tortho	32	.375	.4919	.395	.02	I30potche	43	.232	.4260	.321	.016
H83towtha	32	.438	.5040	.367		I33shexel	14	.067	.2582	.450	.092
H84tradas	32	.313	.4709	.169	.35	I34shoxaw	43	.250	.4369	.151	.266
H85trathi	32	.219	.4200	.211	.24	I35sinsin	43	.286	.4558	.093	.496
H86umbxim	39	.436	.5024	.230	.15	I36sofsof	43	.446	.5016	.094	.489
H87vacvha	32	.094	.2961	-.020	.91	I37staswi	43	.286	.4558	.167	.219
H88walbeb	14	.067	.2582	.029	.91	I38stoxit	43	.339	.4778	.112	.410
H89watwac	32	.500	.5080	.275	.12	I39tabtaf	43	.500	.5045	.163	.230
H8brubur	43	.375	.4885	.309	.02	I3batko	43	.214	.4140	.160	.239
H9bucbak	43	.411	.4964	.147	.27	I40toixih	43	.232	.4260	.167	.217
						I41tummuc	14	.067	.2582	.450	.092
I10comkho	14	.133	.3519	.243	.38	I42TVTV	43	.679	.4713	.167	.220
I12crikho	43	.232	.4260	.168	.21	I43verxit	43	.393	.4928	.091	.503
I13curkhe	14	.133	.3519	.783	.00	I44warwad	43	.321	.4713	.102	.453
I14doonya	43	.339	.4778	.094	.48	I45wasmuc	43	.304	.4640	.046	.735
I15dradir	43	.232	.4260	-.009	.94	I46winfas	43	.554	.5016	.075	.581
I16fanfen	14	.333	.4880	.136	.62	I47zinzin	43	.286	.4558	.164	.228
I18frifur	43	.357	.4835	.277	.03	I4bedmub	43	.321	.4713	.120	.380
I19gargar	43	.286	.4558	.068	.61	I5bedkam	43	.411	.4964	.079	.562
I20gatged	43	.464	.5032	.253	.06	I6benben	43	.143	.3531	.231	.087
I21heahit	14	.333	.4880	.233		I7brako	14	.067	.2582	.450	.092
I22higxit	14	.133	.3519	.496	.06	I8burbat	43	.268	.4469	.166	.220
I23kitkhi	43	.321	.4713	.293	.02	I9chaxit	43	.589	.4964	.086	.528

					J39whebar	14	.400	.5071	.200	.475
J10ladxit	14	.067	.2582	.450	.0923clapap	43	.571	.4994	.046	.738
J11lawrit	43	.214	.4140	.162	J40winmoy	14	.333	.4880	.698	.004
J12lawmuc	43	.250	.4369	.157	.2494flamuj	32	.125	.3360	.121	.508
J13leatlu	32	.281	.4568	.288	.1105floxil	32	.281	.4568	.295	.102
J14moonwv	43	.268	.4469	.271	.0436garngh	32	.125	.3360	.121	.508
J15mounts	32	.156	.3689	.017	.9257grabya	43	.304	.4640	.296	.027
J16pavphe	32	.156	.3689	.277	.1268gragir	43	.161	.3706	.155	.253
J17pooku	43	.214	.4140	.051	.7109hoshoz	43	.232	.4260	.040	.770
J18pooxid	14	.067	.2582	.450	.092					
J19raimpf	43	.500	.5045	.354	.00K10homkay	43	.536	.5032	.157	.249
J1bacnzh	32	.313	.4709	.488	.00K11houyin	43	.536	.5032	.190	.162
J20rocdyi	43	.232	.4260	.250	.06K12malamo	43	.321	.4713	.127	.351
J21roolwa	43	.214	.4140	.015	.91K13movmuv	43	.214	.4140	.054	.690
J22sansav	43	.482	.5042	.118	.38K14outaha	43	.429	.4994	.115	.399
J24skyxib	32	.125	.3360	.121	.50K15parpha	43	.214	.4140	.194	.153
J25slixib	14	.067	.2582	.450	.09K16parntl	43	.268	.4469	.232	.086
J28spaxip	14	.067	.2582	.450	.09K17petgar	43	.250	.4369	.237	.079
J29sprxoc	14	.067	.2582	.450	.09K18picpik	43	.107	.3121	.042	.759
J2brarha	43	.268	.4469	.091	.50K19plandh	43	.179	.3865	.030	.828
J30stanye	14	.200	.4140	.353	.19K1beaabi	43	.304	.4640	.060	.662
J31stinho	14	.200	.4140	.597	.01K20plariv	43	.268	.4469	-.049	.721
J32storib	43	.304	.4640	.233	.08K21schxik	43	.411	.4964	.319	.016
J33strpat	14	.333	.4880	.485	.06K22shovhe	43	.250	.4369	.128	.348
J34sundya	14	.333	.4880	.537	.03K23wooanh	43	.268	.4469	.150	.268
J35swimuj	14	.200	.4140	.597	.01K24wornti	43	.250	.4369	.073	.594
J36trarho	14	.133	.3519	.496	.06K25yarend	43	.339	.4778	.105	.443
J37tremur	14	.133	.3519	.783	.00K26zooZu	43	.125	.3337	.010	.943
J38watmat	14	.600	.5071	.299	.27K2camkhe	43	.067	.2582	.618	.014

K3chuker	43	.554	.5016	.160	.24037Uncpap	43	.250	.4369	.359	.007
K4cirsor	14	.000	.0000	.a	.L38Uncpap	43	.339	.4778	.331	.013
K5coutik	43	.232	.4260	.052	.70L39Whimul	43	.200	.4140	.592	.020
K6crekhi	43	.304	.4640	.132	.33L3Aunmha	43	.304	.4640	.225	.096
K7dowdor	43	.250	.4369	.048	.72L4babric	43	.429	.4994	.296	.027
K8farpur	43	.143	.3531	-.054	.69L5babmup	43	.133	.3519	.207	.460
K9garnggh	43	.054	.2272	.041	.76L6babvit	43	.268	.4469	.265	.049
					L7boymuf	43	.375	.4885	.215	.112
L11chinw	43	.536	.5032	.099	.46L8brobut	43	.607	.4928	.406	.002
L12chivit	43	.357	.4835	.068	.620					
L15dadpap	43	.625	.4885	.250	.06M10cutku	43	.339	.4778	-.034	.805
L16docdok	43	.304	.4640	.113	.40M11dinku	43	.214	.4140	.114	.403
L17firmut	43	.125	.3337	-.018	.89M12Eatnka	43	.250	.4369	.111	.414
L18frimun	43	.218	.4168	.227	.09M13eisixx	43	.518	.5042	.113	.407
L19girnhw	43	.250	.4369	.110	.41M14givhay	43	.554	.5016	.448	.001
L1aunhah	43	.464	.5032	.128	.34M15go_fam	43	.446	.5016	.383	.004
L21grakok	43	.661	.4778	.326	.01M16gonndz	43	.250	.4369	.218	.107
L22ladwan	43	.304	.4640	.071	.60M17haphep	43	.304	.4640	.258	.055
L24manwan	43	.446	.5016	.401	.00M18helavu	43	.357	.4835	.196	.147
L25mommha	43	.786	.4140	.287	.03M19hiahe	43	.696	.4640	.303	.023
L26nurnes	43	.214	.4140	.238	.07M1aahmiy	43	.375	.4885	.169	.213
L27peovan	43	.268	.4469	.051	.71M20howu_n	43	.250	.4369	.130	.338
L28permun	43	.429	.4994	.280	.03M21Incha	43	.304	.4640	.321	.016
L29petvit	43	.304	.4640	.187	.16M22indtik	43	.161	.3706	.111	.415
L2Aunmha	43	.286	.4558	.217	.10M24lunswa	43	.214	.4140	.094	.490
L30polpho	43	.200	.4140	.471	.07M25martim	43	.268	.4469	.181	.183
L32sisses	43	.589	.4964	.350	.00M26my_ka	43	.286	.4558	.201	.137
L35teamud	43	.268	.4469	.135	.32M27napnka	43	.286	.4558	.097	.479
L36uncmal	43	.482	.5042	.382	.00M28nigtet	43	.321	.4713	.290	.030

