A description of phonological patterns in Afrikaans children aged 24–72 months: A retrospective study

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LIST OF TERMINOLOGY

Phonological Disorder: An impaired system of phonemes and phoneme patterns within the context of spoken language. Exemplified by the improper use of phonemes to signify linguistic meaning within a language.

Phonological Patterns: A mental operation that applies in speech to substitute for a class of sounds or sound sequences presenting a common difficulty to the speech capacity of the individual.

Speech Sound Disorder: A breakdown in the speaker's production or cognitive representation of speech sounds.

LIST OF ABBREVIATIONS AND ACRONYMS

PD	**-**	Phonological Disorder
PP	**-**	Phonological Patterns
SLAM	**-**	Crowley and Baigorri School-age Language Assessment Measures
SLT	**-**	Speech-Language Therapist
SSD	**-**	Speech Sound Disorder

GLOSSARY

Phonological pattern:	Definition:
Consonant harmony/ Assimilation	Pronunciation of the whole word is influenced by the presence of a particular consonant in the word.
Context sensitive voicing/ pre-vocalic voicing	A voiceless sound preceding a vowel is replaced by a voiced sound.
Word-final devoicing	Substitution of a final voiced consonant with a voiceless consonant.
Coalescence	Substitution of two phonemes (consonant clusters) with a different phoneme.
Reduplication	Repetition of a complete or incomplete syllable.
Cluster reduction	Consonant clusters occur when two or three consonants occur in a sequence in a word. Part of the cluster is omitted.
Final consonant deletion	Deletion of the final consonant in the word.
Initial consonant deletion	Omission of the first consonant or consonant cluster in a word.
Weak syllable deletion	Omission of either stressed or unstressed syllables.
Epenthesis	Insertion/addition of another phoneme.
Metathesis/ Transposition	Transposition of sounds within a word.

Alveolarisation	Substitution of a non-alveolar with an alveolar sound /t/, /d/, /s/.
Labialisation	Substitution of a non-labial with a labial sound /m/, /p/, /b/.
Vocalisation/ Vowelisation	Substitution of /l/ or /er/ sounds in the final position, with a vowel.
Velar Fronting	A velar stop or nasal is replaced by an alveolar stop or nasal respectively.
Backing	Substitution of a more anteriorly produced phoneme with a posteriorly produced phoneme.
Palatal fronting/ Depalatalisation	Substitution of the palato-alveolar fricatives /ʃ/ and /ʒ/ by alveolar fricatives /s/ and /z/.
Gliding of liquids	Substitution of liquids /l/, /r/* by a glide /w/, /j/ or another liquid.
Deaffrication	Substitution of affricates with fricatives.
Affrication	Substitution of a non- affricate with an affricate.
Stopping	A fricative consonant or an affricate consonant is replaced by a stop.

ABSTRACT

A DESCRIPTION OF PHONOLOGICAL PATTERNS IN AFRIKAANS CHILDREN AGED 24-72 MONTHS: A RETROSPECTIVE STUDY

Purpose:

Afrikaans is one of eleven official languages in South Africa, spoken by 6.8 million speakers. However, limited information exists regarding phonological development in this speaker group. This study aimed to describe phonological patterns (PP) in Afrikaans speaking children aged 24–72 months. To the researcher's knowledge, no other studies have attempted to evaluate the phenomenon of PP in Afrikaans speaking children. Furthermore, no normative data have previously been collected to determine the prevalence rates of PP within a specific age range (24–72 months) in the Afrikaans speaking group. The study adds a valuable contribution by focusing on and capturing accurate and reliable information regarding the development of PP in specific age groups in the Afrikaans first-language speaker. Additionally, the study comments on the differences in the occurrence of PP between male and female speakers.

Method:

The data of 147 participants, distributed across the age range of 24–72 months, were used for this retrospective study. The study employed a retrospective, descriptive study design with comparative components. This retrospective study used previously collected electronic audio recordings from the research by Pringle et al. (2022) that included the speech production of Afrikaans children. The design allowed for the collection of quantitative data and analysed the PP types evident in each child's voice recordings in each age group. The data were analysed by professional speech-language therapists (SLTs) who were divided into panels of three members each for each age group. Statistical analyses were further done to determine the results of the study.

Results and discussion:

Results confirmed that all patterns still persisted after 72 months, except for word-final devoicing and vocalisation/vowelisation, which were fully eliminated by 72 months in Afrikaans first-language speakers. The gliding of liquids and an approximation of the trill /r/ had the highest prevalence among Afrikaans speakers. Statistically significant

differences occurred between the occurrence of a specific pattern between male and female participants.

Conclusion:

The study highlights the contribution that first-language Afrikaans speaking children manifest different prevalence rates for specific PP compared to other children of the same age in other languages. PP show distinct results for individual languages. The results of this study can serve as a guideline for Afrikaans SLTs in private practices or at schools to guide assessment and diagnoses, as well as guide intervention goals and targets for the specific population. The current study further provides a baseline for future research studies regarding PP in Afrikaans first-language speakers.

Keywords:

Afrikaans; age of elimination; consonant clusters; normative data; phonemes; phonological disorder; phonological patterns; speech sound disorder

Chapter One

Introduction and Literature Review

Chapter one aims to provide the reader with a comprehensive overview of current research and background information relating to the development of phonological patterns in children. Included in the overview is a summary pertaining to the limited research on phonological patterns in the first-language Afrikaans speaking child between the ages of 24–72 months. The chapter ends with a rationale and research question for this study.

"The child begins to perceive the world not only through his eyes but also through his speech" – *Lev Vygotsky*

Infants show pre-linguistic behaviours like vocalisations from birth (Serrat-Sellabona et al., 2021). Similarities occur in the combination of sounds in later babbling behaviours and the first words when vocal development is open to social input (Elmlinger et al., 2019). The development of a child's body structures and functions, as well as perception and production systems, takes time to become more advanced and attuned to the sounds of their native language (Philippsen, 2021). This development of the articulatory and phonological systems ranges from pre-linguistic skills, including babbling, to the early school years, which include completing the phonological system (Philippsen, 2021). The development of the phonological system refers to the acquisition of the form *(structure,* the internal grammatical structure of words and phrases and the words themselves in a target language) and function *(purpose,* the active use of language for a specific purpose) of speech sounds within a language system (Ahmed & Bidin, 2016). The development of these aspects is crucial for intelligible speech. Social participation, educational engagement, achievement, and a child's overall quality of life can be negatively impacted by unintelligible speech, regardless of the foundational cause (Hustad et al., 2021).

Intelligible speech incorporates accurate length and nature of speech [single words, individual sentences, narrative discourse, conversational discourse], accurate production of vowels and consonants, syllable structures, and prosody (Hustad et al., 2020). This can better be explained through the sequence of speech sound acquisition in four phases: Phase 1 - Laying the foundations for speech (birth to one year); Phase 2 - Transitioning from words to speech (one to two years); Phase 3 - The growth of the

speech sound inventory and syllable structures as well as grammatical and syntactical structures (two to five years); and Phase 4 - Mastery of speech including timing, prosody, accuracy, and literacy [five+ years] (McLeod, 2017). The consistent production of speech sounds in the initial, medial and final position in syllables or words (in a functional context) suggests proficiency in the articulatory (phonetic) and phonological areas of the sound in a language (van Haaften et al., 2020). After speech sound acquisition has been established, knowledge of the patterns formed by seemingly meaningless isolated sound elements in a language develops (Berent, 2013). Words are formed by combining these sound elements according to specific language rules and sound systems of a particular language (Alduais, 2015). This process of using sounds in a language is known as phonology (Cushing & Hellmuth, 2016).

Phonological patterns (PP), previously known as phonological processes, refer to an impediment in the ability and system of voice production and perception of language, resulting in a set of linguistic cognitive abilities that replaces or excludes key phonological components (Asad et al., 2018; Rose & Inkelas, 2011). Mispronunciation or alterations of words also occur due to the lack of complete conceptual understanding of the correct pronunciation of sounds, leading to particular PP (Fringi et al., 2015). Thus, variations arise in the combination of phonemes (Abou-Elsaad et al., 2019) leading to a phonological disorder (PD).

Speech and the development of all aspects of language, including speech sounds, vocabulary and syntax involve a high level of coordination. Delays in one area, or a restricted capacity to encode information, may lead to difficulties or delays across multiple other areas of language development, resulting in errors (Bernthal et al., 2017). A PD refers to an impairment in the comprehension and use of the speech sound system and its governing rules relevant to a target language (Randolph, 2017). A PD is part of the theory-neutral term speech sound disorders (SSD) and is one of the most prevalent communication disorders in young children (Combiths et al., 2019). Speech sound disorders are defined as “an umbrella term referring to any combination of difficulties with perception, motor production, and/or the phonological representation of speech sounds and speech segments…that impact speech intelligibility” (Bernthal et al. 2017, p.3). In simple terms, it refers to a range of limitations concomitant with perceptual, speech, motor, or linguistic processes (or combinations), which can be

known or unknown in origin, leading to difficulties in producing speech sounds (Namasivayam et al., 2020). Phonological patterns should be embedded in the auditory and motor systems of the phonetic channel to ensure sufficient transmission of words (Berent, 2013). Consequently, production errors occur due to the intricacy of the accurate production and articulation features (McLeod & Crowe, 2018).

Children often present with phonological errors before the acquisition of phonemes occurs (Pringle et al., 2022). The acquisition of phonological skills does not occur in a consistent pattern among some children, which leads to delays or deviations in the process (Ceron et al., 2017). Bowen (2015) stated that Grunwell (1987) described the term “deviation” as the nonconformity of word production by a child from the adult form of production (Bowen, 2015). The inability to produce a given phoneme (vowels, and often consonants or consonant clusters) through poor coordination and activation of muscles explains a phonological disorder within children with the atypical acquisition of phonological skills by the expected age (Ceron et al., 2017). Two ways of analysing children’s speech sound development include speech sound production, referring to motor-based SSDs (phonetic acquisition) versus speech sound use, referring to linguistic-based SSDs [phonemic acquisition] (Dodd et al., 2003). Developmental information is essential to investigate further and provide clinically-sensitive research in child phonology (Pascoe et al., 2018).

1.1 Historical Premise of Phonological Disorder

Speech-Language Therapists (SLTs) began to show interest in understanding the underlying nature and cause of difficulties in speech sound production. They motivated the first publication of Robert West in 1937 – *The Rehabilitation of Speech* (Bowen, 2015). Several authors’ longitudinal studies have been aimed at developing the phonological pattern framework for normal phonemic acquisition and error patterns. These long-standing studies include those of Poole (1934), Van Riper (1939), Templin (1957), Stampe (1973), Grunwell (1975), Ingram (1976), Hodson (1980), Hodson and Paden (1983), and Smit (1990) (Bowen, 2015). The analysis of PP has also been used to describe the disordered speech patterns of children. Consequently, these attempts have led to the development of strategies which describe disordered speech patterns, target PP, and change the application thereof (Dodd & Iacano, 1989).

According to Bailoor and colleagues (2014), fronting, cluster reduction, final consonant deletion and initial consonant deletion may even persist at four years of age since clusters, and all phonemes, are not fully acquired by then (Bailoor et al., 2014). As the child ages, the development of affricates and stops occurs, leading to a decrease in PP (Bailoor et al., 2014). Speech delays are manifested if PP persists beyond the age of elimination (Abou-Elsaad et al., 2019). Cluster reduction is one of the very few patterns to persist after the age of six years in Portuguese speaking children (Ceron et al., 2017). Research by Goldstein and Iglesias (1996) focused on PP in children speaking Spanish in the Puerto Rican dialect. These researchers recorded that numerous substitution and omission errors occurred. Between the ages of three to three years and 11 months evident PP were cluster reduction, stopping, liquid simplification, and initial consonant deletion (Goldstein & Iglesias, 1996). Between the ages of four to four years and 11 months, cluster reduction, liquid simplification, and stopping were recorded (Goldstein & Iglesias, 1996). Bland-Stewart (2016) reported that patterns that persist after the age of three years in Standard American English include cluster reduction, epenthesis, gliding of liquids, vocalisation, stopping, depalatalisation, and final devoicing (Bland-Stewart, 2016). Smith et al. (2005) found that females have an advantage in language abilities and language acquisition until 36 months of age. Ceron et al. (2017) also stated that the male brain may be developing at a slower pace than females. These results indicate that several studies in various countries have been conducted to identify the occurrence of PP in the home language or among males and females speaking foreign languages.

Although the mentioned languages have been well-categorised and documented, only a few studies have tried to identify the age and gender at which PP are present in the speech of functionally developing children within specific linguistic populations (Dodd et al., 2003). To date, no other studies have established efforts to evaluate the phenomenon of PP in Afrikaans speaking children. Additionally, no normative data have previously been collected to determine the occurrence of PP in the Afrikaans speaking group of 24-72 months.

Goldstein and Iglesias (1996) proposed three possible consequences relating to a lack of developmental phonological data for a specific target population. These consequences are a) a delay or absence of diagnostic and therapeutic services, b) the inappropriate labelling of phonological skills in both typically developing and

phonological disordered children, and c) a misdiagnosis of PD due to the lack of reliable data and the use of data collected by those speaking the non-targeted dialect (Goldstein & Iglesias, 1996). For this reason, the current study is a valuable contribution as it focuses on and captures accurate and reliable information regarding the development of PP in specific age groups in the Afrikaans first-language speaker.

1.2 Afrikaans Language System

Den Besten (2009) stated that Afrikaans developed from Cape Dutch after its introduction by the Dutch merchants who arrived in the Cape in the 1600s. Afrikaans is related to the European languages of English, German, and Dutch as it is part of the West Germanic language group and therefore shows similarities in phoneme inventories (Heeringa et al., 2015). Although many similarities and relations are evident, Afrikaans developed in relative isolation in Africa and underwent internal and external changes (Bos, 2016). These changes included contact with other languages in South Africa such as traditional Dutch, German, and French, contact with the indigenous Khoisan people, and African and Asian slaves (Bos, 2016). Therefore, the Afrikaans language developed a distinctive phoneme inventory (Bos, 2016) although highly influenced by Dutch (Den Besten, 2009). Afrikaans is the language with the third highest number of speakers in South Africa as it is spoken by approximately 6,8 million people as their first-language (Alexander, 2021).

Two main divisions exist for classifying Afrikaans phonemes: vowels and consonants (Coetzee, 2018). The monophthongs and diphthongs of Afrikaans, and an example of an Afrikaans word containing the vowel are represented in Table 1.

Table 1 *The vowels of Afrikaans*

Monophthongs	Example of an Afrikaans word that contains the monophthong	The English translation of the Afrikaans word
Short Afrikaans monophthongs		
/i/	D**ie**p	Deep
/y/	N**uu**t	New
/ə/	V**i**s	Fish
/ɛ/	H**e**mp	Shirt
/œ/	H**u**t	Hut
/ɑ/	J**as**	Coat
/ɔ/	Kl**o**p	Knock
/u/	H**oe**d	Hat
Long Afrikaans monophthongs		
/e:/	B**e**ne	Bones
/ø/	N**eu**t	Nut
/a:/	K**aa**rt	Map / card
/o:/	Gl**o**	Believe
Afrikaans diphthongs		
Diphthongs	**Example of an Afrikaans word that contains the diphthong**	**The English translation of the Afrikaans word**
/əi/	Br**ei**	Knit
/œu/	K**ou**s	Sock
/œy/	H**ui**s	House

Adapted from Coetzee (2018), Carstens and Bosman (2014) and Wissing (2020).

Afrikaans consonants can be divided into multiple groups relating to their manner of production and include plosives, affricates, nasals, trills, fricatives, approximants, and laterals (Carstens & Bosman, 2014). Afrikaans also includes consonant clusters containing more than one consonant. The consonants of Afrikaans – single consonants and clusters – together with an example word, are presented in Table 2.