M29noE_E	43	.571	.4994	.263	.05M58twiket	43	.143	.3531	.030	.826
M30oh_yoo	43	.554	.5016	.198	.14M59waiyim	43	.286	.4558	.148	.277
M31oo_kus	43	.375	.4885	-.054	.69M60wakpfu	43	.500	.5045	.147	.279
M32oopyoo	43	.554	.5016	.189	.16M61washla	43	.518	.5042	.362	.006
M33opepfu	14	.07	.258	.450	.09M62welhat	43	.464	.5032	.250	.063
M34patkhe	43	.52	.504	.171	.20M63wowari	43	.196	.4009	.233	.084
M35peeukw	43	.304	.4640	.215	.11M64yesina	43	.518	.5042	.217	.109
M36plamat	43	.214	.4140	.024	.86M6brefih	43	.304	.4640	.071	.601
M37plena	43	.357	.4835	.237	.07M7byetha	43	.339	.4778	.206	.128
M38potfam	43	.411	.4964	.247	.06M8calfon	43	.429	.4994	.325	.015
M39seewa	43	.339	.4778	.326	.01M9carlan	43	.339	.4778	.236	.080
M3bathla	43	.393	.4928	.272	.043					
M40shavak	43	.196	.4009	.083	.54N100pulkok	43	.518	.5042	.103	.450
M41shaxap	43	.589	.4964	.251	.06N101pussus	43	.321	.4713	.205	.130
M43shoku	43	.286	.4558	.323	.01N102putvek	43	.661	.4778	.073	.595
M44skikha	43	.196	.4009	.108	.42N106rolvum	43	.250	.4369	.320	.016
M46snaxo	43	.143	.3531	.012	.93N107rubsul	43	.286	.4558	.288	.031
M47so_xik	43	.357	.4835	.340	.01N108runtsu	43	.464	.5032	.210	.121
M48socbol	43	.339	.4778	.182	.18N109sayvul	43	.411	.4964	.129	.342
M49stotsh	43	.357	.4835	.261	.05N10buiaka	43	.304	.4640	.401	.002
M4be_u_v	43	.214	.4140	.255	.05N110seevon	43	.536	.5032	.085	.532
M50supswa	43	.196	.4009	.273	.04N111shadzi	43	.161	.3706	.156	.251
M51surxoo	43	.518	.5042	.224	.09N112shaave	43	.161	.3706	-.053	.697
M52ta_tis	43	.518	.5042	.223	.09N113shokom	43	.161	.3706	-.005	.973
M53thandz	43	.304	.4640	.057	.67N114sinyim	43	.464	.5032	.170	.210
M54thaa_s	43	.268	.4469	.043	.75N115sittsh	43	.500	.5045	.211	.118
M55thewa	43	.304	.4640	.212	N116skaxib	14	.000	.0000	.a	.
M56thixin	14	.133	.3519	.783	.00N117sleetl	43	.607	.4928	.015	.913
M57turhun	43	.43	.499	.381	.00N118slixek	43	.196	.4009	.177	.191

N119slirhe	43	.268	.4469	.127	.35N14calfon	43	.357	.4835	.041	.764
N11bumkhu	43	.250	.4369	.153	.26N150washla	43	.304	.4640	.217	.108
N120sminw	43	.196	.4009	.175	.19N151watlan	43	.214	.4140	.131	.337
N121splthl	43	.179	.3865	.124	.36N152weaamb	43	.393	.4928	.160	.238
N122splham	43	.143	.3531	.102	.45N153weetsa	43	.429	.4994	.350	.008
N123stayim	43	.661	.4778	.360	.00N156wisnav	43	.339	.4778	.333	.012
N127swekuk	43	.232	.4260	.129	.34N157wortir	43	.339	.4778	.273	.042
N128swihla	43	.268	.4469	.289	.03N158writsa	43	.345	.4799	.500	.000
N129swijom	43	.250	.4369	.269	.04N15carrhw	43	.250	.4369	.100	.463
N12buyxav	43	.500	.5045	.187	.16N16carbeb	43	.536	.5032	.215	.112
N130swilum	43	.286	.4558	.059	N17catkho	14	.267	.4577	.331	.228
N131taktek	43	.625	.4885	.387	.00N18chacha	43	.286	.4558	.221	.102
N132takhlu	43	.393	.4928	.078	.56N1arrfik	43	.446	.5016	.098	.475
N133takhum	43	.304	.4640	.159	.24N20chohla	43	.268	.4469	.059	.666
N134talvul	14	.200	.4140	.597	.01N21clapho	43	.393	.4928	.015	.914
N135tasrin	43	.286	.4558	.189	.16N22clebas	43	.232	.4260	.024	.863
N136teahan	43	.268	.4469	.157	.24N23clikha	43	.482	.5042	.196	.149
N137telbye	43	.321	.4713	.345	.00N24clopf	43	.500	.5045	.033	.810
N138thiehl	43	.143	.3531	.076	.57N26comtan	43	.607	.4928	.114	.401
N139thrhox	43	.304	.4640	.150	.27N27comvuy	43	.679	.4713	.050	.712
N13calvit	43	.482	.5042	.276	.03N28comvuy	43	.321	.4713	.050	.713
N140thrcuk	43	.339	.4778	.386	.00N29cooswe	43	.429	.4994	.106	.436
N141ticdik	43	.196	.4009	.252	.06N2begsun	43	.357	.4835	.295	.027
N142toukhu	14	.067	.2582	.450	.09N30covphu	43	.179	.3865	.099	.468
N143turhun	43	.268	.4469	.229	.08N31crakas	43	.625	.4885	.156	.252
N144visend	43	.143	.3531	.306	.02N32crontl	43	.393	.4928	.058	.670
N145vomhla	43	.286	.4558	.159	.24N33cryril	43	.554	.5016	-.124	.363
N147wakpfu	43	.321	.4713	.232	.08N34cuttse	43	.393	.4928	.208	.124
N148wakpfu	43	.500	.5045	.242	.07N35dancin	43	.482	.5042	.111	.417

N36dradir	43	.304	.4640	.106	.43N62hidtum	43	.375	.4885	.178	.188
N37drinwa	43	.500	.5045	.041	.76N63hitban	43	.571	.4994	.209	.121
N38drixak	14	.067	.2582	.450	.09N64holkho	43	.500	.5045	.330	.013
N39dricha	43	.125	.3337	.018	.89N65hugvuk	43	.214	.4140	.174	.199
N3bitlum	43	.607	.4928	.095	.48N66hurhat	43	.500	.5045	.244	.070
N40drowis	43	.375	.4885	.213	.11N68jumlut	43	.393	.4928	.352	.008
N41drysul	43	.464	.5032	.190	.16N69kicrah	43	.464	.5032	.222	.099
N42dumcuk	43	.393	.4928	.145	.28N6braoxa	43	.357	.4835	.157	.249
N43eatdya	43	.661	.4778	.186	.16N70kisnts	43	.232	.4260	-.012	.932
N44entngh	43	.464	.5032	.183	.17N71knogog	43	.357	.4835	.165	.224
N45falwan	43	.357	.4835	.147	.28N72knotiv	43	.429	.4994	.074	.590
N46feedyi	43	.375	.4885	.124	.36N73knoku	43	.196	.4009	.158	.246
N47finkum	43	.304	.4640	.339	.01N75leasiy	43	.411	.4964	.315	.018
N48finhet	43	.607	.4928	.198	.14N76leahum	43	.482	.5042	.236	.080
N49fitrin	43	.196	.4009	.057	.67N78licnan	43	.232	.4260	.123	.368
N4blofur	43	.339	.4778	.157	.24N79lievun	43	.393	.4928	.059	.665
N50fixlun	43	.232	.4260	.290	.03N7bretsh	43	.411	.4964	.262	.051
N51follan	43	.214	.4140	.032	.81N80liftla	43	.268	.4469	.181	.181
N52getkum	14	.067	.2582	.450	.09N81liktsa	43	.286	.4558	.020	.886
N53givnyi	43	.482	.5042	.158	.24N82lisyin	43	.375	.4885	.015	.911
N54golfam	43	.643	.4835	.006	N83lockhi	14	.133	.3519	.207	.460
N55go2yan	43	.429	.4994	.346	.00N84loolan	43	.375	.4885	.125	.357
N56hatven	43	.214	.4140	.033	.81N85lovrha	43	.214	.4140	.177	.191
N57havku	43	.179	.3865	.098	.47N86makend	43	.321	.4713	.291	.030
N58heaku	43	.286	.4558	.215	.11N87matfan	43	.286	.4558	.240	.075
N59helpfu	43	.339	.4778	.228	.09N88meshal	43	.375	.4885	.298	.026
N5borlom	43	.339	.4778	.191	.15N89opepfu	43	.482	.5042	.090	.509
N60hicnts	43	.268	.4469	-.095	.48N8bremam	43	.393	.4928	.179	.186
N61hidtum	43	.286	.4558	.357	.00N90paipen	43	.268	.4469	.233	.083

N91pasdam	43	.127	.3363	-.025	.8502	anghlu	43	.125	.3337	.256	.056
N92phoxin	43	.255	.4396	.244	.0703	1grerih	43	.089	.2877	.154	.256
N94pintov	43	.411	.4964	.227	.0903	2haptsa	43	.286	.4558	.097	.477
N95platla	14	.267	.4577	.537	.0303	3hartiy	43	.357	.4835	.100	.462
N96poogij	43	.411	.4964	.000	.9903	4heaku	43	.339	.4778	.249	.064
N97pouche	43	.554	.5016	.340	.0103	5highen	43	.321	.4713	.172	.205
N98prepho	43	.321	.4713	.142	.2903	6hothis	43	.518	.5042	.075	.580
N99preku	43	.250	.4369	.038	.7803	7huntwa	43	.393	.4928	.342	.010
N9britis	43	.536	.5032	.174	.1903	8hurvav	43	.339	.4778	.107	.435
						O39lashet	43	.170	.3791	.053	.708
O10brotsh	43	.161	.3706	.174	.1903	asletl	43	.179	.3865	.333	.012
O11brobir	43	.143	.3531	.107	.4304	0ligvev	43	.179	.3865	.068	.617
O12cartiv	43	.143	.3531	.093	.4904	1litxin	43	.250	.4369	.202	.136
O13clebas	43	.214	.4140	.126	.3504	2lonleh	43	.179	.3865	.223	.099
O14clopfa	43	.500	.5045	.197	.1404	3louhuw	43	.196	.4009	.113	.407
O15coltit	43	.375	.4885	.197	.1404	4nausir	43	.232	.4260	.214	.114
O17darxin	43	.375	.4885	.243	.0704	5neakus	43	.161	.3706	.254	.059
O18dirty	43	.375	.4885	.062	.6404	6newxin	43	.232	.4260	.186	.170
O19dryomi	43	.179	.3865	.086	.5204	8noixi	43	.214	.4140	.200	.140
O1allswi	43	.232	.4260	.213		O49offtim	14	.733	.4577	.037	.895
O20empher	43	.286	.4558	.287	.0304	awapfu	43	.321	.4713	.232	.086
O21farkul	43	.339	.4778	.259	.0505	0okalul	43	.161	.3706	.200	.140
O22fashi	43	.161	.3706	.115	.3905	1oldkha	43	.232	.4260	.088	.518
O23fewswi	43	.250	.4369	.214		O52onlum	15	.133	.3519	.783	.001
O25firsun	43	.214	.4140	.183	.1705	3oraore	43	.143	.3531	.281	.036
O26frilon	14	.000	.0000	.a	.054	pinpin	43	.089	.2877	.103	.452
O27fultel	43	.411	.4964	.307	.0205	5poovus	43	.161	.3706	.158	.244
O28genvuk	43	.179	.3865	.048	.7205	6presas	43	.268	.4469	.384	.003
O29gookah	43	.196	.4009	.159	.2405	7purphe	43	.089	.2877	.081	.554

O58quimiy	43	.375	.4885	.104	.4408blanti	43	.250	.4369	.064	.641
O59ratswa	43	.107	.3121	-.045	.7409bluwas	43	.179	.3865	-.044	.749
O5bada_x	43	.232	.4260	.224	.097					
O60redtsh	43	.161	.3706	.080	.56010nowswe	43	.161	.3706	.186	.170
O61rigxin	43	.196	.4009	.081	P11thenka	14	.000	.0000	.a	.
O62sadtsa	43	.107	.3121	.203	.13P12timnka	43	.339	.4778	.060	.662
O63scacha	43	.357	.4835	.105	.44P13todnam	43	.304	.4640	.172	.204
O64sicvab	43	.214	.4140	-.005	.96P14tommun	43	.375	.4885	.185	.171
O65slekh	43	.179	.3865	.279	.03P15tonni	43	.268	.4469	.106	.436
O66slonon	43	.125	.3337	.017	.90P16yestol	43	.375	.4885	.134	.323
O67smaxin	43	.214	.4140	.217	.10P1afte_n	43	.161	.3706	-.014	.921
O68sofolo	14	.000	.0000	.a	. P2aftni	43	.143	.3531	-.167	.219
O69sorexav	43	.393	.4928	.308	.02P3befku	43	.196	.4009	.004	.976
O6betant	43	.125	.3337	.198	.14P4daysik	43	.357	.4835	.167	.220
O70stidam	43	.143	.3531	.113	.40P5firku	43	.143	.3531	-.145	.286
O71studam	14	.000	.0000	.a	. P6late_n	43	.161	.3706	-.070	.607
O72swenya	43	.214	.4140	.241	.07P7morni	43	.214	.4140	-.072	.599
O73swilum	43	.143	.3531	.282	.03P8nigvus	43	.357	.4835	.073	.595
O74thitor	43	.446	.5016	.200	.14P9nowswe	43	.393	.4928	.269	.045
O76tirkar	43	.375	.4885	.071	.604					
O77uglswa	43	.089	.2877	.265	.04Q10memin	43	.500	.5045	.279	.038
O78warkuf	43	.214	.4140	.105	.44Q11min_m	43	.482	.5042	.258	.055
O79wettsa	43	.250	.4369	.209	.12Q12my_m	43	.536	.5032	.289	.031
O7bignku	43	.250	.4369	.185	.17Q13myshi	43	.196	.4009	.051	.706
O80whibas	43	.321	.4713	.090	.51Q14our_h	43	.232	.4260	.105	.443
O81winrim	43	.143	.3531	.047	.73Q15our_h	43	.179	.3865	.384	.003
O82wrohox	43	.250	.4369	.033	.80Q16ourhi	43	.143	.3531	.277	.039
O83yelxit	43	.232	.4260	.086	.52Q18thalex	43	.196	.4009	.185	.171
O84yucpts	43	.339	.4778	.170	.20Q19the_v	43	.143	.3531	.131	.334