Table 2 *The consonants and consonant clusters of Afrikaans*

Consonants	Example of an Afrikaans word that contains the consonant	The English translation of the Afrikaans word
Plosives		
/p/	**P**adda	Frog
/t/	**T**abel	Table
/k/	**K**ind	Child
/b/	**B**adkamer	Bathroom
/d/	**D**eksel	Lid
/g/	Ber**g**e	Mountains
Affricates		
/tʃ/	**Tj**ek	Cheque
/dʒ/	**J**ellie	Jelly
Nasals		
/m/	**M**aan	Moon
/n/	**N**et	Net
/ɲ/	Ho**n**djie	Doggie
/ŋ/	Ha**ng**er	Hanger
Alveolar trill		
/r/	**R**uik	Smell
Uvular trill		
/R/	**R**ooi (dialect in Western Cape)	Red
Fricatives		
/f/	**V**ee	Sweep
/s/	Pie**s**ang	Banana
/ʃ/	**Sj**okolade	Chocolate
/x/	**G**eel	Yellow
/v/	**W**olke	Clouds

Table 2 continued *The consonants and consonant clusters of Afrikaans*

/z/	**Z**ulu	Zulu
/ɦ/	**H**elp	Help
Approximant		
/j/	**J**a	Yes
Lateral		
/l/	**L**aai	Drawer
Consonant clusters of Afrikaans		
Consonant phoneme clusters consisting of two phonemes		**Consonant phoneme clusters consisting of three phonemes**
/rt/, /rk/, /nt/, /st/, /kr/, /dr/, /br/, /sk/, /bl/, /pl/, /xl/, /kl/, /fl/, /lt/, /lf/, /lp/, /lk/, /rs/, /sl/, /ls/, /ts/, /ks/, /sp/, /pr/, /tr/, /rx/, /xr/, /sw/, /kw/, /kn/, and /ŋk/		/spr/, /str/, and /skr/

Adapted from Coetzee (2018), Lotter (1974) and Wissing (2020).

In Table 3, the ages of acquisition of the sounds of Afrikaans as determined by Pringle et al. (2022), are portrayed.

Table 3 *Age of acquisition of the sounds of Afrikaans*

Type of phoneme	When acquired in Afrikaans
Vowels	All vowels are acquired by the age of two years.
Consonants: 24–35 months	**Plosives**: All plosives, /p/, /t/, /k/, /b/, /d/, and /g/, are acquired by the age of two years in Afrikaans. **Nasals**: /m/, /n/ and /ŋ/ are already acquired by the age of two years in Afrikaans. **Approximant**: The palatal approximant /j/ is acquired by the age of two years. **Fricatives**: Four fricatives, /ɦ/, /f/, /v/, and /x/, are acquired by the age of two years. Fricatives not acquired by the age of two years are /s/, /z/, and /ʃ/. **Affricates**: The mean age of the acquisition of the /tʃ/ is four years, and for the /dʒ/, three years. **Lateral**: The two-year-old group had not acquired the /l/. **Trill**: The two-year-old group had not acquired the /r/.
Consonants: 36–47 months	**Nasals**: The three-year-old group acquired the last nasal consonant, namely the velar /ŋ/. **Affricates**: The /tʃ/ is acquired by the three-year-old group. The /dʒ/ is typically acquired by the age of three years. **Lateral**: The lateral /l/ is acquired by the age of three years. **Fricatives**: The three-year-old group has still not acquired the /s/, /z/, and /ʃ/. **Trill**: The three-year-old group had not acquired the /r/.
Consonants: 48–59 months	**Fricatives**: The last three fricatives, /s/, /ʃ/, and, /z/, are acquired by the age of four years. **Trill**: The trill /r/ is not yet acquired by the age of four years as the production accuracy is not met.
Consonants: 60–71 months	**Trill**: The trill /r/ is acquired by the age of five years.
Consonants: 72 months	All phonemes are mastered (90% correctly produced) by the age of six years.

Table 3 continued *Age of acquisition of the sounds of Afrikaans*

Consonant clusters: Insertion, deletion, metathesis and substitution errors can be made while children produce consonant clusters (Collée, 2018).	**24–35 months**: Acquired the /nt/, /kl/, /lk/, and /kw/ clusters. **36–47 months**: Acquired nine consonant clusters, namely, /bl/, /pl/, /xl/, /fl/, /lt/, /lf/, /lp/, /kn/, and /ŋk/. **48–59 months**: Acquired ten consonant clusters, namely /st/, /sk/, /rs/, /sl/, /ls/, /ts/, /ks/, /sp/, /rx/ and /sw/. **60–71 months**: The consonant clusters acquired by the age of five years are /rt/, /rk/, /kr/, /dr/, /br/, /pr/, /tr/, /xr/, /spr, /str/, and /skr/. **72 months**: All Afrikaans consonant clusters exceed the acquisition criterion at six years as all the clusters are acquired by the age of five years.

Adapted from (Pringle et al., 2022).

The acquisition of consonants has been well-known to play a vital role in the decision-making process for children with SSD (Crowe & McLeod, 2020). McLeod and Crowe (2018) asserted that by the age of five years, most children acquired the accurate production of consonants in words across several languages (McLeod & Crowe, 2018). Other research indicates that at the age of five years, a child should be able to accurately use and produce the speech sounds of their mother tongue in all positions (Brancalioni et al., 2012). The normative data for acquiring Afrikaans phonemes have been summarised by Pringle et al. (2022), as seen in Table 3. The study indicated that all Afrikaans phonemes, including vowels (acquired at the age of two years), consonants, and consonant clusters, are acquired by the age of five years (Pringle et al., 2022). In recent years, studies relating to speech sound development of multiple languages in South Africa included those surrounding isiXhosa (Maphalala et al. 2014), Setswana (Mahura & Pascoe, 2016), South African English (Pascoe et al. 2018; van Haaften et al., 2020) and Pringle (2022) for Afrikaans.

Language-specific developmental norms can be functional in identifying if an SSD is absent or present. However, Storkel (2019) argues that the types of errors being made should be highly prioritised during an assessment rather than just collecting information about which sounds and at what age those sounds are in error (Storkel, 2019). Thus, identifying an SSD should be based on numerous measures of development as the acquisition of speech sounds is too complex to only be measured

through an exclusive data point representing typical development (Storkel, 2019). Four points needed are a) the total number of errors, b) intelligibility, c) error patterns, and d) types of errors (Storkel, 2019). Hodson (2011) agrees that although there are normative data for phoneme acquisition, intelligibility is much more significant. Phonological disorders can render speech unintelligible in moderate to severe cases (Ceron et al., 2017). Consequently, the need for children to be intelligible before entering school rises extensively; therefore, assessment and intervention should focus on identifying and treating PP (Hodson, 2011).

1.3 Identification of PP

The identification of PP provides a framework for describing, rather than explaining error patterns in children's speech (Bailoor et al., 2014). Language-specific PP occurs (Lin & Johnson, 2010). Researchers need to establish normative data for their linguistic target population to accurately compare and identify language deficiencies in children's performance (Bland-Stewart, 2016). More than 40 different patterns have been identified within child phonology, although only a handful occurs with any frequency (Bailoor et al., 2014). Two types of patterns are identified, which include the natural patterns (also called typical or developmental) that commonly occur during the acquisition of speech and the unnatural patterns (atypical or non-developmental) that rarely or never occur in typically developing children (Asad et al., 2018). The sound patterns that are grounded in the physical properties of speech, including articulation and perception, are described by modern phonologists as "natural" patterns (Kawahara, 2020). Unnatural sound patterns are characterised by a lack of clear phonetic grounding with no reasonable exclusive phonetic source, origin, or explanation (Asad et al., 2018; Blevins, 2006). The occurrence of these types of patterns may be seen as a developmental phonological disorder. Early diagnosis and efficient treatment planning may be more accurate when information regarding the type and frequency of PP can be identified in both typical acquisition and PD (Ceron et al., 2017).

Abou-Elsaad et al. (2019), Bernthal et al. (2017), and Van Haaften et al. (2020) outlined three categories developed to group the natural, most common PP. These include a) assimilation (when a sound in the word becomes similar to an adjacent sound in the word, b) modification of syllable structures (sound changes that affect the structure of the syllable in the target word, and c) substitution (when a sound is

systematically substituted by another) (Abou-Elsaad et al., 2019; Bernthal et al., 2017; van Haaften et al., 2020). These patterns result in simplification, which leads to a loss of phonemic contrast (Bailoor et al., 2014). This description is, however, limited to the PP that has been known to occur regularly in young children's speech. The most common PP and the approximate ages of elimination in typical acquisition in the English language are presented in Table 4.

Table 4 *Common phonological patterns and their approximate ages of elimination in typical acquisition in the English language*

Phonological pattern:	Definition:	Example:	Age of suppression/ elimination for English
Assimilation patterns:			
Consonant harmony/ Assimilation	Pronunciation of the whole word is influenced by the presence of a particular consonant in the word.	**Bed**: /bed/ /beb/ **Dog**: /dɒg/ /gɒg/	3:0-4;0
Context-sensitive voicing/ pre-vocalic voicing	A voiceless sound preceding a vowel is replaced by a voiced sound.	**Pig:** /pɪg/ /bɪg/ **Kiss:** /kɪs/ /gɪs/	3;0
Word-final devoicing	Substitution of a final voiced consonant with a voiceless consonant.	**Red:** /red/ /ret/ **Bag:** /bæg/ /bæk/	3;0
Coalescence	Substitution of two phonemes with a different phoneme.	**Smoke:** /sməʊk/ /fəʊk/ **Spoon:** /spu:n/ /fu:n/	--
Reduplication	Repetition of a complete or incomplete syllable.	**Water**: /ˈwɔ:tə(ɹ)/ /wawa/	2;5-3;0
Modification patterns: (Syllable structure)			
Cluster reduction	Deletion of one element of the cluster. Consonant clusters occur when two or three consonants occur in a sequence in a word. In cluster reduction, part of the cluster is omitted.	**Plane:** /pleɪn/ /peɪn/ **Blue:** /blu:/ /bu:/ **Ant:** /ænt/ /æt/ **Try:** /traɪ/ /taɪ/	4;0
Final consonant deletion	Deletion of the final consonant in the word. The final consonant in the word is omitted.	**Dog:** /dɒg/ /dɒ/ **Home:** /həʊm/ /həʊ/ **Rough:** /rʌf/ /ɹʌ/	3;3
Initial consonant deletion	Omission of the first consonant or consonant cluster in a word.	**Toy:** /tɔi/ /ɔi/	2;0 Atypical pattern seen in more severe delays

Table 4 continued *Common phonological patterns and their approximate ages of elimination in typical acquisition in the English language*

Weak syllable deletion	Omission of either stressed or unstressed syllables.	**Banana:** /bəˈnɑːnə/ /nɑːnə/ **Again:** /əˈgeɪn/ /geɪn/ **Tidying:** /taɪdɪŋ/ /taɪɪŋ/ **Telephone**: /ˈtelɪfəʊn/ /ˈtefəʊn/	4;0
Epenthesis	Insertion/addition of another phoneme.	**Blue:** /bluː/ /beluː/ **Plate:** /pleɪt/ /pʌhleɪt/	8;0
Metathesis/ Transposition	Transposition of sounds within a word.	**Spaghetti:** /spɑghettɪ/ /bɑskettɪ/	7;0
Substitution patterns:			
Alveolarization	Substitution of a non-alveolar with an alveolar sound /t/, /d/, /s/.	**Chew**: /tʃuː/ /tuː/ **Shop:** /ʃɒp/ /tɒp/	5;0
Labialization	Substitution of a non-labial with a labial sound /m/, /p/, /b/.	**Take:** /teɪk/ /beɪk/	6;0
Vocalisation/ Vowelisation	Substitution of /l/ or /er/ sounds in the final position with a vowel.	**People:** /ˈpiːpl/ /pɪpo/ **Teacher:** /tiətʃe(r)/ /tiətʃo/	--
Velar Fronting	Velars are realised as sounds produced further forward in the oral cavity (typically alveolars). A velar stop or nasal is replaced by an alveolar stop or nasal, respectively.	**Car:** /kɑː(r)/ /tɑː(r)/ **Kiss:** /kɪs/ /tɪs/ **Give:** /gɪv/ /dɪv/ **Wing:** /wɪŋ/ /wɪn/	3;6
Backing	Substitution of a more anteriorly produced phoneme with a posteriorly produced phoneme.	**Boat:** /bəʊt/ /bəʊk/ **Tap:** /tæp/ /cæp/	4;0-5;0

Table 4 continued *Common phonological patterns and their approximate ages of elimination in typical acquisition in the English language*

Palatal fronting/ Depalatalization	Substitution of the palato-alveolar fricatives /ʃ/ and /ʒ/ by alveolar fricatives /s/ and /z/. Palatal sounds are realized as sounds produced further forward in the oral cavity (typically alveolars).	**Ship:** /ʃɪp/ /sɪp/ **Fish:** /fɪʃ/ /fɪs/	3;9
Gliding of liquids	Substitution of liquids /l/, /r/* by a glide /w/, /j/ or another liquid.	**Rabbit:** /ˈræbɪt/ /wæbɪt/ **Real:** /riəl/ /wiəl/ **Leg:** /leg/ /jeg/	5;0
Deaffrication	Substitution of affricates with fricatives.	**Church:** /tʃɜ:tʃ/ /ʃɜ:tʃ/ **Page:** /peɪdʒ/ /peɪdz/ **Chop:** /tʃɒp/ /ʃɒp/ **Sip:** /sɪp/ /tʃɪp/ **Cheap:** /tʃiəp/ /tiəp/	4;0
Affrication	Substitution of a non-affricate with an affricate.	**Sheep:** /ʃi:p/ /tʃI:p/ **Door:** /dɔ:(ɹ)/ /dʒɔ:(ɹ)/	3;0
Stopping	A fricative consonant or an affricate consonant is replaced by a stop.	**Sun:** /sʌn/ /tʌn/ **Funny**: /'fʌnɪ/ /pʌnɪ/ **Jump:** /dʒʌmp/ /dʌmp/	See below
Approximate ages of suppression/elimination for stopping of fricatives and affricates in English speaking children:			
/f/, /s/	**Funny**: /fʌni/→/pʌni/ **Sip:** /sɪp/→ /tɪp/		3;0
/v/, /z/	**Van:** /væn/ → /bæn/ **Zoo:** /zu:/ → /du:/		3;6
/ʃ/, /dʒ/, /tʃ/	**Ship:** /ʃɪp/ → /dɪp/ **Jump:** /dʒʌmp/ → /dʌmp/ **Chip:** /tʃɪp/ → /tɪp/		4;6
/θ/, /ð/	**Thing:** /tɪŋ/ → /tɪŋ/ **Them:** /ðəm/ → /dəm/		5;0

* In Afrikaans, an adaptation occurs with regards to the gliding of liquids and the trill /r/, where children tend to replace the trill /r/ in words with an approximant /ɹ/ or a /j/ or /l/. Thus whenever referring to gliding of liquids, the pattern is better explained as an approximation for this population. Adapted from Bauman-Waengler (2014), Bernthal

et al. (2017), and Grunwell (1987, as cited in Bowen, 2015), and Shipley and McAfee (2016).

Typical phonological development implies that the overall growth of language in the child is closely related to the acquisition of a functional sound system (Pyata & Banik, 2016). Linguistic differences between languages can also affect phonological development (Viterbori et al., 2018). The typical pattern of phonological development needs to be well understood within the linguistic target groups since it will assist in the identification of individuals who show deviations from the acceptable pattern (Bland-Stewart, 2016). Van Haaften et al. (2020) highlight that typical phonological development is denoted through an amplification in phonological contrasts and a decrease in simplification patterns (van Haaften et al., 2020). The results from well-known authors (Bauman-Waengler, 2014; Bernthal et al., 2017; Grunwell, 1987), as indicated in Table 4, may lend themselves to the assumption that typical PP are acceptable up until the age of five years, where after patterns should decline and be eliminated (Bowen, 2015). As the child matures and more adult-like speech emerges, PP are modified, adapted and eliminated (Bland-Stewart, 2016), and speech becomes more intelligible.

The caseloads of SLTs mainly comprise children with SSDs, thus including a PD (Jesus et al., 2015). Diagnosing SSD warrants a single measure and a more comprehensive depiction of development, considering the range and variability in development relating to best practices (Storkel, 2019). It is within the SLT's scope of practice to assess and make decisions about whether a child's speech is functional or not (American Speech Language Hearing Association, 2016). Goldstein and Washington (2001) also reiterated that SLTs are required to examine the nature and quantity of specific pattern types during an assessment (Goldstein & Washington, 2001). It is also critical to present a framework for the normative age of elimination of PP [four years old in typically developing speakers] (Bowen, 2015; Peña-Brooks & Hegde, 2015).

The two most relevant historical studies on PP relating to Germanic languages include the English study by Dodd et al. (2003) and that of Beers (1995) on Dutch. The results of these two studies indicated that Dutch children up until the age of four produce the following errors: cluster reduction, the substitution of segments and deletion of final

consonants, while English speaking children presented with substitution errors until the age of five years and 11 months, and cluster reduction until four years and 11 months (Collée, 2018). These results indicate that phonological patterns transpire in different languages but are not eliminated at the same age (Clausen & Fox-Boyer, 2017). To date, no similar study has been done for Afrikaans.

Afrikaans is the third most spoken of the 11 official languages in South Africa (StatsSa, 2018). Later language impairment is determined by early atypical phonological development (Viterbori et al., 2018). With a definite need identified among SLTs, the present study focuses on describing phonological patterns in Afrikaans speaking children aged 24-72 months. Without the required support through the appropriate type and amount of therapy during the preschool years, the risk for academic and socio-emotional difficulties increases (Sugden et al., 2018). Clinical phonological assessment relies on the availability of essential, representative normative data that reflects the true population to make clinical decisions (Dodd et al., 2003). Differences in the rate of acquisition of words in young children have an impact on later language, literacy, and academic success (Howard & Melhuish, 2017). Storkel (2019) stated that developmental norms determine if a speech sound disorder is present or absent. When these norms are coupled with accessory measures (total number of errors, normative data about error types and patterns), a rational and detailed diagnosis can be made. Shipley and McAfee (2016) stated that the PP approach provides an advantage when evaluating articulation, as the SLT can identify and target error patterns to restore more than one simultaneously.

When the developmental norms, such as those of Pringle et al. (2022), in Table 3 are coupled with additional measures, including the error types, and error patterns, SLTs can make an accurate and insightful evidence-based diagnosis and implement EBP into their daily practices (Storkel, 2019). Therefore, the rationale of this study was to provide SLTs with evidence-based guidelines and data for describing PP in Afrikaans speaking children. This data can be used to determine whether phonological patterns should be eliminated, or if the presence thereof is still acceptable since developmental norms are determined to improve upon limitations. This rationale leads to the research question: What is the typical description of PP in an Afrikaans first-language speaker in the age groups between the ages of 24–72 months?

Chapter Two

Method

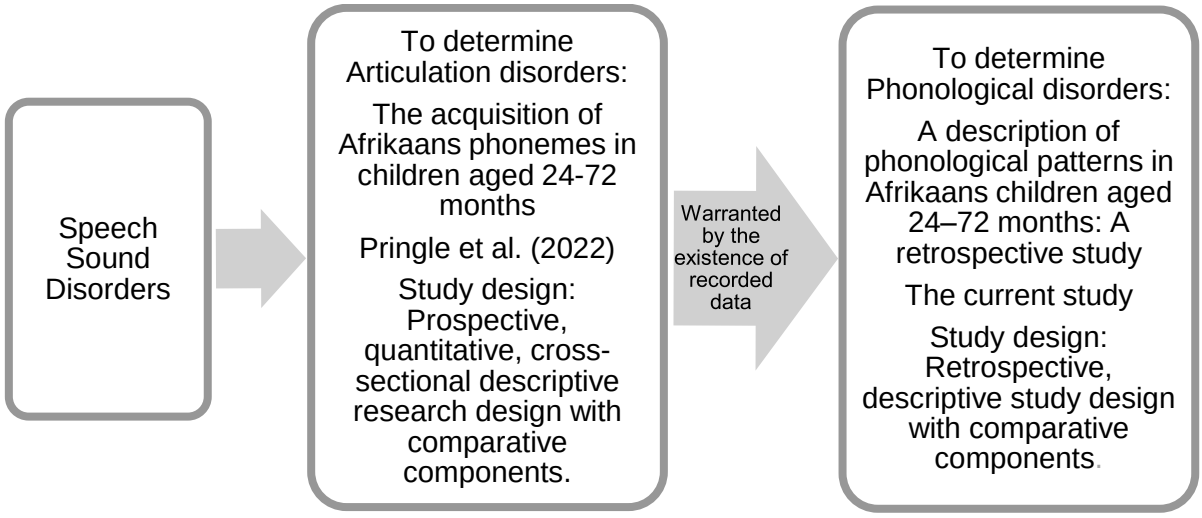
Chapter two aims to provide the reader with a broad, descriptive outline of the research procedures that were followed. The aims of the study, as well as the research design, participants, material and apparatus, and procedure for data analysis throughout the study, are described in this chapter. A pilot study is shortly described with the aim and conclusion. The chapter describes all ethical principles that were considered and concludes with the validity and reliability of the study.

"Children do learn what they live. Then they grow up to live what they've learned." – *Dorothy Nolte*

2.1. Research Aims and Objective

The study aimed to determine and describe PP in the Afrikaans first-language speaking child, age groups 24–72 months. The study had two objectives. The first was to describe the various PP produced per age group. The second objective was to compare the results of male and female participants for various PP per age group (24-72 months).

2.2. Research Design



The study employed a retrospective, descriptive study design with comparative components. A retrospective study design includes that the outcome of interest has already occurred in each individual, and data analysis includes analysing previously collected records (Talari & Goyal, 2020). There is no direct follow-up with the participants (Ranganathan & Aggarwal, 2018). Although retrospective studies are

often viewed as inferior to prospective, randomised and controlled clinical trials, unrecognised strength and validity present themselves in the hierarchy of clinical data (Abbott et al., 2016). The design allowed for the inspection of quantitative data, as the study re-analysed the types of PP made in each age group from existing data. In the study, the retrospective design was warranted by the existence of recorded data on the speech production of children across the age groups 24–72 months.

The study aimed to focus specifically on the phenomenon of PP in Afrikaans speaking children. Descriptive studies merely delineate data between events or characteristics of interest in a group of individuals (Ranganathan & Aggarwal, 2018). The current study aimed to determine and describe the occurrence of PP between multiple age groups including 24–35 months, 36–47 months, 48–59 months, 60–71 months, and 72 months. The study also aimed to determine and describe the differences in prevalence rates for each PP among male and female participants within each age group.

2.3. Participants

The initial study population consisted of 150 participants, of which there were 30 participants (15 male and 15 female) across each age group. Since parents or guardians had been requested to give separate consent for future data use for research purposes, the current study included 147 participants in total. The distribution of participants in each age group included: 24–35 months: 30 participants; 36–47 months: 30 participants; 48–59 months: 28 participants; 60–71 months: 29 participants, and 72 months: 30 participants.

2.3.1. Setting

Due to the COVID-19 pandemic and the consequences thereof, the data collection setting for the original study completed in 2021 had to be adapted. Initially, data collection had taken place at Afrikaans-medium private schools and preschools in Pretoria, Gauteng Province, South Africa. Due to the lockdown, the data collection method had been adapted to engage the parents in the data collection process. The data collection took place within participants' home environments with intensive guidance to the parents by the investigator of the original study via communication platforms, including WhatsApp, emails, and phone calls. While the data analysis of the initial study had been done at the principal investigator's home, that of the current

study took place within the homes of each member of the listener panel, since they were allowed to analyse in their own time, within a limited time frame.

2.3.2. Criteria for Selection of Participant

The inclusion criteria for selecting participants for the original study included that all possible participants had to be Afrikaans first-language users. The study's outcome was to determine the acquisition of Afrikaans phonemes in first-language speakers (Pringle et al., 2022). Secondly, the participants had to fit into the age range of 24 to 72 months, as this was the target group for the study. Lastly, the participants had to portray typical language development, normal hearing, and normal anatomical and physiological functions of the oral and facial musculature and structures, as reported by the parents or guardians through an extensive questionnaire. Normal perception of sound, anatomy, and physiology of the speech mechanism is critical for accurate, expressive language. The retrospective study, therefore, followed the same inclusion criteria as both the previous (Pringle et al., 2022) and the current study, and focused on outcomes specifically relating to Afrikaans first-language speaking children between the ages of 24- and 72 months old.

2.3.3. Participant Selection Procedure

The initial selection procedure included permission from all relevant parties to conduct the research among children in Afrikaans-medium private preschools and schools. Consent letters, and all relevant information, were distributed to the selected institutions, after which the teachers were asked to identify possible participants according to the selection criteria. Information concerning the study accompanied by consent letters had been sent to the parents or guardians of the identified participants via the teachers, requesting consent to include the children in the study. Once consent had been given, the teachers distributed the Afrikaans case history form and the developmental questionnaire to the parents or guardians. The consent form in Afrikaans, and a translated version in English for the ease of the members of the Faculty Research Ethics Committee, are included in Appendix B1, p. 81 and Appendix B2, p. 82 respectively. During the collection of data in 2020 and 2021 by Pringle (2022), consent had been received from all parents and guardians of the participants, except three, to use the collected data for future studies and publications. These three participants were therefore excluded from the current study. The section where parents or guardians had to indicate additional consent for the use of the data for future

studies was included in the consent forms as indicated on p.6 in Appendix B1 and p. 6 in Appendix B2.

The initial selection procedure included an oral-facial examination to determine the functioning of the anatomical and physiological features and (Shipley & McAfee, 2016) language screening through the Baigorri School-age Language Assessment Measures (SLAM) cards (Crowley & Baigorri, 2015). Adaptations had to be made due to the COVID-19 pandemic and lockdown, including contacting the remaining participants privately or via Afrikaans preschools and schools. Parents interested in the study were also allowed to contact the original study investigator personally. Due to the initial study's investigator's inability to assess the anatomical and physiological functions, relevant questions regarding these aspects were included in the case history and developmental questionnaire. The developmental questionnaire was adjusted to incorporate hearing and language development questions. The questionnaire was sensitive enough to identify participants with a risk of hearing loss by asking questions relating to the participant's developmental and medical history. The Afrikaans case history and developmental questionnaire had been adapted from Owens (2014), Roth and Worthington (2016), and Shipley and McAfee (2016), as well as the Crowley and Baigorri School-age Language Assessment Measures (SLAM) cards (Crowley & Baigorri, 2015).

Regardless of the adaptions that had to be made, the speech and language screening and analyses were still conducted through the Crowley and Baigorri School-age Language Assessment Measures (SLAM) cards. This tool was specifically developed to elicit language in preschool and elementary school children to analyse speech and language skills.

Once the case history and questionnaire were received from the parents or caregivers, the investigator of the initial study examined the results. Participants who showed atypical development had been provided with a unique confidential referral letter for an in-depth assessment and were excluded from the study.

2.4. Materials and Apparatus for Data Collection

Various materials and tools have been used to obtain the relevant data and information for the previous study (Pringle et al., 2022). The initial study used tools and assessments to gain information on phoneme acquisition and PP. Comprehensive

samples were collected by the initial study investigator for each participant, using the *Afrikaanse Artikulasie Ondersoek* developed by Lotter (1974) and the *Afrikaanse Dieptetoets vir die Artikulasie van Foneme* developed by Venter (1977). The *Afrikaanse Artikulasie Ondersoek* was developed to assess and obtain information regarding Afrikaans speaking children's articulatory abilities. It is a standardised tool that measures the production of different phonemes and consonant clusters in the initial, medial, and final positions in Afrikaans words (Lotter, 1974). The *"Afrikaanse Dieptetoets vir die Artikulasie van Foneme"* (Venter, 1977) was used to assess the accuracy of phoneme production in various ways and phonemic contexts to support the reliability of the results. The investigator of the initial study had developed a self-compiled repetition task for producing Afrikaans vowels since there were no available assessment tasks concerning the production of Afrikaans vowels at that stage. This task included a list of words containing all Afrikaans vowels – monophthongs and diphthongs. Quality audio recordings were made using the original study's investigator or participants' parents' smartphones for all the assessments.

2.5. Research Procedures

2.5.1. Pilot Study

Using the recorded material collected by Pringle et al. (2022), a pilot study was conducted in 2022 when ethical clearance was received.

Aims and objectives of the pilot study

A pilot study is administered on a smaller scale than the main study with the key aim of identifying where the quality and efficiency of the main study can be improved (In, 2017). It tests how credible and appropriate the process is to conduct the final research study most accurately and reliably (Ismail et al., 2018). The pilot study aimed to determine if the desired outcome/s of the planned research study could be achieved and to determine the feasibility of the study (Leon et al. 2011). Lowe (2019) states that pilot studies often have the inability to determine formal hypothesis testing, but is rather used to determine if preliminary findings support a more error-free investigation. The objective of the pilot study was to analyse one randomly selected sample out of the audio recordings to determine if the procedure to identify PP within the data worked accurately. In addition, the pilot study sheds light on possible adaptations that had to be made to the method of the larger master's study.

Procedures of the pilot study

The data used in the pilot study consisted of one randomly selected participant from one age group of the collected audio recordings. The audio recordings of one randomly selected participant were sent to the listeners' panel of the pilot study. This panel included three qualified, adult SLTs, with three or more years of experience, who acted as raters for this pilot study and who were not included in the larger analysis, but was willing to participate in the pilot study. The listeners were allowed to do the assessment individually on their own time since the pilot study aimed at determining if the method of data analysis would be successful. The pilot procedure consisted of a self-compiled checklist, constructed by the researcher of this study and adapted from Pringle et al. (2022), onto which types of errors and PP were recorded, as seen in Appendix E, p. 86. The pilot study aimed to determine if the method for data analysis was accurate and reliable. The pilot study further determined if results could have been obtained from the audio recordings to reach the study objectives and answer the research question.

Conclusion of the pilot study

The planned method for data analysis was found to be accurate and reliable. Triangulation rendered the data analysis procedure as accurate and reliable since three different SLTs scored and analysed the recordings of the same participant. It was decided to use the same method, including the self-compiled checklist of all the PP definitions and the key with all the symbols in the conduction of the main study. Adaptations were made concerning the list of PP definitions, where some PP were evident in the analysis but did not occur on the list. Since the raters of the pilot study pointed out that the analyses are time consuming, all instructions were still clear and unambiguous (Leon et al. 2011). It was decided to include more SLTs and create five panels, consisting of three members analysing the data of one particular age group, to minimise the number of recordings that had to be analysed per panel.

Procedures for data collection

Following approval by the Faculty of Humanities Research Ethics Committee (HUM007/0422) at the University of Pretoria, the current retrospective study used previously collected electronic audio recordings from the research by Pringle et al.

(2022) (HUM015/1219). The above-mentioned audio recordings were collected from the University of Pretoria repository for further use in the current study.

All the mentioned tools and tests were administered according to the instructions by Pringle et al. (2022). The responses to these tests for each child were recorded on smartphones. Since the focus of the initial study was on the perceptual analysis of the data, it was pivotal that quality audio recordings were made. Data capturing included storing the results with alphanumerical codes for each participant. Target words were produced in connected speech for all assessment tasks to allow for spontaneous production, whereas vowels were assessed through repetition.

Data analysis

A total of 12 expert SLTs were part of the data analysis. Some SLTs analysed the data of more participants, depending on their work load, availability and willingness; thus, they were part of more than one panel. Five listeners' panels (one for each age group) were set up for the analysis procedures of the retrospective data. Each panel consisted of three adult SLT Afrikaans first-language speakers with normal hearing abilities. The panel was specifically chosen since all listeners had to have three (or more) years of theoretical and practical knowledge regarding PP in practice. For data analysis, three panel members were each assigned the data of the same age group. Therefore the data per group were analysed by multiple sources. This ensured that the accuracy of the results was verified through triangulation. Triangulation has been used as a means of attaining a level of validity and increasing confidence and value in the results (Thurmond, 2001). The panels were divided into five groups. The five groups were each assigned to analyse the data of one age group respectively (24–35 months; 36–47 months; 48–59 months; 60–71 months, and 72-month-olds). The participants were unknown to the panels.

The data of the relevant age groups, as well as the checklists and instructions were sent to the panel member responsible for the analysis of a specific age group. No personal information was shared since all participants were assigned an alphanumerical code. The panels could analyse the data within their own time within a cut-off date. The panels were allowed to contact the researcher if any instructions were unclear. Panel members were not allowed to discuss results with each other and

signed a non-disclosure document to keep all information confidential, as seen in Appendix D, p.85.

The panel used a self-compiled checklist provided to them to determine the types of errors and PP after listening to the audio speech samples, as seen in Appendix E, p. 86. Each checklist had the name of the assessment tool visible at the top. The panels were provided with a list of the most common PP, a definition of each pattern, and a key where each PP represents a specific symbol in the key. The target words of each assessment were visible on the checklist. The panel of listeners judged whether the PP are evident, and which type of PP they heard by indicating the type of PP on a self-compiled checklist. If an outlier occurred between the members' results, then the majority's opinion was accepted as the true measure. If no PP were evident, the block was left open. The data were collected, then the results were compared and further analysed through statistical analyses to determine the outcome and results of the study pertaining to the age and gender differences. The percentage of occurrence for each pattern was recorded. According to Kirk and Vigeland (2015), percentages are used to identify the potential target error patterns present in the phonological system of a child (Kirk & Vigeland, 2015). Statistical analyses also included using the independent samples two-proportion z-test to determine significant differences ($p<0.05$) among age groups and gender groups.