Q1heyen	43	.429	.4994	.121	.375	13herkwa	43	.464	.5032	-.023	.864
Q20thevon	43	.411	.4964	.067	.628	15herhi	43	.393	.4928	.078	.568
Q21thehi	43	.214	.4140	.172	.206	16inema	43	.161	.3706	.179	.186
Q22thele	43	.250	.4369	.318	.015	17inend	43	.250	.4369	.248	.066
Q24thile	43	.375	.4885	.361	.006	18intend	43	.179	.3865	.264	.050
Q25tholav	43	.161	.3706	.049	.728	1abomay	43	.250	.4369	-.003	.983
Q26ushin	43	.321	.4713	.227	.095	21offsus	43	.339	.4778	.080	.558
Q28youwen	43	.339	.4778	.316	.018	22onhen	43	.214	.4140	.241	.074
Q29younw	43	.161	.3706	.152	.265	23one_h	43	.250	.4369	-.005	.970
Q30you__w	43	.214	.4140	.086	.535	24outhan	43	.429	.4994	.165	.223
Q32you__n	43	.196	.4009	.019	.889	25oute_h	43	.214	.4140	.044	.747
Q33youhi	43	.214	.4140	.195	.149	27thelah	43	.196	.4009	.108	.427
Q3her__y	43	.196	.4009	.289	.035	28thrhi	43	.179	.3865	.064	.638
Q4herhi	43	.143	.3531	-.043	S29	toe_k	15	.000	.0000	.a	.
Q7his__y	43	.214	.4140	.308	.025	30undhan	43	.250	.4369	.258	.055
Q8Indz	43	.429	.4994	.247	.066	31uphen	43	.339	.4778	.285	.033
Q9it_xi	43	.214	.4140	.322	.015	32witna	43	.286	.4558	.233	.083
					S3	agatsh	43	.214	.4140	.055	.688
R1hownjh	43	.286	.4558	.103	.455	4arokus	43	.232	.4260	.091	.506
R2whayin	43	.589	.4964	.155	.255	5atle	43	.321	.4713	.144	.290
R3wherin	43	.375	.4885	.230	.089	6awaeku	43	.250	.4369	.160	.238
R4whekwi	43	.357	.4835	.191	.158	7bacndz	43	.179	.3865	.207	.126
R5whixih	43	.321	.4713	.166	.228	8behend	43	.125	.3337	.081	.551
R6whoman	43	.339	.4778	.283	.035	9beseth	43	.196	.4009	.112	.412
R7whyhik	43	.321	.4713	.362	.006						
					T11	fewswi	43	.107	.3121	.149	.272
S10bykus	43	.179	.3865	.123	.361	12man__ta	43	.232	.4260	.068	.617
S11dowhan	43	.500	.5045	.339	.011	13morswo	43	.161	.3706	.097	.479
S12forxa	43	.196	.4009	.087	.521	14nonku	43	.321	.4713	.106	.437

T15nota_y	43	.232	.4260	.173	.203	V3butkam	43	.196	.4009	.417	.001
T16oth_n	43	.250	.4369	-.053	.690	V4iflok	43	.321	.4713	.217	.108
T19the_fa	43	.196	.4009	.100	.463	V6theswi	43	.143	.3531	.085	.532
T20toona	14	.067	.2582	-.119	.673	NOTE: highlighted items have less partipants reponses recorded					
T21who_he	43	.143	.3531	.095	.485						
T2allhin	43	.179	.3865	-.149	.222						
T4alsna	43	.268	.4469	.153	.261						
T5anona	43	.179	.3865	.069	.615						
T6anyxin	43	.179	.3865	.100	.462						
T7bothi	43	.107	.3121	.131	.335						
T8eacha	43	.179	.3865	.124	.362						
T9evehin	43	.179	.3865	-.104	.446						
U10isi	41	.220	.4191	.083	.608						
U11letndz	41	.146	.3578	.141	.379						
U12may_k	41	.244	.4348	.175	.275						
U15tryrin	41	.073	.2637	.260	.100						
U16wasa_n	41	.122	.3313	.206	.197						
U18woua_n	41	.146	.3578	.087	.589						
U1ammin	41	.366	.4877	.241	.129						
U2are_h	41	.220	.4191	.141	.378						
U4canndz	41	.171	.3809	.175	.275						
U5coykot	41	.293	.4606	.106	.509						
U7doend	41	.317	.4711	.154	.336						
U8donu_n	41	.195	.4012	.222	.164						
U9hadfan	41	.220	.4191	.154	.336						
V1andna	43	.375	.4885	-.017	.899						
V2bechik	43	.161	.3706	.135	.319						

APPENDIX G: TABLE OF INDIVIDUAL
ANALYSIS OF THE LEXICAL ITEM ON THE
TODDLER FORM BASED ON WHEN THEY WERE
FIRST OBSERVED

Lexical items	months	MIN %	Max%	Mean %
2. nkawu	16	0%	20%	9%
2. mbuti	16	33%	100%	82%
8. foni	16	67%	100%	93%
3. xikochikara	17	0%	67%	37%
2. huku	17	67%	100%	94%
3. bazi	17	40%	100%	82%
4. bolo	17	60%	100%	94%
5. banana	17	33%	100%	88%
5. huku	17	60%	100%	91%
3. movha	18	73%	100%	94%
12. kokwana	18	33%	100%	89%
5. mihandzu	19	0%	73%	30%
10. papa	19	0%	73%	48%
2. xibodze	20	0%	20%	8%
2. humba	20	0%	40%	19%
2. ndlopfu	20	0%	40%	23%
2. nghala	20	0%	40%	22%
2. ngwenya	20	0%	40%	20%
2. nyimpfu	20	0%	40%	17%
2. xihancana	20	0%	40%	14%

2. xiharhi	20	0%	40%	14%
2. xinkankanka / yingwe	20	0%	40%	13%
2. xinkhovha	20	0%	40%	10%
2. xinyimpfana	20	0%	40%	16%
4. bete	20	0%	40%	15%
4. biloko	20	0%	40%	18%
6. vuhlalu bya le nkolweni	20	0%	40%	10%
6. vusenga	20	0%	40%	8%
6. xingwavila	20	0%	40%	10%
8. alamu	20	0%	40%	14%
8. hamula	20	0%	40%	17%
8. lipayisi / xotola nomo	20	0%	40%	21%
9. ko oxela	20	0%	40%	12%
2. hanci	20	0%	60%	26%
2. pilipili	20	0%	60%	25%
4. babulu	20	0%	60%	21%
4. choko	20	0%	60%	29%
4. dlilu	20	0%	60%	21%
4. xitori / ntsheketo	20	0%	60%	19%
4. phazili	20	0%	60%	27%
4. vumba	20	0%	60%	16%
5. sitiroberi	20	0%	60%	12%
5. soseji	20	0%	60%	14%
5. tinyawa	20	0%	60%	26%
5. tivhitamini	20	0%	60%	12%
5. xinkwa xa thost	20	0%	60%	16%