2.6. Ethical Considerations

Informed consent to use the collected data for future research in accordance with ethical research procedures had been obtained from all the parents or guardians of participants in the initial study, except three. The data from these three participants were therefore excluded from the current study. The informed consent letters of the initial study are included in Appendix B1 (p. 81) and Appendix B2 (p. 82). Participant assent had also been requested before any form of data collection took place. Participants were allowed to indicate if they wanted to participate by pointing towards a happy face or sad face card. They were also allowed to withdraw at any time during the assessment. The participant assent letter is included in Appendix C1 (p. 83) and Appendix C2 (p. 84) Ethical clearance for the initial study had been received from the Research and Ethics Committee of the Faculty of Humanities at the University of Pretoria in January 2020 (HUM015/1219). Ethical clearance for the current study has

also been received from the Research and Ethics Committee of the Faculty of Humanities at the University of Pretoria (HUM007/0422). All ethical guidelines were followed during the data collection procedures. For this study, the ethical principles discussed in the following sections were adhered to (see Sections 2.6.1–2.6.2).

2.6.1. Autonomy

The participating schools, participants' parents, and the participants themselves had all been respected throughout the study by recognising their rights. All parents or guardians of the participants had been informed about the study and had the right to freely decide whether they wanted their child to participate in the study. The parents and guardians also had the right to decide whether they wanted their child's information and data to be used for future studies. The principle of autonomy was adhered to in the current study by allowing panel members to be part of the study through their own will and allowing them to withdraw at any time during the assessment.

2.6.2. Beneficence

The ethical principle of beneficence, as set out by the Health Professions Council of South Africa (HPCSA), was adhered to during data collection for the initial study. Although participants benefitted from participating in the study by receiving a free speech and language screening, voluntary consent was given by all parents of participants. If any concerns regarding speech, language or hearing had been noted, confidential, individual referral letters were written for an in-depth assessment. However, the principle of beneficence does not apply to the current study since no additional adherence was needed.

2.6.3. Confidentiality

The researcher adhered to the ethical principle of confidentiality. All information received had been kept confidential. The personal identifying information of the respondents had been stored in accordance with the conditions of lawful processing as set out in the Protection of Personal Information Act 4 of 2013 (POPIA) and the Researcher's Protection of Personal Identifying Information and Retention of Documents Policy. Confidentiality was achieved by coding the results in alphanumerical codes. The data storage policy of the University of Pretoria states that all data will be kept at the Department of Speech-Language Pathology and Audiology

for 15 years. The data collected throughout the current study is kept in hard copy and on a password-protected compact disc (CD). The data and subsequent dissertation will be uploaded to the protected University of Pretoria repository.

2.6.4. Non-Maleficence

No participant had been exposed to any physiological and/or psychological harm during the initial study. Since the study was retrospective, the ethical principle of non-maleficence did not apply

2.6.5. Honesty

The information discussed in the current study was presented and discussed truthfully and honestly. No false information, changes or alterations were made to the results.

2.6.6. Research Competence

The researcher of this study is registered as a postgraduate SLT at the HPCSA (ST S 0019020) and is competent to conduct the research in the specific field.

2.7. Reliability And Validity

Reliability in the current study was established by using inter-rater reliability. The method tests for equivalence among observations and provides an opportunity to compare and identify the similarities (or dissimilarities) in the measurements (Brink et al., 2018). Five listener panels were formed/selected to analyse the data. The panels consisted of three members in each panel. No discussions were allowed during the analysis, and all panel members were asked to sign a non-disclosure document beforehand (Appendix D). Integrated statistical procedures were further used to determine and compare the outcome of the results and draw conclusions for the current study.

Validity had been established by using face, criterion, and construct validity in the initial study when data collection had been done. Face validity was ensured by using culturally and linguistically appropriate and age-appropriate assessment tools for the Afrikaans population. Various assessment tools (Afrikaanse Artikulasie Ondersoek and the Afrikaanse Dieptetoets van Foneme) ensured criterion validity to assess the production of phonemes and to assess the occurrence of phonological patterns in the study. Construct validity was ensured by formally assessing the occurrence of phonological patterns using formal assessment tools. Since the current study was

retrospective, the previously recorded data used in this study were already validated through these procedures.

Chapter Three

Research Article

Chapter three provides the reader with an article relating to the study, submitted to the journal, LitNet Akademies. The format of the article in this chapter is that of the journal requirements and differs from the rest of the dissertation. Articles should be left-aligned, formatted in Verdana 10, and single spacing with 6pt before and after each paragraph. Articles in this journal must be edited and should be between 7000-15000 words. An Afrikaans abstract of 300 words is required. The referencing style of this journal is the Harvard method. The submitted Afrikaans version of the article can be found in Appendix G together with the proof of submission of the article in Appendix H.

Abstract:

A description of phonological patterns in Afrikaans children aged 24–72 months: A retrospective study

Purpose: Afrikaans is one of eleven official languages in South Africa, although limited information exists regarding phonological development. The study adds a valuable contribution to the development of phonological patterns (PP) in 24–72-month-old children in the Afrikaans population. Additionally, the study comments on the differences in the occurrence of PP between male and female speakers. The rationale included to provide SLTs with evidence-based guidelines and data for the description of PP. The research question for this study is - What is the typical description of PP in an Afrikaans first-language speaker between the age groups of 24–72 months?

Theoretical framework: Up to date, no other studies have evaluated the phenomenon of PP in Afrikaans speaking children. No normative data have been previously collected to determine the occurrence of PP within the Afrikaans speaking group or the differences among male and female speakers.

Method: The study aimed to determine and describe PP in the Afrikaans first-language speaking child, age groups 24–72 months. The study employed a retrospective, descriptive study design and included 147 participants in total. This retrospective study used previously collected electronic audio recordings from the research by Pringle et al. (2022). 12 expert SLTs were part of the data analysis procedures to determine PP within the data. Five listeners' panels were set up for the analysis procedures, after which statistical analyses were done to determine advanced results.

Results: All patterns persisted after 72 months, except for word final devoicing and vocalisation/vowelisation which were fully eliminated. Gliding of liquids had the highest prevalence and significant differences between the performance of girls and boys were found. Results revealed that first-language Afrikaans speakers manifest different prevalence rates for specific PP compared to other children of the same age in other languages.

Keywords: Afrikaans; age of elimination; consonant clusters; normative data; phonemes; phonological disorder; phonological patterns; speech sound disorder

1. Introduction and rationale for the study

Infants show pre-linguistic behaviours from the moment they are born and add meaning to their speech by the end of 12 months old (Serrat-Sellabona et al. 2021:1). The development of the body structures and functions as well as perception - and production systems, take time to become more advanced and attuned to the sounds of their indigenous language (Philippsen 2021:56). The development of the phonological system refers to acquiring the form *[structure]* and function *[purpose]* of speech sounds within a language system (Ahmed and Bidin 2016:210). The functional development of these aspects is crucial for intelligibility, since social participation, educational engagement, achievement, and the overall quality of life of a child can be negatively impacted by unintelligible speech (Hustad et al. 2021:3707).

Intelligible speech incorporates accurate length and nature of speech, accurate production of vowels and consonants, syllable structures, and prosody (Hustad et al. 2020:1675). This description can be further delineated through the sequence of speech sound acquisition. This includes Phase 1 - Laying the foundations for speech (birth to 1 year); Phase 2 - Transitioning from words to speech (1 to 2 years); Phase 3 - The growth of the speech sound inventory and syllable structures as well as grammatical and syntactical structures (2 to 5 years); and Phase 4 - Mastery of speech including timing, prosody, accuracy, and literacy (5+ years) (McLeod 2017:64). By following the language rules and sound systems of a particular language, words are formed through specific sound combinations (Alduais 2015:158). The term phonology refers to the process of using sounds in a language (Cushing and Hellmuth 2016:90).

Phonological patterns (PP), previously known as phonological processes, refer to an impairment or limitation in the vocal production and perception of language, resulting in a set of linguistic cognitive abilities that replaces or excludes key phonological components (Asad et al. 2018:11; Rose and Inkelas 2011:1-2). The lack of complete conceptual understanding of the correct pronunciation of sounds results in a particular PP (Fringi et al. 2015:1621). Variations arise in the combination of phonemes (Abou-Elsaad et al. 2019:87) leading to a phonological disorder (PD). A PD refers to an impairment in the comprehension and use of the speech sound system and its governing rules relevant to a target language (Randolph 2017:1). Consequently, production errors occur due to the intricacy of the accurate production and articulation features (McLeod and Crowe 2018:1652). The atypical acquisition of phonological skills by the expected age refers to the inability to produce a given phoneme through poor coordination and activation of muscles (Ceron et al. 2017:2). Developmental information is essential to further investigate and provide clinically-sensitive research in child phonology (Pascoe et al. 2018:1146).

Historical premise of phonological disorder

Several long-standing longitudinal studies ((Poole (1934); Van Riper (1939); Templin (1957); Stampe (1973); Grunwell (1975); Ingram (1976); Hodson (1980); Hodson and Paden (1983); and Smit (1990)) have been aimed at developing the phonological pattern framework for normal phonemic acquisition and error patterns (Bowen 2015:22). As a consequence, these attempts have led to the development of strategies which describe disordered speech patterns, target PP, and change the application thereof (Dodd and Iacano 1989:334).

Speech delays are manifested if PP persists beyond the age of elimination (Abou-Elsaad et al. 2019:81). Ceron et al. (2017) found that the male brain may be developing at a slower pace than females which may have an influence on language acquisition across genders (Ceron et al. 2017:7). Smith et al. (2005) however, found that females have an advantage in language abilities and language acquisition until 36 months of age.The results by Bailoor et al. (2014:2); Bland-Stewart (2016:106); Ceron et al. (2017:2); and Goldstein and Iglesias (1996:378) indicate that several countries already conducted studies to identify the occurrence of PP in their home languages or among genders.

Only a few studies have tried to identify the age at which PP are present in the speech of functionally developing children within specific linguistic populations (Dodd et al. 2003:623). To date, no other studies have established efforts to evaluate the phenomenon of PP in Afrikaans speaking children. Additionally, no normative data have been previously collected to determine the occurrence of PP within the Afrikaans speaking group of 24-72 months or the differences among male and female speakers. Three possible consequences relating to a lack of developmental phonological data for a specific target population were proposed. These consequences are a) a delay or absence of diagnostic and therapeutic services, b) the inappropriate labelling of phonological skills in both typically developing and phonological disordered children, and c) a misdiagnosis of PD due to the lack of reliable data (Goldstein and Iglesias 1996:368). For this reason, the current study is a novel contribution as it focuses on, and captures, accurate and reliable information regarding the development of PP in specific age groups in the Afrikaans first-language speaker.

Afrikaans language system

Afrikaans is related to the European languages of English, German, and Dutch as it is part of the West Germanic language group (Heeringa et al. 2015:15). Although Afrikaans is highly influenced by Dutch, Afrikaans developed in relative isolation in Africa and developed its own distinctive phoneme inventory(Bos 2016:7-8; Den Besten 2009:4).

Two main divisions exist for the classification of Afrikaans phonemes, namely vowels and consonants (Coetzee 2018:35). The monophthongs and diphthongs of Afrikaans together with an example of an Afrikaans word containing the vowel are represented in Table 1.

TABLE 1: The vowels of Afrikaans

Monophthongs	**Example of an Afrikaans word that contains the monophthong**	**The English translation of the Afrikaans word**
Short Afrikaans monophthongs		
/i/	D**ie**p	Deep
/y/	N**uu**t	New
/ə/	V**i**s	Fish
/ɛ/	H**e**mp	Shirt
/œ/	H**u**t	Hut
/ɑ/	J**as**	Coat
/ɔ/	Kl**o**p	Knock
/u/	H**oe**d	Hat
Long Afrikaans monophthongs		
/e:/	B**e**ne	Bones

/ø/	N**eu**t	Nut
/a:/	K**aa**rt	Map / card
/o:/	Gl**o**	Believe
Afrikaans diphthongs		
Diphthongs	**Example of an Afrikaans word that contains the diphthong**	**The English translation of the Afrikaans word**
/əi/	Br**ei**	Knit
/œu/	K**ou**s	Sock
/œy/	H**ui**s	House

Adapted from (Coetzee 2018:35), (Carstens and Bosman 2014:91-125), and (Wissing 2020:134-135).

Afrikaans consonants are divided into multiple groups relating to their manner of production (Carstens and Bosman 2014:115). Afrikaans also includes consonant clusters which contain more than one consonant. The consonants of Afrikaans - single consonants and clusters - together with an example word are presented in Table 2.

TABLE 2: The consonants and consonant clusters of Afrikaans

Consonants	**Example of an Afrikaans word that contains the consonant**	**The English translation of the Afrikaans word**
Plosives		
/p/	**P**adda	Frog
/t/	**T**abel	Table
/k/	**K**ind	Child
/b/	**B**adkamer	Bathroom
/d/	**D**eksel	Lid
/g/	Ber**g**e	Mountains
Affricates		
/tʃ/	**Tj**ek	Cheque
/dʒ/	**J**ellie	Jelly

Nasals		
/m/	**M**aan	Moon
/n/	**N**et	Net
/ɲ/	Ho**n**djie	Doggie
/ŋ/	Ha**ng**er	Hanger
Alveolar trill		
/r/	**R**uik	Smell
Uvular trill		
/R/	**R**ooi (dialect in Western Cape)	Red
Fricatives		
/f/	**V**ee	Sweep
/s/	Pie**s**ang	Banana
/ʃ/	**Sj**okolade	Chocolate
/x/	**G**eel	Yellow
/v/	**W**olke	Clouds
/z/	**Z**ulu	Zulu
/ɦ/	**H**elp	Help
Approximant		
/j/	**J**a	Yes
Lateral		
/l/	**L**aai	Drawer
Consonant clusters of Afrikaans		
Consonant phoneme clusters consisting of two phonemes		**Consonant phoneme clusters consisting of three phonemes**

/rt/, /rk/, /nt/, /st/, /kr/, /dr/, /br/, /sk/, /bl/, /pl/, /xl/, /kl/, /fl/, /lt/, /lf/, /lp/, /lk/, /rs/, /sl/, /ls/, /ts/, /ks/, /sp/, /pr/, /tr/, /rx/, /xr/, /sw/, /kw/, /kn/, and /ŋk/	/spr/, /str/, and /skr/

Adapted from (Coetzee 2018:35-36), (Lotter 1974:153-154), and (Wissing 2020:130).

In Table 3 the ages of acquisition of the sounds of Afrikaans as determined by Pringle et al. (2022) are portrayed.

TABLE 3: Age of acquisition of the sounds of Afrikaans (Pringle et al., 2022)

Type of phoneme	When acquired in Afrikaans
Vowels	All vowels are acquired by the age of two years.
Consonants: 24–35 months	**Plosives**: All plosives, /p/, /t/, /k/, /b/, /d/, and /g/, are acquired by the age of two years. **Affricates**: The mean age of the acquisition of the /ʧ/ is four years and for the /dʒ/ three years. **Nasals**: /m/, /n/ and /ɲ/ are already acquired by the age of two years. **Trill**: The two-year-old group had not acquired the /r/. **Fricatives**: /ɦ/, /f/, /v/, and /x/, are acquired by the age of two years. Fricatives that were not acquired yet, include /s/, /z/, and /ʃ/. **Approximant**: The palatal approximant /j/ is acquired by the age of two years. **Lateral**: The two-year-old group had not acquired the /l/.
Consonants: 36–47 months	**Affricates**: The /ʧ/ is acquired by the three-year-old group. The /dʒ/ is typically acquired by the age of three years. **Nasals**: The three-year-old group acquired the velar /ŋ/. **Trill**: The three-year-old group had not acquired the /r/. **Fricatives**: The three-year-old group has not acquired the /s/, /z/, and /ʃ/. **Lateral**: The lateral /l/ is acquired by the age of three years.
Consonants: 48–59 months	**Trill**: The trill /r/ is not yet acquired by the age of four years. **Fricatives**: /s/, /ʃ/, and, /z/, are acquired by the age of four years.
Consonants: 60–71 months	**Trill**: The trill /r/ is acquired by the age of five years.
Consonants: 72 months	All phonemes are mastered (90% correctly produced) by the age of six years.
Consonant clusters: Insertion, deletion,	**24–35 months**: Acquired the /nt/, /kl/, /lk/, and /kw/ clusters. **36–47 months**: Acquired nine consonant clusters, namely, /bl/, /pl/, /xl/, /fl/, /lt/, /lf/, /lp/, /kn/, and /ŋk/.

metathesis and substitution errors can be made while children produce consonant clusters (Collée 2018:44).	**48–59 months**: Acquired ten consonant clusters, namely /st/, /sk/, /rs/, /sl/, /ls/, /ts/, /ks/, /sp/, /rx/ and /sw/. **60–71 months**: The consonant clusters acquired by the age of five years are /rt/, /rk/, /kr/, /dr/, /br/, /pr/, /tr/, /xr/, /spr, /str/, and /skr/. **72 months**: All consonant clusters exceed the acquisition criterion at six years as they are acquired by the age of five years.