6. bokhathi	20	0%	60%	21%
6. jasi	20	0%	60%	15%
6. rhenikhoti	20	0%	60%	12%
6. swingwavila	20	0%	60%	16%
8. khuthekis (cutex)	20	0%	60%	21%
8. rhed-lipisi / lipisitiki	20	0%	60%	15%
8. sevhietete	20	0%	60%	11%
8. silothepi	20	0%	60%	20%
8. vhakhumu	20	0%	60%	12%
9. khoto	20	0%	60%	13%
10. phulu	20	0%	60%	17%
13. vakhithi	20	0%	60%	15%
13. wa vona ke	20	0%	60%	24%
14. hoxela	20	0%	60%	22%
14. khudlunya	20	0%	60%	17%
1. khuchu- khuchu	20	0%	80%	37%
1. kring-kring	20	0%	80%	34%
3. xitimela	20	0%	80%	42%
4. penisele	20	0%	80%	49%
5. kalavatla	20	0%	80%	41%
5. phayi	20	20%	80%	47%
5. pyere	20	0%	80%	39%
6. sandhasi	20	0%	80%	30%
7. nkava	20	0%	80%	60%
8. rhandi	20	0%	80%	44%
8. tliloko	20	0%	80%	19%
8. xifaniso	20	33%	80%	53%

8. xikurufu	20	0%	80%	20%
8. xilo	20	0%	80%	50%
8. xinepe	20	0%	80%	44%
8. xipaci	20	0%	80%	42%
8. xolumeka	20	0%	80%	31%
10. nghadi	20	0%	80%	24%
13. ketiketi	20	0%	80%	14%
13. xo xawula	20	0%	80%	32%
14. languta	20	30%	80%	57%
14. tshova	20	10%	80%	44%
1. achu	20	33%	100%	86%
1. cwi-cwi	20	25%	100%	56%
1. grrr	20	20%	100%	70%
1. ham ham	20	33%	100%	86%
1. hu hu	20	60%	100%	85%
1. kiip kiip kiip	20	0%	100%	44%
1. kikiliki	20	0%	100%	42%
1. mhee mhee	20	33%	100%	61%
1. mhooo	20	67%	100%	86%
1. miyawu	20	33%	100%	63%
1. mmmm	20	60%	100%	82%
1. piipiip	20	45%	100%	81%
1. wu wu wu	20	60%	100%	85%
1. yowee	20	33%	100%	65%
2. donki / mbongholo	20	50%	100%	77%
2. hlampfi	20	20%	100%	62%
2. homu	20	64%	100%	87%
2. mbyana	20	60%	100%	89%

2. xinyenyana	20	20%	100%	65%
3. basikiri	20	33%	100%	79%
3. thekisi	20	0%	100%	71%
4. buku	20	20%	100%	68%
4. ximpompana	20	33%	100%	70%
5. apula	20	60%	100%	88%
5. ayisi	20	40%	100%	77%
5. chepisi / nchungama	20	33%	100%	75%
5. chokoleti	20	30%	100%	69%
5. gwinya	20	40%	100%	85%
5. jamu	20	20%	100%	69%
5. juzi	20	20%	100%	81%
5. khekhe	20	40%	100%	86%
5. khodirinki	20	50%	100%	78%
5. lamula	20	40%	100%	85%
5. masi	20	60%	100%	93%
5. masimba	20	60%	100%	87%
5. mati	20	33%	100%	90%
5. miroho / matsavu	20	20%	100%	61%
5. mukapu	20	60%	100%	87%
5. nyama	20	60%	100%	85%
5. paloni	20	20%	100%	68%
5. rheyisi	20	20%	100%	70%
5. tamatisi	20	33%	100%	74%
5. tandza	20	33%	100%	80%
5. tiya	20	60%	100%	86%
5. vuswa	20	40%	100%	91%
5. xikhekhana	20	20%	100%	75%

5. xinkwa	20	33%	100%	83%
5. zambala / tapula	20	33%	100%	79%
6. buruku	20	40%	100%	81%
6. jesi	20	33%	100%	82%
6. ntanghu	20	33%	100%	82%
6. rhoko	20	20%	100%	70%
6. sokisi	20	20%	100%	76%
6. xidloko / kepisi	20	33%	100%	73%
6. xikete	20	0%	100%	59%
6. xikipa	20	33%	100%	76%
6. xorhangisa / phenti	20	30%	100%	60%
7. khwirhi	20	33%	100%	80%
7. misisi	20	60%	100%	88%
7. nenge	20	33%	100%	80%
7. nhloko	20	33%	100%	88%
7. nhompfu	20	20%	100%	72%
7. nkolo	20	0%	100%	65%
7. nomu	20	33%	100%	83%
7. rhama	20	20%	100%	68%
7. rintiho	20	20%	100%	67%
7. switshamu	20	0%	100%	53%
7. tihlo	20	40%	100%	83%
7. tino	20	33%	100%	73%
7. vele	20	33%	100%	71%
7. voko	20	33%	100%	80%
7. xilebvuu	20	0%	100%	46%
7. xinuma	20	0%	100%	48%

8. bikiri / khapu	20	20%	100%	74%
8. bodlela	20	33%	100%	78%
8. burachi	20	20%	100%	64%
8. burhachi ya meno	20	0%	100%	61%
8. lepula	20	20%	100%	81%
8. mali	20	40%	100%	88%
8. murhi	20	33%	100%	80%
8. thawula	20	44%	100%	80%
8. xibamu	20	25%	100%	64%
8. xisibi	20	50%	100%	77%
9. bavhu	20	33%	100%	72%
9. mubedwa	20	33%	100%	75%
9. sofa	20	33%	100%	69%
9. TV	20	60%	100%	88%
9. xitulu	20	33%	100%	83%
9. xitulu xa n'wana	20	0%	100%	68%
10. moya	20	0%	100%	71%
10. murhi / nsinya	20	20%	100%	69%
11. kereke	20	0%	100%	62%
12. hahani	20	0%	100%	70%
12. malume	20	0%	100%	68%
12. mhani / mama	20	67%	100%	94%
12. papa / bava	20	50%	100%	86%
12. sesi	20	33%	100%	80%
13. famba huma	20	33%	100%	70%
13. hay 5	20	50%	100%	83%
13. hlamba	20	33%	100%	77%

13. hlamba mavoko	20	0%	100%	73%
13. na kombela	20	33%	100%	81%
13. tete / u wisa kahle	20	25%	100%	75%
13. thatha / salani / bayibayi	20	33%	100%	82%
13. tisa	20	60%	100%	84%
13. tshika sweswo	20	0%	100%	65%
13. wa tshwa	20	25%	100%	68%
13. xap	20	50%	100%	81%
13. xoo	20	25%	100%	71%
14. ambala	20	0%	100%	66%
14. bana	20	50%	100%	81%
14. bebula	20	33%	100%	76%
14. huma	20	33%	100%	71%
14. tsutsuma	20	33%	100%	78%
14. vona	20	33%	100%	74%
14. furhetela	21	20%	67%	50%
10. mati	21	60%	100%	92%
10. mpfula	21	40%	100%	74%
5. muthotho	22	20%	100%	76%
13. avuxeni	22	50%	100%	78%
14. mamisa	22	33%	100%	63%
15. herile	22	25%	100%	59%
6. xoti	23	0%	80%	34%
8. rhekerhe	23	0%	80%	42%
10. xitepisi	23	0%	80%	39%
12. phorisa	23	0%	80%	42%
12. wansati	23	0%	80%	36%

14. hlongola / hlongorisa	23	0%	80%	47%
15. khudzehela	23	0%	80%	38%
15. swi herile	23	0%	80%	44%
16. sweswi	23	33%	80%	63%
17. xa hina	23	0%	80%	45%
17. ya wena	23	0%	80%	41%
19. ehandle	23	0%	80%	34%
1. brr	23	67%	100%	85%
5. yogati	23	20%	100%	66%
7. ndleve	23	33%	100%	80%
12. n'wana	23	0%	100%	78%
12. wanuna / malume	23	0%	100%	53%
13. hepi bethdeyi	23	25%	100%	74%
13. pipita	23	40%	100%	80%
14. cina / giya	23	33%	100%	82%
14. dyana	23	50%	100%	84%
14. etlela	23	50%	100%	79%
14. famba	23	60%	100%	82%
14. nwana	23	33%	100%	77%
14. pfuka	23	33%	100%	76%
14. pfula	23	33%	100%	79%
14. phokotela	23	33%	100%	73%
14. raha	23	25%	100%	67%
14. tana	23	33%	100%	79%
14. teka	23	33%	100%	73%
14. tisa	23	33%	100%	76%
15. hisa	23	30%	100%	72%