Adapted from (Pringle et al. 2022:344-360).

By the age of five years, most children acquired the accurate production of consonants in words and can accurately use and produce the speech sounds of their mother tongue in all positions (Brancalioni et al. 2012:158; McLeod and Crowe 2018:1563). The normative data for the acquisition of Afrikaans phonemes, as seen in Table 3 indicated that all Afrikaans phonemes, are acquired by the age of five years (Pringle et al. 2022:360).

Language-specific developmental norms can be functional to determine if an SSD is absent or present since language-specific PP occur (Lin and Johnson 2010:383). However, Storkel (2019) argues that the acquisition of speech sounds is too complex to only be measured through an exclusive data point that represents typical development. Rather, the types of errors being made should be of high priority during an assessment (Storkel 2019:69). Numerous measures of development should be focused on including a) the total number of errors, b) intelligibility, c) error patterns, and d) types of errors (Storkel 2019:69). Assessment and intervention should focus on identifying and treating PP (Hodson 2011:17).

Abou-Elsaad et al. (2019) and Bernthal et al. (2017) outlined three categories developed to group the natural, most common patterns. These include a) assimilation (when a sound in the word becomes similar to an adjacent sound in the word, b) modification of syllable structures (sound changes that affect the structure of the syllable in the target word, and c) substitution (when a sound is systematically substituted by another) (Abou-Elsaad et al. 2019:81; Bernthal et al. 2017:83). The most common PP and the approximate ages of elimination in typical acquisition in the English language are presented in Table 4.

TABLE 4: The common phonological patterns and their approximate ages of elimination in typical acquisition in the English language

Phonological pattern:	**Definition:**	**Example:**	**Age of suppression/ elimination for English**
Assimilation patterns			
Consonant harmony/ Assimilation	Pronunciation of the whole word is influenced by the presence of a particular consonant in the word.	Bed: /bɐd/ /bɐb/ Dog: /dɒg/ /gɒg/	3:0-4;0
Context sensitive voicing/ pre-vocalic voicing	A voiceless sound preceding a vowel is replaced by a voiced sound.	Pig: /pɪg/ /bɪg/ Kiss: /kɪs/ /gɪs/	3;0

Word-final devoicing	Substitution of a final voiced consonant with a voiceless consonant.	Red: /red/ /ret/ Bag: /bæg/ /bæk/	3;0
Coalescence	Substitution of two phonemes (consonant clusters) with a different phoneme.	Smoke: /sməʊk/ /fəʊk/ Spoon: /spuːn/ /fuːn/	--
Reduplication	Repetition of a complete or incomplete syllable.	Water: /ˈwɔːtə(ɹ)/ /wawa/	2;5-3;0
Modification patterns (syllable structure)			
Cluster reduction	Consonant clusters occur when two or three consonants occur in a sequence in a word. Part of the cluster is omitted.	Plane: /pleɪn/ /peɪn/ Blue: /bluː/ /buː/	4;0
Final consonant deletion	Deletion of the final consonant in the word.	Dog: /dɒg/ /dɒ/ Home: /həʊm/ /həʊ/	3;3
Initial consonant deletion	Omission of the first consonant or consonant cluster in a word.	Toy: /tɔi/ /ɔi/	2;0
Weak syllable deletion	Omission of either stressed or unstressed syllables.	Banana: /bəˈnɑːnə/ /nɑːnə/ Telephone: /ˈtelɪfəʊn/ /ˈtefəʊn/	4;0
Epenthesis	Insertion/addition of another phoneme.	Blue: /bluː/ /beluː/ Plate: /pleɪt/ /pʌhleɪt/	8;0
Metathesis/ Transposition	Transposition of sounds within a word.	**Spaghetti:** /spɑghettɪ/ /bɑskettɪ/	7;0
Substitution patterns			
Alveolarisation	Substitution of a non-alveolar with an alveolar sound /t/, /d/, /s/.	Chew: /tʃuː/ /tuː/ Shop: /ʃɒp/ /tɒp/	5;0
Labialisation	Substitution of a non-labial with a labial sound /m/, /p/, /b/.	Take: /teɪk/ /beɪk/	6;0

Vocalisation/ Vowelisation	Substitution of /l/ or /er/ sounds in the final position, with a vowel.	People: /ˈpi:pl/ /pɪpo/ Teacher: /tiətʃe(r)/ /tiətʃo/	--
Velar Fronting	A velar stop or nasal is replaced by an alveolar stop or nasal respectively.	Car: /kɑ:(r)/ /tɑ:(r)/ Wing: /wɪŋ/ /wɪn/	3;6
Backing	Substitution of a more anteriorly produced phoneme with a posteriorly produced phoneme.	Boat: /bəʊt/ /bəʊk/ Tap: /tæp/ /cæp/	4;0-5;0
Palatal fronting/ Depalatalisation	Substitution of the palato-alveolar fricatives /ʃ/ and /ʒ/ by alveolar fricatives /s/ and /z/.	Ship: /ʃɪp/ /sɪp/ Fish: /fɪʃ/ /fɪs/	3;9
Gliding of liquids	Substitution of liquids /l/, /r/* by a glide /w/, /j/ or another liquid.	Rabbit: /ˈræbɪt/ /wæbɪt/ Leg: /leg/ /jeg/	5;0
Deaffrication	Substitution of affricates with fricatives.	Church: /tʃɜ:tʃ/ /ʃɜ:tʃ/ Page: /peɪdʒ/ /peɪdz/	4;0
Affrication	Substitution of a non-affricate with an affricate.	Sheep: /ʃi:p/ /tʃI:p/ Door: /dɔ:(ɹ)/ /dʒɔ:(ɹ)/	3;0
Stopping	A fricative consonant or an affricate consonant is replaced by a stop.	Funny: /’fʌnɪ/ /pʌnɪ/ Jump: /dʒʌmp/ /dʌmp/	See below
Approximate ages of suppression/elimination for stopping of fricatives and affricates in English speaking children			
/f/, /s/	Funny: /fʌni/→/pʌni/	Sip: /sɪp/→ /tɪp/	3;0
/v/, /z/	Van: /væn/ → /bæn/	Zoo: /zu:/ → /du:/	3;6
/ʃ/, /dʒ/, /tʃ/	Ship: /ʃɪp/ → /dɪp/	Chip: /tʃɪp/ → /tɪp/	4;6
/θ/, /ð/	Thing: /tɪŋ/ → /tɪŋ/	Them: /ðəm/ → /dəm/	5;0

Adapted from (Bauman-Waengler 2014:103-106; Bernthal et al. 2017:83); and Grunwell (1987) from (Bowen 2015:73; Shipley and McAfee 2016:197-200). * In Afrikaans, an

adaptation occurs with regards to the gliding of liquids and the trill /r/, where children tend to replace the trill /r/ in words with an approximant /ɹ/ or a /j/ or /l/. Thus whenever referring to gliding of liquids, the pattern is better explained as an approximation for this population.

Typical phonological development implies that the overall growth of language is closely related to the acquisition of a functional sound system (Pyata and Banik 2016:150). Knowledge about the typical pattern of phonological development will assist in identifying individuals who show deviations from the acceptable pattern (Bland-Stewart 2016:109).

The caseloads of speech-language therapists (SLTs) mainly comprise of children with SSDs, including PD. It is the responsibility of the SLTs to assess and make decisions whether a child's speech is typically developing or not considering the range and variability innate among development relating to best practice (American Speech–Language–Hearing 2016; Storkel 2019:73). The nature and quantity of specific pattern types should be examined by SLTs during an assessment (Goldstein and Washington 2001:160).

The two most relevant historical studies done on PP relating to Germanic languages include the English study of Dodd et al. (2003) and that of Beers (1995) on Dutch. These results indicated that phonological patterns do transpire in different languages, but they are not eliminated at the same age (Clausen and Fox-Boyer 2017:441). To date, no similar study has been conducted in Afrikaans.

Afrikaans is the third most spoken of the 11 official languages in South Africa (StatsSa 2018:8). With a definite need identified among SLTs, since later language impairment is determined by early atypical phonological development (Viterbori et al. 2018:540), the present study focuses on describing phonological patterns in Afrikaans speaking children aged 24-72 months. Without the required support through the appropriate type and amount of therapy during the preschool years, based on representative normative data, the risk for academic and socio-emotional difficulties increases (Dodd et al. 2003:638; Sugden et al. 2018:3).

Little to no information is available regarding the description of PP in Afrikaans first-language speakers between the ages of 24–72 months. The current study also incorporated a description of the occurrence of PP among male and female participants within the respective age groups. When the developmental norms of Pringle et al. (2022) in Table 3 are coupled with additional measures, including the error types and error patterns, SLTs will be able to make an accurate and insightful diagnosis (Storkel 2019:73) for the Afrikaans population. Therefore, the rationale of the planned study was to provide SLTs with evidence-based guidelines and data for the description of PP in Afrikaans speaking children. This leads to the research question: What is the typical description of PP in an Afrikaans first-language speaker between the age groups of 24–72 months?

2. Method

2.1 Aim and objectives of the study

The aim of the study was to determine and describe PP in the Afrikaans first-language speaking child, age groups 24–72 months. The study had two objectives. The first was to describe the various PP produced per said age group. The second objective was to compare the results of male and female participants for various PP per age group (24–72 months).

2.2 Design

The study employed a retrospective, descriptive study design with comparative components.

2.3 Setting of the study

While the data analysis of the initial study had been done at the home of the principal investigator, that of the current study took place within the homes of each member of the listener panel, since they were allowed to do the analysis in their own time, within a limited time frame.

2.4 Participants

The initial study population consisted of 150 participants, of which there had been 30 participants (15 male and 15 female) across each age group. Since parents or guardians had been requested to give separate consent for future data use for research purposes, the current study included 147 participants in total. The distribution of participants in each age group included: 24–35 months: 30 participants; 36–47 months: 30 participants; 48–59 months: 28 participants; 60–71 months: 29 participants, and 72 months: 30 participants.

2.5 Participant selection procedures

During the collection of data in 2020 and 2021 by Pringle et al. (2022), consent had been received from all parents and guardians of the participants, except three, to use the collected data for future studies and publications. These three participants were therefore excluded from the current study.

Adaptations had to be made to the initial selection procedure due to the Covid-19 pandemic and lockdown, including contacting the remaining participants privately or via Afrikaans preschools and schools. Parents interested in the study were allowed to contact the principal investigator personally. Due to the inability of the principal investigator of the initial study to assess the anatomical and physiological functions, relevant questions regarding hearing and language development had been incorporated. The questionnaire was sensitive enough to identify participants with a risk of hearing loss. Participants who showed atypical development had been provided with a unique confidential referral letter for an in-depth assessment and had been excluded from the study.

2.6 Research procedures

2.6.1 Pilot study

A pilot study was conducted aiming to determine if the desired outcome/s of the current study could be achieved. It also indicated the feasibility of the study and whether adaptations had to be made to the method of the larger master's study. The objective of the pilot study was to analyse one randomly selected sample out of the audio recordings to determine if the procedure to identify PP within the data worked accurately.

The data used in the pilot study consisted of one randomly selected participant from one age group of the collected audio recordings. The pilot procedure consisted of a self-compiled checklist adapted from Pringle et al. (2022), onto which types of errors and error patterns were recorded.

The planned method for data analysis was found to be accurate and reliable. It was decided that the same method including the self-compiled checklist with the definitions of each PP and the key with all the symbols should be used in the conduction of the main study. Adaptations were made with regard to the list of PP definitions, where some PP were evident in the analysis, but did not occur on the list. For this reason, the list of PP was adapted and personalised for the purpose of analysing the utterances of the Afrikaans children. Adaptations were also made regarding the number of members that would be included in the study. Since the raters of the pilot study pointed out that the analyses are time consuming, it was decided to include more SLTs and create five panels, consisting of three members analysing the data of one particular age group, to minimise the number of recordings that had to be analysed per panel.

2.6.2 Data collection

This retrospective study used previously collected electronic audio recordings from the research by Pringle et al. (2022). These audio recordings were collected from the University of Pretoria repository for further use in the current study. All the tools and tests (Afrikaanse Artikulasie Ondersoek developed by Lotter (1974) and the Afrikaanse Dieptetoets vir die Artikulasie van Foneme developed by Venter (1977)) had been administered according to their instructions. Data capturing included storing the results with alphanumerical codes for each participant.

2.6.3 Data analysis

A total of 12 expert SLTs with normal hearing were part of the data analysis. Some SLTs analysed the data of more participants, depending on their work load, availability and willingness. Five listeners' panels were set up for the analysis procedures of the retrospective data. Each panel consisted of three Afrikaans first-language speakers. The panel was specifically chosen since all listeners had to have three (or more) years of theoretical and practical knowledge regarding PP in practice. This ensured that the accuracy of the results are verified by means of triangulation. Triangulation has been used as a means of attaining a level of validity and increasing confidence and value in the results (Thurmond 2001:255). The participants were unknown to the panels.

The data of the relevant age groups, as well as the checklists and instructions, were sent to the panel member responsible for the analysis of a specific age group. No personal information was shared, since all participants received an alphanumerical code. The panels were able to analyse the data within their own time within a cut-off date. Panel members were not allowed to discuss results with each other and signed a non-disclosure document to keep all information confidential.

A checklist was used to determine the types of errors and error patterns after listening to the available audio speech samples. Each checklist had the name of the assessment tool visible at the top and the target words of each assessment were visible on the left-hand side. The members were provided with a list of the most common PP and a definition of each pattern, as well as a key where each PP represents a specific symbol in the key. The panels were asked to write down the symbol of the identified PP in the block next to the target word once the recording was listened to. If no PP were evident, the block is left open. The principal investigator collected the data, after which the results were compared and further analysed through statistical analyses to determine the outcome and results of the study pertaining to age and gender differences. Prevalence rate were reported according to percentage of occurrence of each PP. Statistical analyses included using the independent samples two-proportion z-test to determine significant differences ($p<0.05$) among age groups and gender groups.

2.6.4 Ethical considerations

Ethical clearance for the initial study as well as for the current study was received from the Research and Ethics Committee of the Faculty of Humanities at the University of Pretoria (HUM007/0422). After the principal investigator had ensured that all ethical guidelines were followed for the purpose of the initial study, the researcher of the current study cross-checked all principles to verify their rationality. These ethical principles included autonomy, beneficence, confidentiality and anonymity, non-maleficence, and honesty.

2.6.5 Reliability and validity

Reliability in the current study was established by using inter-rater reliability. Five listener panels were formed to analyse the data. The panels consisted of an uneven number of members (three in each panel). If an outlier occurred between the results of the members, the majority's opinion was accepted as the true measure. No discussions were allowed during the analysis and all panel members were asked to sign a non-disclosure document beforehand.

Validity had been established by using face, criterion, and construct validity in the initial study when data collection had been done. The principal investigator had ensured face validity by using culturally-, linguistically-, and age-appropriate assessment tools for the Afrikaans population. A variety of assessment tools *(Afrikaanse Artikulasie Ondersoek and the Afrikaanse Dieptetoets van Foneme)* had ensured criterion validity (concurrent validity) to assess the production of phonemes and to assess the occurrence of phonological patterns in the current study. Construct validity had been ensured by formally assessing the occurrence of phonological patterns through using formal assessment tools. Since the current study was retrospective, the previously recorded data that were used in this study, were already validated through these procedures.

3. Results

The aim of the study was to determine and describe PP in the Afrikaans first-language speaking child, age groups 24–72 months. No previous studies have reported the description of PP in Afrikaans first-language speakers between the ages of 24–72 months, despite the necessity for these measures to support a diagnosis of SSDs. For this reason, the results in this study were compared to the development of PP in English and Dutch children. Table 5 represents the percentage occurrence of each PP among male and female participants, per age group (Group 1: 24–35 months, Group 2: 36–47 months, Group 3: 48–59 months, Group 4: 60–71 months and Group 5: 72 months) and the p-value thereof. The first row of each PP contains the percentages (%), whereas the second row contains the *z*-test statistic and the *p*-value in brackets.