17. mina	23	33%	100%	77%
17. xa mina	23	33%	100%	69%
18. xihi	23	10%	100%	43%
19. a kule	23	20%	100%	59%
19. handle	23	0%	100%	53%
19. hi lexi	23	20%	100%	65%
20. ku hava	23	25%	100%	64%
2. jakalasi	24	0%	40%	14%
2. mangedyani	24	0%	40%	12%
2. maxindyani	24	0%	40%	10%
2. mhunti	24	0%	40%	18%
2. mangwa	24	0%	60%	21%
14. damarheta	24	0%	60%	26%
15. khomekile	24	0%	60%	20%
15. pinki	24	0%	60%	18%
15. xinyami	24	0%	60%	26%
2. hele	24	0%	80%	31%
7. xandla	24	0%	80%	39%
10. n'weti	24	0%	80%	27%
11. anhoveni	24	0%	80%	35%
14. bula	24	0%	80%	32%
14. dirowa/ tsala	24	0%	80%	39%
14. tsema	24	10%	80%	50%
15. sasekile	24	11%	80%	48%
16. mundzuku	24	0%	80%	40%
17. lexiya	24	20%	80%	56%
21. loko	24	0%	80%	41%
4. thoyi / xohuhwisa	24	20%	100%	68%

5. chukela	24	20%	100%	63%
5. mangwa	24	0%	100%	59%
6. ximbhulele	24	20%	100%	59%
7. ngati	24	20%	100%	65%
7. ririmi	24	33%	100%	70%
8. mukwana	24	33%	100%	71%
12. munhu	24	0%	100%	60%
13. pfuka	24	60%	100%	84%
14. yana	24	20%	100%	62%
14. hatlisa	24	20%	100%	63%
14. heta	24	20%	100%	61%
14. rila	24	33%	100%	77%
14. tlula	24	20%	100%	61%
14. veka	24	33%	100%	72%
17. lexi	24	33%	100%	69%
18. mani	24	20%	100%	64%
2. sekwa	25	0%	67%	28%
3. xihahampfhuka	25	0%	67%	32%
6. pijama	25	0%	67%	34%
7. nhlolo	25	0%	67%	30%
14. nantswa	25	0%	67%	47%
15. switsinini	25	0%	67%	42%
3. lori	25	0%	89%	64%
6. hembe	25	0%	89%	49%
8. swikhiya	25	0%	89%	62%
8. thochi	25	25%	89%	59%
8. vhasilapi	25	25%	89%	62%
13. jika / hundzulaka	25	0%	89%	58%

14. koka	25	25%	89%	61%
14. tshama	25	30%	89%	68%
15. chava	25	25%	89%	61%
6. mabuntsu	25	20%	100%	60%
10. barha	25	25%	100%	68%
11. akaya	25	33%	100%	78%
13. Ina	25	57%	100%	81%
14. hleka	25	40%	100%	75%
14. hoxa	25	20%	100%	59%
14. tumbela	25	25%	100%	63%
2. mbeva	26	0%	33%	10%
10. ampfungwe	26	0%	33%	9%
11. bichi / alwandle	26	0%	33%	9%
14. tlhambusa	26	0%	33%	14%
15. orenji	26	0%	33%	9%
16. e ndzhaku ka nkarhi	26	0%	33%	12%
16. ku nga se	26	0%	33%	10%
18. hikokwalaho ka yini	26	0%	33%	11%
20. xo ka xi nga ri xona	26	0%	33%	12%
21. swi nga leswi	26	0%	33%	13%
3. xibebe / baki	26	0%	67%	38%
8. njhekixini	26	0%	67%	25%
8. peni	26	0%	67%	29%
8. semendhe	26	0%	67%	38%
9. bence / bangisitulu	26	0%	67%	21%

9. vheranda	26	0%	67%	30%
10. ntshava	26	0%	67%	23%
10. nyeleti	26	0%	67%	25%
10. sava	26	0%	67%	35%
10. xochelela	26	0%	67%	24%
11. endyangu	26	0%	67%	30%
11. entirhweni	26	0%	67%	35%
11. molo	26	0%	67%	18%
11. ndhawu	26	0%	67%	17%
11. phaka	26	0%	67%	20%
12. dokodela	26	0%	67%	26%
14. avelana	26	0%	67%	30%
14. chayela	26	0%	67%	26%
14. dzinginisa / kucunga	26	0%	67%	27%
14. endzela	26	0%	67%	32%
14. ku ti endlisa	26	0%	67%	22%
14. langutisa	26	0%	67%	43%
14. lumeka	26	0%	67%	37%
14. lunghisa	26	0%	67%	35%
14. ringa	26	0%	67%	32%
14. ringeta	26	0%	67%	32%
14. susumeta	26	20%	67%	48%
14. thunya	26	0%	67%	32%
14. xinepe	26	0%	67%	38%
15. a xi kahle	26	0%	67%	28%
15. basa	26	0%	67%	38%
15. hlundzuka	26	0%	67%	33%
15. hoxile	26	0%	67%	27%

15. lumeka	26	0%	67%	31%
15. nyanganya	26	0%	67%	39%
15. pongo	26	0%	67%	40%
15. rihlaza	26	0%	67%	15%
15. siringa	26	0%	67%	34%
15. swarha	26	0%	67%	27%
15. tshwuka	26	0%	67%	22%
15. xi na huwa	26	0%	67%	36%
16. ku sungula	26	0%	67%	34%
19. jikajika	26	0%	67%	32%
5. malekere	26	20%	100%	70%
8. bakiti	26	33%	100%	64%
8. basikiti	26	0%	100%	26%
8. bokisi	26	20%	100%	66%
8. foroko	26	33%	100%	69%
8. manghilazi	26	0%	100%	47%
8. mencisi	26	0%	100%	55%
8. mopo	26	33%	100%	68%
8. ndhichi	26	20%	100%	69%
8. nkukulu	26	33%	100%	72%
8. nkumba	26	33%	100%	72%
8. phayiphi	26	30%	100%	59%
8. xikamu	26	33%	100%	74%
8. xikhigelo	26	33%	100%	65%
9. furiji	26	0%	100%	63%
9. gede	26	20%	100%	74%
9. khixi/ xitanga	26	0%	100%	59%
9. tafula	26	0%	100%	66%
11. phati	26	20%	100%	51%

11. vhengele	26	0%	100%	56%
11. yindlu	26	20%	100%	69%
12. buti	26	33%	100%	80%
12. mhanihulu	26	0%	100%	52%
13. e e / hayi	26	20%	100%	74%
13. fonela	26	40%	100%	70%
13. ix	26	0%	100%	71%
14. fonela	26	33%	100%	66%
14. nghena	26	20%	100%	66%
15. tsakama	26	30%	100%	63%
2. pume	27	18%	67%	43%
4. nyiko	27	0%	67%	28%
5. mayilo	27	0%	67%	29%
5. supu	27	0%	67%	42%
6. kinopo / nkunupu	27	0%	67%	36%
9. dirowa / layiki	27	0%	67%	27%
9. switepisi	27	0%	67%	30%
9. xawara	27	0%	67%	32%
10. rhavi	27	0%	67%	20%
14. hlawula	27	0%	67%	32%
14. gava	27	0%	67%	18%
14. kombisa	27	0%	67%	34%
14. ntsikwana	27	0%	67%	27%
14. penda	27	0%	67%	29%
15. antswa	27	0%	67%	36%
15. hetelela	27	0%	67%	31%
15. hi rivilo	27	0%	67%	30%
15. nkulu	27	0%	67%	34%

15. omile	27	0%	67%	31%
15. swa antswa	27	0%	67%	26%
15. swi lulamile	27	0%	67%	23%
15. timile	27	0%	67%	26%
15. vabya	27	10%	67%	37%
15. vevuka	27	0%	67%	24%
15. xikahle	27	0%	67%	39%
15. xintshwa	27	0%	67%	33%
16. ni madyambu	27	0%	67%	32%
16. ni mixo / mpundzu	27	0%	67%	35%
16. siku	27	0%	67%	35%
17. hi wexe	27	0%	67%	40%
17. ndzexe	27	0%	67%	32%
17. swa n'wina	27	0%	67%	33%
17. swa vona	27	0%	67%	30%
17. ya n'wina	27	0%	67%	36%
18. njhani	27	0%	67%	29%
18. rini	27	0%	67%	42%
19. ehenhla ka	27	0%	67%	24%
19. emahlweni ka	27	0%	67%	22%
19. endhzaku ka	27	0%	67%	23%
19. endzeni	27	0%	67%	34%
19. endzeni ka	27	0%	67%	23%
19. ethlelo ka	27	0%	67%	20%
19. lahaya	27	0%	67%	33%
19. lumeka	27	0%	67%	30%
19. ndzhaku	27	0%	67%	33%

20. hinkwaswo	27	0%	67%	31%
20. hinkwavo	27	0%	67%	27%
20. na yin'wana	27	0%	67%	28%
20. swa fana	27	0%	67%	33%
20. swin'wana	27	0%	67%	26%
20. swotala	27	0%	67%	35%
20. xin'wana na xin'wana	27	0%	67%	24%
2. chela	27	0%	100%	55%
3. xithuthuthu	27	33%	100%	74%
5. pitsa	27	20%	100%	69%
5. swakudya	27	33%	100%	63%
12. vito ra n'wana	27	0%	100%	53%
13. ku xaveni	27	20%	100%	65%
13. ndza khensa	27	25%	100%	66%
13. whaw	27	20%	100%	50%
13. xxxxx	27	20%	100%	57%
13. yoowee	27	0%	100%	60%
14. aka	27	0%	100%	44%
14. chela	27	0%	100%	55%
14. endla	27	20%	100%	64%
14. gija / huma	27	40%	100%	78%
14. hlohlonya / nwayisa	27	0%	100%	30%
14. kasa	27	20%	100%	63%
14. khoma	27	20%	100%	64%
14. luma	27	25%	100%	67%
14. pfala	27	33%	100%	74%
14. sula	27	0%	100%	57%

14. tlanga	27	20%	100%	60%
14. tova	27	25%	100%	64%
14. vula	27	20%	100%	60%
14. wana	27	20%	100%	57%
14. wisa	27	20%	100%	54%
15. kule	27	20%	100%	47%
15. leha	27	0%	100%	43%
15. ntima	27	0%	100%	27%
15. sis	27	20%	100%	48%
15. torha	27	25%	100%	62%
15. xavava	27	25%	100%	61%
16. namunthla	27	0%	100%	50%
16. vusiku	27	0%	100%	44%
17. vona	27	0%	100%	52%
17. xi	27	0%	100%	43%
17. yena	27	20%	100%	48%
18. kwihi	27	0%	100%	42%
18. yini	27	33%	100%	63%
19. a	27	25%	100%	58%
19. ehenhla	27	0%	100%	42%
19. hansi	27	20%	100%	59%
19. hi leyi	27	0%	100%	49%
19. kwala	27	20%	100%	47%
19. le	27	25%	100%	55%
19. na	27	0%	100%	45%
20. na	27	0%	100%	50%
20. na m1 / na yena	27	20%	100%	55%
20. xihelerile	27	0%	100%	34%

21. na	27	33%	100%	59%
21. se	27	11%	100%	52%
13. a swi hlekisi	28	0%	43%	19%
21. kambe	28	0%	43%	18%
7. katla	28	0%	57%	22%
9. sinki	28	0%	57%	20%
15. tivoneli	28	0%	57%	18%
15. vukheta	28	0%	57%	20%
15. ximoyana	28	0%	57%	23%
16. nkarhi	28	0%	57%	25%
20. vunyingi	28	0%	57%	19%
3. ambulense	28	0%	71%	37%
5. khereto	28	0%	71%	34%
6. xikafu	28	0%	71%	25%
7. minkondzo	28	0%	71%	45%
8. ganju	28	0%	71%	26%
8. jara	28	0%	71%	33%
8. khamera	28	0%	71%	35%
8. mbita	28	0%	71%	28%
8. phefumu	28	0%	71%	33%
9. garaji	28	0%	71%	45%
9. hitara	28	0%	71%	35%
10. byasi / ritlangi	28	0%	71%	37%
10. rheta	28	0%	71%	36%
11. erivalani	28	0%	71%	35%
11. garaji	28	0%	71%	34%
12. vito ra ximanga / mbyana	28	0%	71%	39%

14. basisa	28	0%	71%	35%
14. dikilida	28	20%	71%	51%
14. humesa	28	0%	71%	48%
14. jikisa	28	0%	71%	46%
14. ku tiva	28	0%	71%	40%
14. rhwala	28	0%	71%	47%
15. pfukile	28	0%	71%	44%
15. tika	28	10%	71%	47%
19. ehansi ka	28	0%	71%	27%
6. mathaputhapu	28	0%	86%	52%
6. silipasi	28	25%	86%	54%
8. khandlela	28	0%	86%	45%
8. xikero	28	0%	86%	62%
8. ximbhulele	28	30%	86%	61%
9. kamuri	28	0%	86%	48%
9. batirhumu	28	0%	86%	43%
10. dyambu	28	0%	86%	52%
10. tluka	28	0%	86%	36%
10. xiluva / bilomu	28	20%	86%	62%
12. mufana	28	0%	86%	43%
12. nhwanyana	28	0%	86%	41%
13. nkarhi wo tlela/ badama	28	0%	86%	50%
13. yimanyana	28	0%	86%	53%
14. jomba	28	0%	86%	47%
14. tsakamisa	28	25%	86%	63%
14. vukarha	28	0%	86%	50%
14. vuya la	28	10%	86%	46%

15. basile	28	0%	86%	35%
15. etlerile	28	0%	86%	46%
15. miyela	28	25%	86%	62%
15. pfala	28	20%	86%	57%
15. titimela	28	0%	86%	45%
15. twa ndlala	28	22%	86%	56%
5. xitokosiwitsi	28	0%	100%	53%
8. rivoni	28	0%	100%	59%
9. thoyilete	28	0%	100%	60%
10. ribye	28	0%	100%	64%
11. ahandle	28	0%	100%	53%
12. ricece / n'wana	28	11%	100%	58%
14. kukula	28	20%	100%	65%
14. vuya	28	33%	100%	70%
14. yima	28	33%	100%	71%
2. mpfundla	29	0%	50%	18%
2. nyoxi	29	0%	50%	30%
21. hikuva	29	0%	50%	13%
2. njiya	29	20%	75%	46%
10. dyiribye / tamba	29	0%	75%	32%
11. doroba	29	0%	75%	26%
15. thyakile	29	0%	75%	40%
19. timile	29	0%	75%	30%
2. risokoti	29	20%	100%	61%
2. ximanga	29	0%	100%	63%
4. baluni	29	0%	100%	59%
5. khonifleksi	29	0%	100%	56%