Table 5 *Illustration of the percentage occurrence of each PP in gender per age group*

		Two years			Three years			Four years			Five years			Six years		
		All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Phonological Patterns:																
A1: Consonant harmony/ Assimilation	Assimilation patterns:	3.2	2.9	3.5	7.1	5.8	8,9	3,9	3,1	5,1	8,5	5,9	15,4	11,6	10,8	13,3
		(1.438, 0.151)			(3.332, 0.001*)			(2.413, 0.016*)			(5.832, <0.001*)			(1.467, 0.142)		
A2: Context sensitive voicing/ pre-vocalic voicing		0.3	0.3	0.2	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.0	0.5	0.1	0.1	0.0
		(0.681, 0.496)			(1.678, 0.093)			(0.293, 0.769)			(2.298, 0.022*)			(0.670, 0.503)		
A3: Word-final devoicing		0.0	0.0	0.0	0.1	0.1	0.0	0.3	0.1	0.6	0.1	0.0	0.5	0.0	0.0	0.0
		(1.002, 0.316)			(1.193, 0.233)			(1.915, 0.055)			(2.298, 0.022*)			(0.000, 1.000)		
A4: Coalescence		0.5	0.6	0.3	0.2	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0
		(1.853, 0.064)			(0.409, 0.683)			(1.196, 0.232)			(0.616, 0.538)			(0.670, 0.503)		
A5: Reduplication		0.5	0.4	0.6	0.5	0.5	0.4	0.2	0.1	0.2	0.3	0.3	0.5	1.6	1.0	2.9
		(1.013, 0.311)			(0.444, 0.657)			(0.338, 0.735)			(0.627, 0.531)			(2.727, 0.006*)		
M1: Cluster reduction	Modification patterns:	25.5	26.1	24.9	23.2	21.3	26,0	19,3	21,7	15,9	23,5	21,6	28,4	13,7	11,3	18,9
		(1.151, 0.250)			(3.045, 0.002*)			(3.533, <0.001*)			(2.742, 0.006*)			(4.029, <0.001*)		
M2: Final consonant deletion		7.2	6.3	8.2	8.1	7.4	9.1	8.7	10.2	6.6	13.7	15.8	8.1	9.5	10.7	6.8
		(3.175, 0.001*)			(1.609, 0.108)			(3.083, 0.002)			(3.863, <0.001*)			(2.451, 0.014*)		
M3: Initial consonant deletion		2.4	2.7	2.0	2.8	3.1	2.4	0.9	0.8	1.1	0.5	0.6	0.0	0.2	0.3	0.0
		(2.066, 0.039*)			(1.135, 0.256)			(0.796, 0.426)			(1.633, 0.102)			(1.162, 0.245)		
M4: Weak syllable deletion		17.3	14.8	19.8	16.1	16.1	16.2	10.5	10.2	10.9	6.3	4.5	10.8	9.0	9.8	7.2
		(5.539, <0.001*)			(0.119, 0.906)			(0.497, 0.619)			(4.418, <0.001*)			(1.658, 0.097)		
M5: Epenthesis		2.8	1.9	3.7	3.7	3.1	4.6	4.6	3.8	5.7	6.0	4.4	10.3	10.2	9.0	12.9
		(4.676, <0.001*)			(2.150, 0.032*)			(2.104, 0.035*)			(4.289, <0.001*)			(2.359, 0.018*)		
M6: Metathesis/		1.6	1.4	1.8	0.6	0.6	0.6	5.5	4.1	7.5	2.0	1.8	2.7	1.0	1.1	0.6

Transposition		(1.530, 0.126)			(0.251, 0.802)			(3.628, <0.001*)			(1.135, 0.256)			(0.924, 0.355)			
S1: Alveolarisation	Substitution patterns:	0.2	0.2	0.2	3.4	2.6	4.4	2.3	1.4	3.4	1.1	1.3	0.7	0.9	1.0	0.6	
		(0.528, 0.597)			(2.687, 0.007*)			(3.210, 0.001*)			(0.916, 0.360)			(0.777, 0.437)			
S2: Labialisation		0.8	0.8	0.8	3.3	3.7	2.8	0.6	0.4	0.9	1.3	0.9	2.2	0.9	0.8	1.0	
		(0.117, 0.907)			(1.507, 0.132)			(1.721, 0.085)			(1.951, 0.051)			(0.385, 0.701)			
S3: Vocalisation/ Vowelisation		0.1	0.1	0.1	0.0	0.0	0.0	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	
		(0.813, 0.417)			(0.000, 1.000)			(0.415, 0.678)			(0.000, 1.000)			(0.000, 1.000)			
S4: Velar fronting		5.6	7.5	3.6	12.6	14.8	9.5	5.8	5.2	6.6	3.1	2.4	4.9	2.5	2.1	3.5	
		(7.353, <0.001*)			(4.308, <0.001*)			(1.412, 0.158)			(2.465, 0.014*)			(1.596, 0.111)			
S5: Backing		0.7	0.3	1.2	2.4	1.7	3.4	1.4	0.7	2.4	2.2	1.6	3.9	1.6	1.7	1.2	
		(4.111, <0.001*)			(2.927, 0.003*)			(3.445, 0.001*)			(2.729, 0.006*)			(0.761, 0.447)			
S6A: Palatal fronting/ Depalatalisation		0.4	0.5	0.4	0.7	0.6	0.7	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.3	0.0	
		(0.890, 0.374)			(0.315, 0.753)			(0.239, 0.811)			(0.616, 0.538)			(1.162, 0.245)			
S6B: Palatalisation		0.2	0.3	0.1	3.3	4.4	1.7	0.2	0.2	0.2	10.4	14.0	0.7	0.1	0.2	0.0	
		(2.319, 0.020*)			(4.032, <0.001*)			(0.076, 0.939)			(7.502, <0.001*)			(0.948, 0.343)			
S7: Gliding of liquids		27.3	27.7	26.9	6.6	7.1	6.0	30.7	32.5	28.3	17.9	22.4	6.1	34.3	36.9	28.7	
		(0.830, 0.407)			(1.228, 0.219)			(2.166, 0.030*)			(7.298, <0.001*)			(3.170, 0.002*)			
S8: Deaffrication		0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.2	
		(0.271, 0.786)			(0.243, 0.808)			(1.196, 0.232)			(0.000, 1.000)			(1.493, 0.136)			
S9: Affrication		0.4	0.3	0.4	0.1	0.1	0.0	2.2	1.7	2.9	1.6	1.2	2.7	1.5	1.8	0.6	
		(0.588, 0.557)			(1.193, 0.233)			(2.085, 0.037*)			(2.027, 0.043*)			(1.874, 0.061)			
S10: Stopping		3.0	4.6	1.4	5.1	6.7	2.9	2.2	2.8	1.2	1.3	1.1	1.7	1.2	1.0	1.6	
		(7.813, <0.001*)			(4.693, <0.001*)			(2.657, 0.008*)			(0.917, 0.359)			(1.055, 0.292)			

*p-value<0.05 statistically significant

3.1 Description of the various PP produced per age group

3.1.1 Group 1: (24–35 months old)

Assimilation patterns

Among the five assimilation patterns, including consonant harmony/assimilation, context sensitive voicing/pre-vocalic voicing, word-final devoicing, coalescence and reduplication, consonant harmony/assimilation had the highest prevalence among group one with 3.2%. The remaining four patterns showed results of 0.50% and lower, with the lowest being 0.01% for word-final devoicing.

Modification patterns

Six modification patterns were applied and recorded. The results for these patterns differed remarkably. Cluster reduction and weak syllable deletion had a high prevalence rate with the latter recorded as 17.3%, and cluster reduction as 25.5%. Final consonant deletion (7.2%), initial consonant deletion (2.4%), epenthesis (2.8%), and metathesis/transposition (1.6%) were not widely recorded among group one (24–35 months old).

Substitution patterns

The highest prevalence recorded among substitution patterns was gliding of liquids, including the approximation of the trill /r/, with 27.3%. The remaining patterns were all below 10% with velar fronting presenting with 5.6%, and stopping with a prevalence of 3.0%. Alveolarisation (0.2%), labialisation (0.8%), vocalisation/vowelisation (0.1%), backing (0.8%), palatal fronting/depalatalisation (0.4%), palatalisation (0.2%), deaffrication (0.2%), and affrication (0.4%) all had prevalence rates lower than 1.0%.

3.1.2 Group 2: (36–47 months old)

Assimilation patterns

Although the prevalence of consonant harmony/assimilation was reported to be under 10% (at 7.1%), it was recorded to have the highest prevalence among the five assimilation patterns. Results for context sensitive voicing/pre-vocalic voicing (0.1%), word-final devoicing (0.1%), coalescence (0.2%), and reduplication (0.5%) indicated prevalence rates all below 0.50%.

Modification patterns

Similar results occurred in group two (36–47 months) compared to group one (24–35 months) for modification patterns. Cluster reduction and weak syllable deletion were recorded to have the highest prevalence rates with the first mentioned at 23.2% and the latter at 16.1%. The remaining patterns all had prevalence rates below 10%, including final consonant deletion (8.1%), initial consonant deletion (2.9%), epenthesis (3.7%), and metathesis/transposition (0.6%).

Substitution patterns

Similar to group one, gliding of liquids or the approximation of the trill /r/ (6.6%) and velar fronting (12.6%) was recorded to have the highest prevalence among the substitution patterns. However, a statistically significant difference ($p<0.05$) occurred among the prevalence of gliding of liquids (decreased from group one to group two) and that of velar fronting (increased from group one to group two) from group one to group two. Both these groups had p-values of <0,001* when compared to one another. Alveolarisation (3.4%), labialisation (3.3%), vocalisation/vowelisation (0.00%), backing (2.2%), palatal fronting/depalatalisation (0.7%), palatalization (3.3%), deaffrication (0.1%) affrication (0.1%), and stopping (5.1%) all had prevalence numbers below 10%. The prevalence of these patterns, except for vocalisation/vowelisation, gliding of liquids, deaffrication and affrication, all showed increased prevalence numbers from age 24–35 months to 36–47 months. This may be an indication that these patterns are not yet eliminated by age 36–74 months.

3.1.3 Group 3: (48–59 months old)

Assimilation patterns

The results indicated that a consistent pattern seems to occur among the five assimilation patterns. This resemblance resorts to consonant harmony/assimilation which has the highest prevalence rate (3.9%). For group three, the prevalence rate showed a significant difference of $p<0.05$ (p-value = <0,001*) and decreased from group two (36–47 months) to group three (48-59 months) when being compared to each other. Context sensitive voicing/pre-vocalic voicing (0.1%) and word-final devoicing (0.3%) slightly increased in occurrence, although the differences are microscopic. Coalescence (0.1%) and reduplication (0.2%) were reported to decrease, although not fully eliminated.

Modification patterns

Parallel to the results of groups one and two for modification patterns, group three also showed interchangeable results with cluster reduction (19.3%) and weak syllable deletion (10.5%) reported to have the highest prevalence. Statistically significant differences ($p<0.05$) were reported for these patterns between groups two (36–47 months) and three (48-59 months). Initial consonant deletion (0.9%) significantly decreased from group two to group three, with p-value = <0,001*, while final consonant deletion (8.7%), epenthesis (4.6%) and metathesis/transposition (5.5%) all increased together with the increase in age groups.

Substitution patterns

Although gliding of liquids or in Afrikaans, the approximation of the trill /r/ appeared to decrease in prevalence, a substantial increment occurred between group two to group three with percentages for this significant difference stretching from 6.6% to 30.7%. The prevalence for velar fronting was reported to be 5.8% which also indicated a significant difference between groups two (35–47 months) and three (48–59 months). Alveolarisation (2.3%), labialisation (0.6%), backing (1.4%), palatal fronting/depalatalisation (0.1%), palatalisation (0.2%), and stopping (2.2%) all decreased in prevalence as the age of the group increased, which may be an indication that self-elimination takes place over time. However, vocalisation/vowelisation (0.3%), deaffrication (0.1%), and affrication (2.2%) showed small-scale increases in prevalence.

3.1.4 Group 4: (60–71 months old)

Assimilation patterns

Corresponding results stipulate that consonant harmony/assimilation (8.5%) has the highest prevalence among all assimilation patterns. Reduplication also increased in prevalence from 0.2% (48–59 months) to 0.3% (60–71 months), although no significant difference between the groups was reported (p-value = 0.295). Context sensitive voicing/pre-vocalic voicing (0.1%), word-final devoicing (0.1%), coalescence (0.1%) decreased in prevalence in group four.

Modification patterns

Although cluster reduction appeared to decrease in prevalence, a substantial increase occurred between 48-59 months (19.3%) and 60–71 months (23.5%). It seems that out of the older age groups, the 60-71 month old children used cluster reduction the most. Final consonant deletion was also reported to have the highest prevalence among all five age groups with 13.7%. Parallel to previous results, epenthesis increased in group four at a prevalence rate of 6%. The prevalence rates for initial consonant deletion (0.5%), weak syllable deletion (6.3%) and metathesis/transposition (2%) all declined in occurrence, although these patterns are not fully eliminated.

Substitution patterns

Palatalisation was an outlier in this group of substitution patterns and showed an extensive increase in prevalence with 10.4% for 60–71 month old children. Other

patterns recorded to increase slightly were labialisation (1.3%) and backing (2.2%). All other patterns within this category decreased in prevalence, including alveolarisation (1.1%), velar fronting (3.1%), palatal fronting/depalatalisation (0.1%), gliding of liquids including the approximation of the trill /r/ (17.9%), deaffrication (0.0%) affrication (1.6%) and stopping (1.3%), although not fully eliminated.

3.1.5 Group 5: (72 months old)

Assimilation patterns

The prevalence of consonant harmony/assimilation was the highest in group five with 11.6%. Statistically significant differences ($p<0.05$) occurred among all group comparisons for consonant harmony/assimilation, except for group one versus group three, and groups two versus four. This may be an indication that consonant harmony/assimilation is a pattern that occurs more as the child gets older, since the complexity of words increases. Reduplication (1.6%) also gradually increased in prevalence within the last three age groups. By the age of 72 months, context sensitive voicing/pre-vocalic voicing (0.1%) and coalescence (0.1%) seem to decrease and start to eliminate itself. Word-final devoicing (0.0%) was fully eliminated by 72 months of age.

Modification patterns

Cluster reduction (13.7%), final consonant deletion (9.5%), initial consonant deletion (0.2%), and metathesis/transposition (1%) showed a decline in prevalence from group four to group five (72 months). This tendency may be an indication that the natural process of elimination might take place within these patterns. However, weak syllable deletion (9%) and epenthesis (10.2%) increased in prevalence within the 72-month-old group. This may be an indication that these patterns are only used later on, as the child gets older and vocabulary inventories increase. No modification pattern is fully eliminated by the age of 72 months within first-language Afrikaans speaking children.

Substitution patterns

Palatal fronting/depalatalisation (0.2%) and deaffrication slightly increased within the 72 months old age group, although no statistically significant differences ($p>0.05$) were recorded for these patterns between group one (24–35 months) and group five (72 months). The p-value for palatal fronting/depalatalisation was 0,168 and 0,295 for deaffrication. Gliding of liquids including the approximation of the trill /r/, once again showed a significant increase from 60–71 months, to 72 months with 34.4% occurrence recorded. The remaining patterns, including alveolarisation (0.9%), labialisation (0.9%), velar fronting (2.5%), backing (1.6%), palatalisation (0.1%), affrication (1.5%), and stopping (1.2%) all showed a decrease in prevalence. These numbers may be an indication that the patterns are gradually being eliminated as the child gets older.

3.2 The results of male and female participants for various PP per age group (24–72 months)

The following section elucidates the differences recorded for male and female participants in each age group. Although phonological patterns are present among certain ages in general, differences in percentages among male and female are also evident. Separate age group discussions will first focus on the types of patterns that showed significant gender differences. Secondly, the top PP with the highest percentages, or PP where the prevalence rates differed by 3% or more between males and females in each age group will be discussed individually under each section. For differences between male and female groups, the two-proportions z-test flagged many differences as significant with these significant differences ranging from 0.25% to 16.24%, however, many researchers advocate that one should not report these small differences, as finding a statistically significant result for a small effect may have statistical significance ($p<0.05$), but not real-world or practical significance (Baicus and Caraiola 2009; Peeters 2016). Independent samples for the two-proportion z-test were

used to determine the p-value between male and female participants for each pattern in each age group.

3.2.1 Group 1 (24–35 months) - Male versus Female:

Significant gender differences ($p<0.05$) occurred within the age group 24–35 months in the PP of final consonant deletion (M2) (p-value = 0.001), initial consonant deletion (M3) (p-value = 0.039), weak syllable deletion (M4) (p-value = <0.001), epenthesis (M5) (p-value = <0.001), velar fronting (S4) (p-value = <0.001), backing (S5) (p-value = <0.001), palatalisation (S6B) (p-value = 0.020), and stopping (S10) (p-value = <0.001).