6. layere / phamphasi	29	20%	100%	67%
8. thyaka	29	0%	100%	62%
9. fasitere	29	0%	100%	68%
14. cukumeta thyaka	29	0%	100%	59%
17. wena	29	33%	100%	67%
2. nhuntlwa	30	0%	33%	9%
8. CD	30	0%	40%	10%
2. mbhaha	30	0%	50%	19%
2. dzedze	30	0%	50%	18%
6. baji / xilamba	30	0%	50%	18%
14. ehleketa	30	0%	50%	20%
14. hlula	30	0%	50%	20%
14. ku va na	30	0%	50%	21%
15. biraweni	30	0%	50%	14%
15. xitshopana	30	0%	50%	14%
2. nkuku	30	0%	67%	27%
4. ntlangu	30	0%	67%	27%
5. kofi	30	0%	67%	25%
5. muchayeni	30	0%	67%	19%
5. phopukhon / mbvacha	30	0%	67%	29%
6. nkwama	30	0%	67%	25%
6. vuhlalu	30	0%	67%	23%
9. chemba	30	0%	67%	19%
9. dip-firizi	30	0%	67%	22%
9. xelufu	30	0%	67%	29%
12. mudyondzisi	30	0%	67%	28%
15. lumekile	30	0%	67%	23%

2. kondlo	30	0%	83%	51%
2. nsuna	30	0%	83%	48%
2. nyoka	30	0%	83%	42%
2. phaphatani	30	0%	83%	43%
2. rhole	30	0%	83%	27%
2. thedibere	30	20%	83%	46%
2.xivungu	30	20%	83%	55%
4. khirayoni	30	0%	83%	39%
5. ayisipopo	30	20%	83%	60%
5. chizi	30	0%	83%	48%
5. khasitadi	30	0%	83%	34%
5. kwembe	30	0%	83%	37%
5. madiriva	30	0%	83%	40%
5. nyala	30	0%	83%	43%
5. perekisi	30	0%	83%	36%
5. sipagheti	30	0%	83%	29%
5. vhiyana	30	0%	83%	37%
6. bandi	30	0%	83%	49%
6. manghilavhu	30	0%	83%	37%
6. wachi	30	0%	83%	54%
6. zipi	30	20%	83%	48%
7. nhamu	30	0%	83%	44%
7. n'wala	30	0%	83%	51%
7. xikandza	30	0%	83%	56%
7. xikunwana	30	25%	83%	59%
7. -N'wana loyi... - xisuti	30	0%	83%	47%
8. dasibini	30	0%	83%	35%
8. maphilisi	30	0%	83%	33%

8. n'wala	30	0%	83%	47%
8. wachi	30	25%	83%	58%
8. xiponji	30	0%	83%	44%
9. kheteni	30	0%	83%	51%
9. makhirowevhi	30	0%	83%	33%
10. mujombhe	30	0%	83%	46%
10. nhonga	30	0%	83%	35%
10. xipedi	30	0%	83%	47%
11. exikolweni	30	0%	83%	38%
11. khirexe	30	0%	83%	43%
12. mhanintsongo	30	0%	83%	50%
12. munghana	30	0%	83%	38%
12. papantsongo	30	11%	83%	38%
12. vanhu	30	0%	83%	45%
13. bolo ya milenge	30	0%	83%	33%
13. ndzi ta ku kuma	30	0%	83%	27%
13. xikulu	30	0%	83%	44%
14. dyisa / phamela	30	33%	83%	62%
14. hlantswa	30	20%	83%	50%
14. hlaya	30	0%	83%	42%
14. hluvula	30	11%	83%	54%
14. kuma	30	0%	83%	42%
14. landzelela	30	0%	83%	52%
14. lombha	30	0%	83%	36%
14. n'wayitela	30	0%	83%	48%
14. nyika	30	20%	83%	56%

14. phutsela	30	0%	83%	39%
14. rhandza	30	11%	83%	52%
14. rheta	30	0%	83%	41%
14. tirha	30	0%	83%	46%
14. tlakusa	30	0%	83%	37%
14. tsakela	30	11%	83%	47%
14. tsala	30	20%	83%	55%
14. tumbeta	30	0%	83%	50%
14. xekelela	30	0%	83%	41%
15. karhele	30	0%	83%	46%
15. khale	30	0%	83%	42%
15. ku sungula	30	0%	83%	39%
15. ku tiya	30	0%	83%	34%
15. ku tsaka	30	0%	83%	40%
15. kufumela	30	0%	83%	39%
15. nandziha	30	20%	83%	55%
15. nonoka	30	0%	83%	29%
15. tshovekile	30	0%	83%	39%
15. vaviseka	30	20%	83%	48%
15. xintsanana	30	0%	83%	42%
15. xitele	30	0%	83%	41%
16. e ndzhaku	30	0%	83%	36%
17. hina	30	20%	83%	52%
17. leswi	30	10%	83%	45%
17. n'wina	30	11%	83%	43%
17. xa yena	30	0%	83%	42%
2. nguluve	30	20%	100%	58%
2. nhongana	30	0%	100%	50%
2. nkolombyana	30	20%	100%	49%

2. tuva	30	20%	100%	52%
2. ximbyanyana	30	33%	100%	65%
3. teretere	30	0%	100%	53%
4. xitsalu	30	0%	100%	52%
5. ayisikhirimi	30	33%	100%	72%
5. havhokhadi	30	0%	100%	52%
5. hlampfi	30	0%	100%	67%
5. munyu	30	0%	100%	45%
5. ph1batha	30	0%	100%	42%
5. rhama / botoro	30	20%	100%	61%
5. tamatisoso	30	30%	100%	65%
5. tihove	30	0%	100%	36%
5. timanga / timomgo	30	0%	100%	52%
5. vhoroso	30	20%	100%	66%
5. xifaki	30	20%	100%	60%
5. xikontso	30	0%	100%	56%
7. tsolo	30	30%	100%	58%
7. xifuva	30	0%	100%	47%
8. ayini	30	20%	100%	57%
8. chekasi	30	0%	100%	62%
8. ketlele	30	0%	100%	58%
8. nghilazi	30	0%	100%	54%
8. rhadiyo	30	0%	100%	59%
8. rhimoti	30	33%	100%	68%
8. thixu	30	30%	100%	69%
9. nyangwa	30	30%	100%	57%
9. wadirobo	30	0%	100%	55%
9. xitofu	30	0%	100%	56%

10. patu	30	20%	100%	57%
12. papahulu	30	0%	100%	43%
14. byela	30	0%	100%	58%
14. fika	30	0%	100%	53%
14. gogondza	30	20%	100%	61%
14. halata	30	20%	100%	58%
14. handzula	30	0%	100%	46%
14. hembra	30	0%	100%	40%
14. hlambela	30	0%	100%	47%
14. hlanta	30	0%	100%	51%
14. khandziya	30	30%	100%	65%
14. khiya	30	20%	100%	59%
14. ku twa	30	0%	100%	50%
14. navela	30	0%	100%	50%
14. ntluntlama	30	30%	100%	62%
14. ntswontswa	30	30%	100%	60%
14. pfuna	30	0%	100%	46%
14. pfuxa	30	0%	100%	55%
14. photosa	30	30%	100%	65%
14. siya	30	0%	100%	49%
14. sungula	30	0%	100%	50%
14. sweka	30	20%	100%	60%
14. vitana	30	25%	100%	64%
14. xava	30	25%	100%	66%
14. yimbelela	30	30%	100%	69%
14. yingisa	30	0%	100%	57%
15. henhla	30	20%	100%	57%
15. kusuhi	30	0%	100%	39%
15. xintsongo	30	0%	100%	45%