19.8% (n=15) of female participants applied weak syllable deletion compared to 14.8% (n=15) for male peers. Male participants, however, showed a greater application of velar fronting 7.5%; (n=15) compared to their female counterparts 3.6%; (n=15), as well as in stopping with 4.6% (n=15) for males and 1.4% (n=15) for females.

3.2.2 Group 2 (36–47 months) - Male versus Female:

Significant gender differences ($p<0.05$) within this age group occurred in PP of consonant harmony/assimilation (A1) (p-value = 0.001), cluster reduction (M1) (p-value = 0.002), epenthesis (M5) (p-value = 0.032), alveolarisation (S1) (p-value = 0.007), velar fronting (S4) (p-value = <0.001), backing (S5) (p-value = 0.003), palatalisation (S6B) (p-value = <0.001), and stopping (S10) (p-value = <0.001).

The results indicated that female participants showed a greater percentage than male participants in the application of consonant harmony/assimilation patterns, with females 8.9% (n=15) and males 5.8% (n=15). This occurrence reflected in cluster reduction as well where the female numbers are 26% (n=15) and male 21.3% (n=15). The male participants, however, used velar fronting more, yielding a percentage of 14.8% (n=15) compared to the females with 9.5% (n=15). This trend is reflected in palatalisation too where 4.3% (n=15) of males, and 1.7% (n=15) of females apply the pattern respectively. Finally, stopping occurs more frequently amongst the male group (6.7%; n=15), and only 2.9% (n=15) females only apply this pattern.

3.2.3 Group 3 (48–59 months) - Male versus Female:

Significant gender differences ($p<0.05$) for the 48–59-month-old group occurred for consonant harmony/assimilation (A1) (p-value = 0.016), cluster reduction (M1) (p-value = <0.001), final consonant deletion (M2) (p-value = 0.002), epenthesis (M5) (p-value = 0.035), metathesis/transposition (M6) (p-value = <0.001), alveolarisation (S1) (p-value = 0.001), backing (S5) (p-value = 0.001), gliding of liquids (S7) (p-value = 0.030), affrication (S9) (p-value = 0.037), and stopping (S10) (p-value = 0.008).

The results for this group indicated that the use of cluster reduction was excessive within both genders, although males presented with 21.7% (n=14) of occurrence instances, while female participants presented with a slightly reduced number of n=14 (15.9%). Notable differences were also recorded for final consonant deletion with males at 10.2% (n=14) and females 6.6% (n=14). Additionally, the gliding of liquids differed with males representing 32.5% (n=14) of the occurrences, and females 28.3% (n=14). However, for some patterns, female participants amplified the percentages: metathesis/transposition with a percentage of 7.5% (n=14) in comparison to 4.1% (n=14), and alveolarisation with 3.5% (n=14) for compared to 1.5% (n=14).

3.2.4 Group 4 (60–71 months) - Male versus Female:

Significant gender differences ($p<0.05$) within group four (60–71 months) between male and female occurred in consonant harmony/assimilation (A1) (p-value = <0.001), context sensitive voicing/pre-vocalic voicing (A2) (p-value = 0.022), word-final devoicing (A3) (p-value = 0.022), cluster reduction (M1) (p-value = 0.006), final consonant deletion (M2) (p-value = <0.001), weak syllable deletion (M4) (p-value = <0.001), epenthesis (M5) (p-value = <0.001), velar fronting (S4) (p-value = 0.014), backing

(S5) (p-value = 0.006), palatalisation (S6B) (p-value = <0.001), gliding of liquids (S7) (p-value = <0.001), and affrication (S9) (p-value = 0.043).

The results between male and female participants in group four (60–71 months) differed extensively from the other age groups, as persistent intervals appeared between males and females. Female participants presented with 15.4% (n=14) for consonant harmony/assimilation and males only 5.9% (n=15). Cluster reduction also reflected significant differences with 28.3% (n=14) for females and 21.6% (n=15) for males. Females presented with 10.8% (n=14) for weak syllable deletion and male participants with 4.6% (n=15). For epenthesis, 10.3% (n=14) of females apply this PP, and 4.4% (n=15) of males. Nevertheless, the latter gender presented with 15.8% (n=15) compared to female 8.1% (n=14) for final consonant deletion, as well as 14% (n=15) compared to 0.7% (n=14) for palatalisation. Finally, 22.4% (n=15) of males apply liquids in contrast to the 6.1% (n=14) of their female peers.

3.2.5 Group 5 (72 months) - Male versus Female:

Significant differences ($p<0.05$) among group five (72 months) between males and females occurred in PP of reduplication (A5) (p-value = 0.006), cluster reduction (M1) (p-value = <0.001), final consonant deletion (M2) (p-value = 0.014), epenthesis (M5) (p-value = 0.018), and gliding of liquids (S7) (p-value = 0.002).

The results for group five (72 months) indicated that for cluster reduction, females presented with a percentage of 18.9% (n=14) compared to 11.3% (n=15) for males, and 12.9% (n=14) for epenthesis compared to 9% (n=15) for male participants. Male participants, however, presented with 10.7% (n=15) for final consonant deletion, compared to females who had a percentage of 6.8% (n=14), and for gliding of liquids, males had a percentage of 36.9% (n=15) compared to females who presented with 28.7% (n=14).

3.3 Summary

Figures 1–3 represent all PP and their prevalence per age group (group 1–5). The patterns are divided according to their categories. Each category is discussed under the relevant figure representing the results. Figure 1 represents the pattern of occurrence for all assimilation patterns across all five age groups.

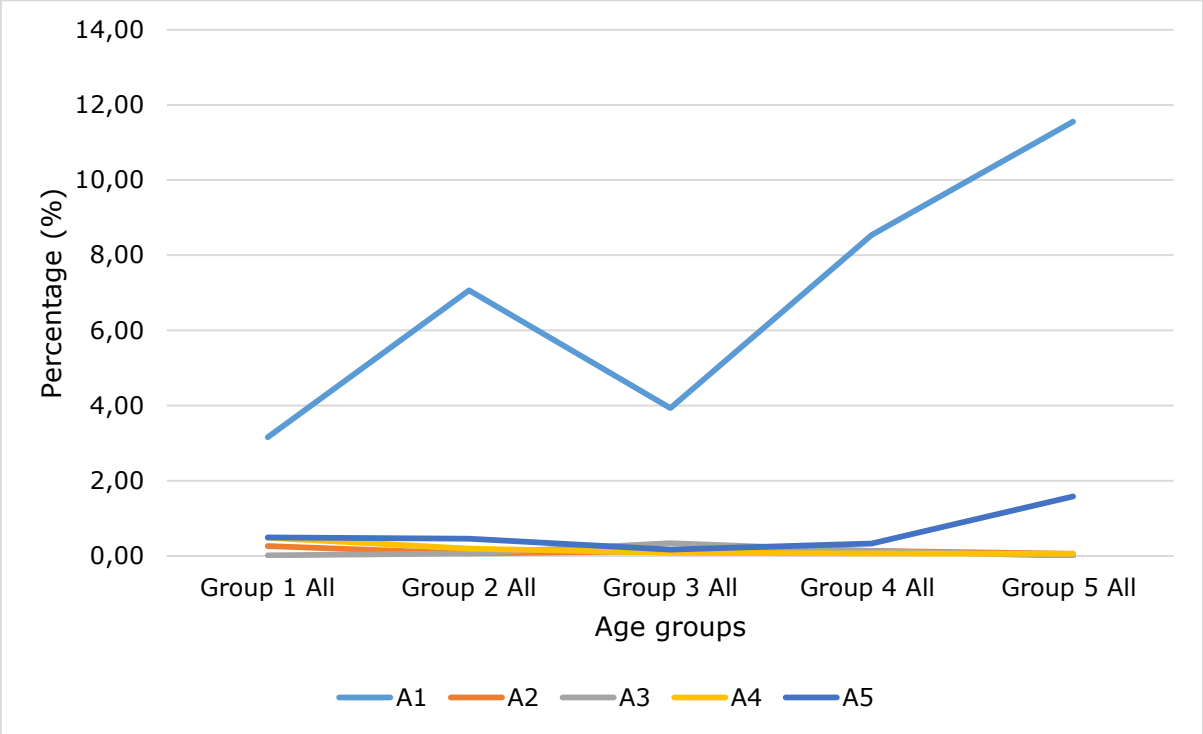


Figure 1 Assimilation patterns applied per age group in percentages

It is evident in the figure that for context sensitive voicing/pre-vocalic voicing (A2), word-final devoicing (A3), and coalescence (A4) it seems that the patterns slowly decreased in the frequency of occurrence by the age of 72 months. However, an outlier occurred for consonant harmony/assimilation (A1) which was applied by all age groups, compared to the other assimilation patterns. Reduplication (A5) was also a pattern that decreased alongside age progression, up until group four (60–71 months), where a slight elevation in pattern application occurred at 72 months.

Figure 2 represents the pattern of occurrence across all age groups for modification patterns.

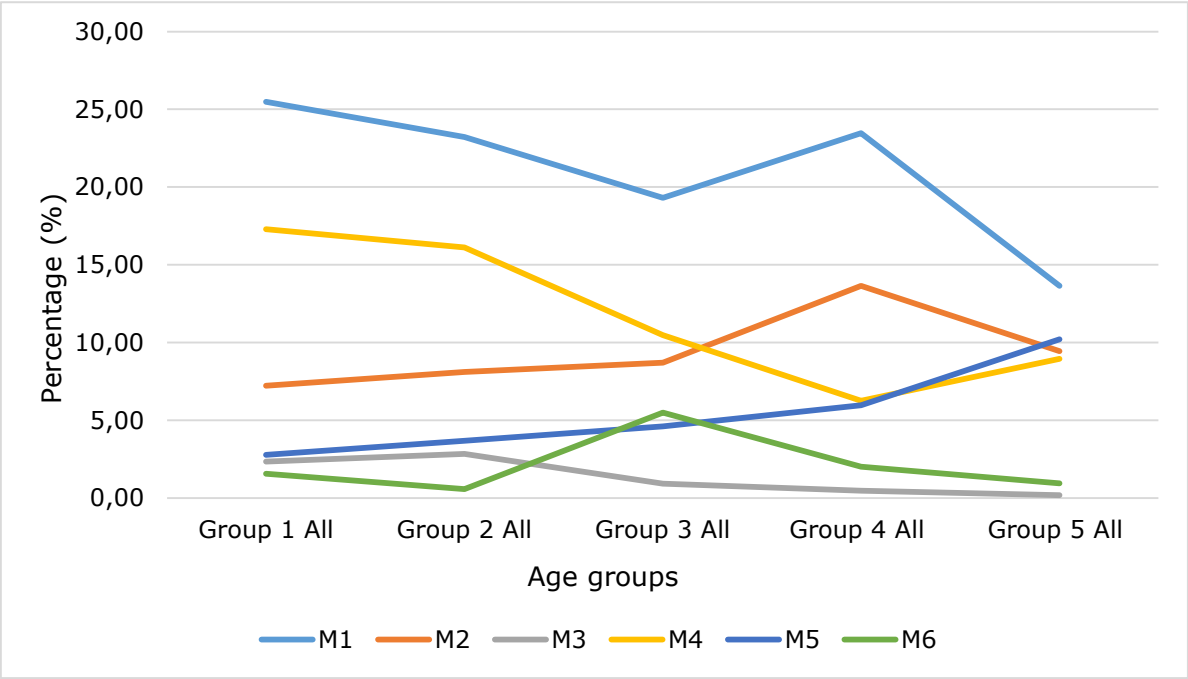


Figure 2 Modification patterns applied per age group in percentages

Even though most patterns (including cluster reduction (M1), final consonant deletion (M2), initial consonant deletion (M3), and metathesis/transposition (M6)) showed a slight increase in prevalence in group three (48–59 months) or group four (60–71 months), most patterns presented with a gradual decrease as age progressed until 72 months (group five). Weak syllable deletion (M4) and epenthesis (M5) however, did not decline by the age of 72 months.

Figure 3 represents the pattern of occurrence across all age groups for substitution patterns.

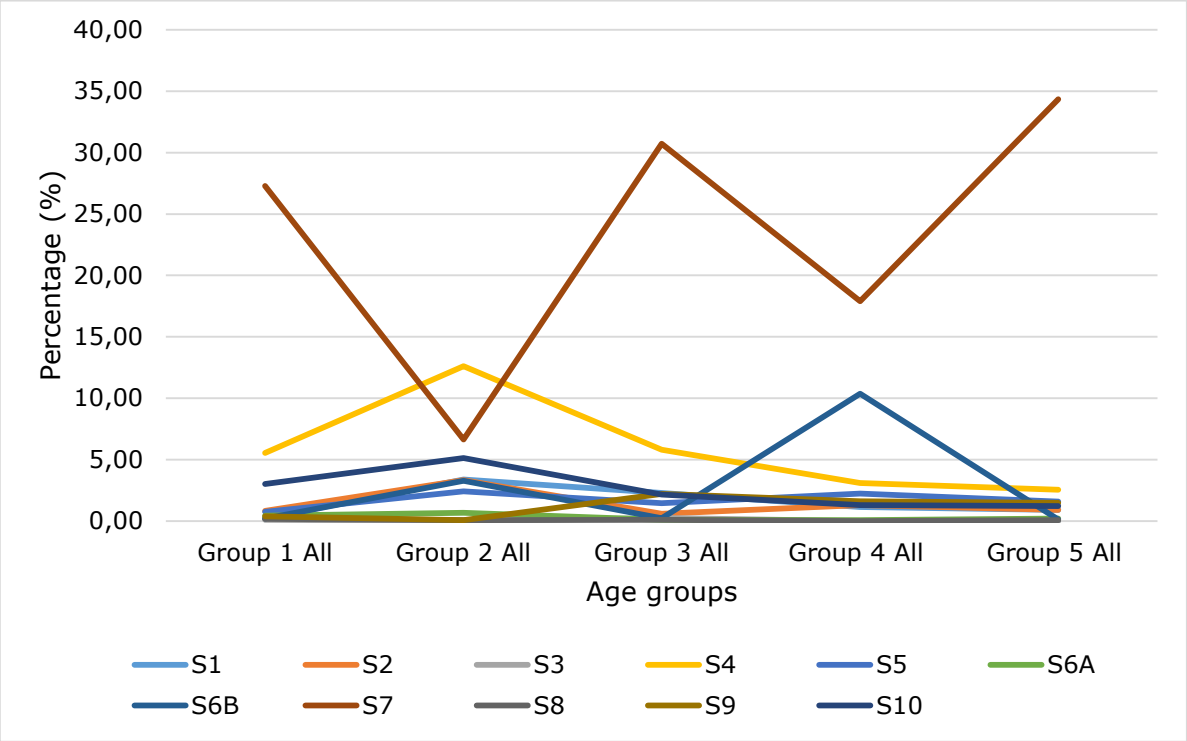


Figure 3 Substitution patterns applied per age group in percentages

The results in Figure 3 depict that gliding of liquids (S7) is an outlier above all other substitution patterns. It is evident in the figure that even though palatalisation (S6B) was also spiking in group four, it showed a moderate decrease by the age of 72 months. All other patterns evident, also showed a significant decrease by the age of 72 months, although they seem to be not fully eliminated by then.

The following discussion focussed on the top three highest percentage PP errors in each age group. Figure 4 represents a line graph of cluster reduction (recorded in all five groups), weak syllable deletion (recorded in three out of five groups) and gliding of liquids (recorded in four out of five groups).

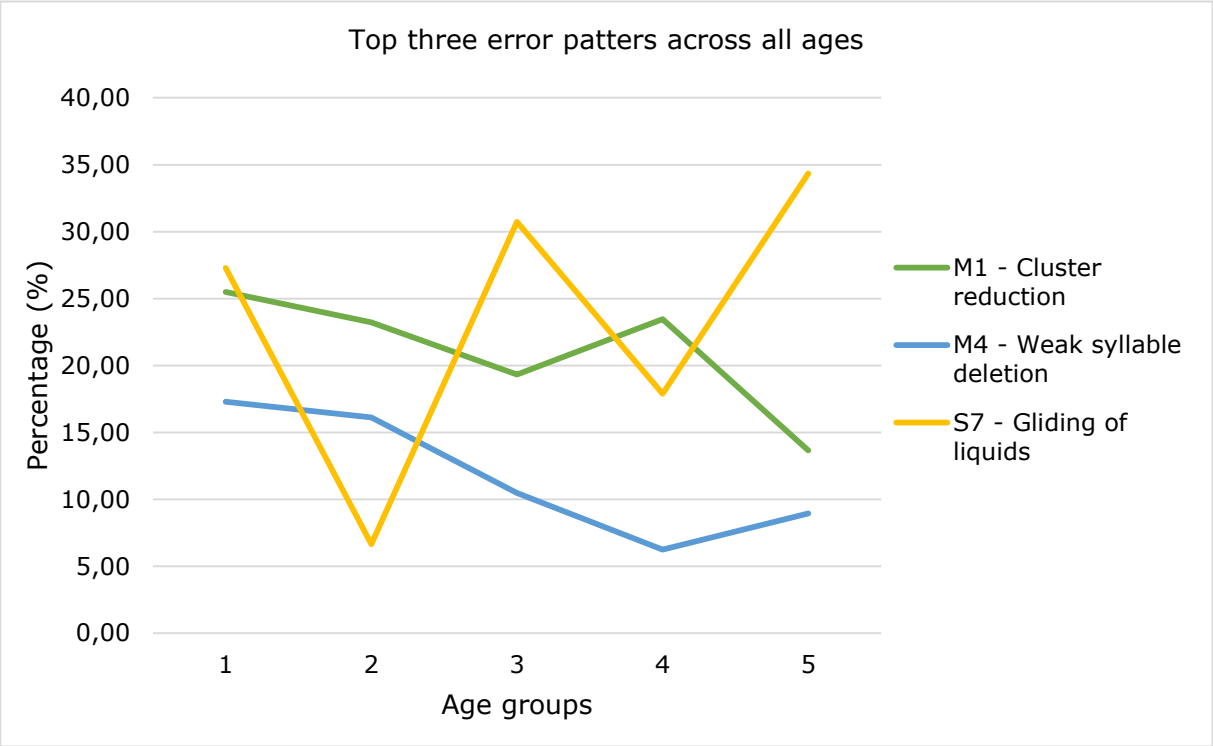


Figure 4 Error patterns that were most recorded across all five age groups (24–72 months)

These PP had the highest prevalence among all five age groups. It is evident in the results that cluster reduction gradually declined as the age of the groups increased, despite a mild spike in group four (aged 60–71 months). Weak syllable deletion also showed a smooth decline, up until group five (72 months) where the curve slightly increased (9%), although the curve does not reach the group one (24–35 months) a percentage of 17.3%. Gliding of liquids refer to the substitution of liquids /l/ and /r/ by a glide /w/, /j/ or another liquid (Kirk and Vigeland 2015:19). In Afrikaans, gliding refers to when the lateral /l/ and trill /r/ is substituted with a glide /w/, /j/ or the English /r/ - i.e. the approximant /ɹ/. As reported in Figure 4, it is evident that gliding of liquids were still severely used as a word simplification pattern from 24 months up to 72 months of age.

4. Discussion

Although the occurrence of patterns showed a gradual decrease in prevalence in the current results, all patterns still persisted after 72 months. Outliers occurred, including consonant harmony/assimilation, reduplication, weak syllable deletion, epenthesis and gliding of liquids. However, according to the current results, word final devoicing (0.0%) and vocalisation/vowelisation (0.0%) were fully eliminated by 72 months in Afrikaans first-language speakers.

In accordance with Van Haaften et al. (2020), Dodd et al. (2003), and several other studies (Clausen and Fox-Boyer 2017, Kirk and Vigeland 2015, and Pascoe et al. 2018) phonological patterns are still age-appropriate if the presence thereof achieves the 10% criterion. This criterion states that a phonological pattern is present and age-appropriate in the particular age group if it reaches the criterion of 10% or less occurrence in 10% of

the participants (van Haaften et al. 2020:977). Therefore, where this specific criterion is not realised for a specific age group, the applied pattern may be viewed as *an error pattern*. Through implementing this criterion, results regarding typical and atypical phonological error patterns can be determined and the possibility of more patterns being eliminated by 72 months will be confirmed through evidence-based research.

The results of the current study indicated that for all participants in group one (aged 24–35 months) (n=30), none of the phonological patterns was eliminated yet and the highest prevalence of PP recorded was 27.3% for the gliding of liquids, 25.5% for cluster reduction, and 17.3% for weak syllable deletions. The findings of this study are in agreement with those of Pascoe et al. (2018) who determined that Afrikaans bilingual, South African English speaking children in this age group still exhibit all of the mentioned PP until 47 months (Pascoe et al. 2018:1154). In the van Haaften et al. (2020) cohort of Dutch speaking children it was however found that gliding of liquids did not occur in their normative sample. Furthermore, percentages for cluster reduction were far beyond 10% for this age group (van Haaften et al. 2020:982). Van Haaften et al. (2020) did not investigate the occurrence of weak syllable deletion in Dutch children.

The results for group two (36–47 months) indicated that there seems to be a process of natural elimination occurring in some patterns from group one to group two (decrease in percentages), although no PP are eliminated by 36–47 months in Afrikaans speakers. These results are in accordance with those of Ceron et al. (2017) who stated that the prevalence of PP decrease with age in typically developing children (Ceron et al. 2017:4). For group two (aged 36–47 months) (n=30), the most common patterns evident in the results were cluster reduction at 23.2%, weak syllable deletion at 16.6%, and velar fronting at 12.6%. Bailoor et al. (2014) and other authors (Bland-Stewart 2016 and Van Haaften et al. 2020) stated that velar fronting persisted between 36–47 months in Standard American English, Dutch and Indian bilingual speaking children (Bailoor et al. 2014:8; Bland-Stewart 2016:109; van Haaften et al. 2020:982) which were the corresponding results for velar fronting in this particular age group in the current Afrikaans study. Furthermore, cluster reduction and weak syllable deletion persisted with prevalence rates achieving the 10% criterion, even after 36 months (Bland-Stewart 2016:109; Pascoe et al. 2018:1154).

Gliding of liquids was the most recorded PP in group three (aged 48–59 months) (n=28) with an elevated percentage from groups two (6.6%) to three (30.7%), following cluster reduction with 19.3% and weak syllable deletion with 10.5%. In contrast to Van Haaften et al. (2020) who reported no single occurrence of gliding of liquids among Dutch speakers in any age group, the current results agree with the findings of Pascoe et al. (2018), who equally recorded the prevalence of gliding of liquids and weak syllable deletion to have prevalence rates above 10% in 48–59-month-old Afrikaans bilingual children (Pascoe et al. 2018:1154). In their study, cluster reduction was eliminated by the age of 48–59 months. Weak syllable deletion only occurred in the speech of Afrikaans bilingual children, whereas no other languages referred to in the current study displayed any occurrence of weak syllable deletion as a typical PP (Pascoe et al. 2018:1154).

The results of group four (aged 60–71 months) (n=29) indicated that cluster reduction had the highest percentage of occurrence at 23.5%, followed by gliding of liquids (17.9%) and final consonant deletion (13.7%). Vocalisation/vowelisation (0.0%) was the only pattern that seemed to be fully eliminated by the age of 60–71 months in the Afrikaans children of our study. Additionally, Pascoe et al. (2018) noted that weak syllable deletion was eliminated in Afrikaans bilingual children by the age of 60 months (Pascoe et al. 2018:1154). Conversely, this was not the case for the current study. Although cluster reduction is fully eliminated in 36–48 months in South African English speakers, the supporting results of Bailoor et al. (2014) concur with ours. Cluster reduction and final consonant deletion were consistently found after 48 months in the bilingual Indian speaking children of their investigation (Bailoor et al. 2014:8). Likewise, Ceron et al. also identified cluster reduction as the most prevalent PP in their study

(Ceron et al. 2017:7). In contrast, final consonant deletion already started to disappear by 36 months in the Standard American English child (Bland-Stewart 2016:109).

For group five (aged 72 months) (n=29), the most prevalent patterns recorded were gliding of liquids with an average of 34.4%, cluster reduction with 13.7%, and consonant harmony or assimilation with 11.6%. Based on these numbers, no patterns were fully eliminated by 72 months, except for word final devoicing (0.0%) and vocalisation/vowelisation (0.0%). Once again, these results are in alignment with Bland-Stewart (2016) and Pascoe et al. (2018) which indicated that although most PP in their studies appeared to be eliminated after 47 months, gliding seemed to persist beyond 71 months (Bland-Stewart 2016:109; Pascoe et al. 2018:1154). The findings for this age group also concur with those of Van Haaften and colleagues whose Dutch participant percentages for cluster reduction remained above 10% after 72 months of age. Consonant harmony/assimilation refers to when the pronunciation of a whole word is influenced by the presence of a particular consonant in the word. Consonant harmony/assimilation seems to be an outlier in the speech of Afrikaans 72-month-old children, as other studies reported assimilation do not occur regularly or only in atypical speech (Bailoor et al. 2014:2; Ceron et al. 2017:5).

Although cluster reduction had one of the highest prevalence rates and showed significant differences between almost all age groups, the results do not concur with the results of Van Haaften et al. (2020) which reported that cluster reduction was present for the most extended period. In fact, gliding of liquids had the highest prevalence among Afrikaans speakers. Both Dutch and Afrikaans use the trill /r/, or the rhotic /r/ in Dutch, within their phoneme inventories (van Haaften et al. 2020:973). The differences in the results between these languages may be due to one language group omitting the consonants in words, and the other rather substituting them (Van Haaften et al. 2020:13). Bailoor et al. (2014) also reiterated that the sound with which substitution transpire, differs within languages (Bailoor et al. 2014:3). In Finland, a study by Aalto et al. (2020) on Finnish speaking children also indicated that language-specific tendencies, with regards to specific substitution or omission patterns occur among different languages. The difficulty in producing the trill /r/ phoneme lies in the manner of articulation (Aalto et al. 2020:628). Aalto et al. (2020), described that Finnish speaking children tend to use assimilation more than omissions to ease production of words containing a trill /r/ (Aalto et al. 2020:621). However, in Afrikaans, words containing a trill /r/, is rather substituted and formed into an approximation, with the trill /r/ substituted with an approximant /ɹ/. The reason for gliding of liquids occurring regularly may also be due to the fact that the Afrikaans trill /r/ is only acquired by the age of five years (Pringle et al. 2022:344-360) and that phonological errors are often present before the acquisition of speech sounds (Pringle et al. 2022:361). The results of the present study share the view of Aalto et al. (2020) that phonological development is specific to each language (Aalto et al. 2020:633) and that there are PP that can be specifically ascribed to an individual language (Clausen and Fox-Boyer 2017:454).

Male versus Female

Through these results, it is observed that boys revealed a higher prevalence of PP in group one (24–35 months), whereas girls were more likely to have a higher prevalence of PP in group two (36–47 months), group three (48–59 months) and group four (60–71 months). In group five (72 months) the prevalence of PP were equally distributed among boys and girls. The mixed results of this section on gender did not concur with the results of Clausen and Fox-Boyer (2017), or the study of Brancalioni et al. (2012) on Portuguese children in Brazil. No significant differences between the performance of girls and boys were found in these studies (Brancalioni et al. 2012:159; Clausen and Fox-Boyer 2017:456). Ceron et al. (2017) reported that phonological impairments were more evident among males than females, except for the three-year-old group where female prevalence rates were the highest, although the results were not statistically significant (Ceron et al. 2017:7). However, the results of the current study indicated that in some PP, as discussed above, there were significant differences that occurred between the

occurrence of a specific pattern between males and females. Since there is no consensus between existing studies on differences between gender groups, the influence of gender on phonological development can still be seen as indeterminate (Clausen and Fox-Boyer 2017:444) until more in-depth studies are done on this.

5. Conclusion

Results of the current study revealed that first-language Afrikaans speaking children manifest different prevalence rates for specific PP compared to other children of the same age in other languages. This conclusion concurs with the results of Lin and Johnson (2010), which state that language-specific PP occurs (Lin and Johnson 2010:383). Statistically significant differences were noted among the prevalence rates of PP between male and female participants in the current study.

The results of the current study provide Afrikaans SLTs with data and in-depth descriptions of phonological development, specifically focussing on phonological patterns, to provide efficient person-centred, evidence-based intervention to this population. Periodical updates regarding population demographics should be made to explicitly constitute detailed normative data for the current population (Kirk and Vigeland 2014:366).

The potential for future research is highlighted in the study. Future research should investigate the approximation of the trill /r/-sound as a separate pattern in languages such as the African languages that also contain the trill sound, as this pattern showed a high prevalence in the current study. Furthermore, focus should be placed on the age of elimination for each PP in Afrikaans first-language speakers based on the 10% criterion. PP are categorised as error patterns if the phenomenon is present at least four times in the speech of a child according to Kirk and Vigeland (2015) and Clausen and Fox-Boyer (2017). Through the use of this criterion, Afrikaans SLTs will be able to discern whether phonological development is progressing typically, and when the errors should become atypical (Pascoe et al. 2018:1474).

6. References

Aalto, E., K. Saaristo-Helin and S. Stolt. 2020. Phonological development of Finnish speaking children at 3;6 and associations to previous and simultaneous lexical ability. *Clinical Linguistics and Phonetics,* 34(7)**:** 617-633.

Abou-Elsaad, T., O. Afsah and M. Rabea. 2019. Identification of phonological processes in Arabic–speaking egyptian children by single-word test. *Journal of Communication Disorders,* 77(10)**:** 80-93.

Ahmed, R. Z. and S. J. B. Bidin. 2016. The effect of task based language teaching on writing skills of efl learners in malaysia. *Open Journal of Modern Linguistics,* 6(3) 207-218.

Alduais, A. 2015. An account of phonetics and phonology as similar identical or different. *The International Journal of Indian Psychology,* 3(1)**:** 157-165.

American Speech–Language–Hearing, A. 2016. Scope of practice in speech-language pathology, www.asha.org/policy.

Asad, A. N., S. C. Purdy, E. Ballard, L. Fairgray and C. Bowen. 2018. Phonological processes in the speech of school-age children with hearing loss: Comparisons with children with normal hearing. *Journal of Communication Disorders,* 74(4)**:** 10-22.

Baicus, C. and S. Caraiola. 2009. Effect measure for quantitative endpoints: Statistical versus clinical significance, or "how large the scale is?". *European Journal of Internal Medicine,* 20(5)**:** e124-e125.

Bailoor, P., M. Rai and L. Krishnan. 2014. Development of phonological processes in typically developing 3-4 year old Indian bilingual children. *European Journal of Educational and Development Psychology,* 2(2)**:** 1-9.

Bauman-Waengler, J. 2014. *Articulatory and phonological impairment - a clinical focus*. Pearson.

Bernthal, J. E., N. W. Bankson and P. Flipsen, Jr. 2017. *Articulation and phonological disorders - Speech sound disorders in children*. Pearson.

Bland-Stewart, L. M. 2016. Phonetic inventories and phonological patterns of African American two-year-olds: A preliminary investigation. *Communication Disorders Quarterly,* 24(3)**:** 109-120.

Bos, K. 2016. From Cape Dutch to Afrikaans a comparison of phonemic inventories. Baccalareus thesis, University Utrecht.

Bowen, C. 2015. *Children's speech sound disorders*. John Wiley & Sons, Ltd.

Brancalioni, A. R., A. P. C. Bertagnolli, J. B. Bonini, M. B. Gubiani and M. Keske-Soares. 2012. The relation between auditory discrimination and phonological disorder tt - a relação entre a discriminação auditiva e o desvio fonológico. *J. Soc. Bras. Fonoaudiol,* 24(2)**:** 157-161.

Carstens, W. and N. Bosman 2014. *Kontemporêre Afrikaanse taalkunde*. Pretoria: Van Schaik Uitgewers.

Ceron, M. I., M. B. Gubiani, C. R. de Oliveira, M. B. Gubiani and M. Keske-Soares. 2017. Prevalence of phonological disorders and phonological processes in typical and atypical phonological development. *Codas,* 29(3)**:** 1-9.

Clausen, M. C. and A. Fox-Boyer. 2017. Phonological development of Danish-speaking children: A normative cross-sectional study. *Clinical Linguistics and Phonetics,* 31(6)**:** 440-458.

Coetzee, A. E. 2018. *Fonetiek*. Pretoria, South Africa: Van Schaik Uitgewers.

Collée, E. 2018. A new Dutch non-word-repetition task to test the production of consonant clusters with and without /s/ by TD Dutch children*.*

Cushing, I. and S. Hellmuth 2016. Phonetics and phonology. In Giovanelli, M. & Clayton, D. (eds.).

Den Besten, J. B. 2009. Desiderata voor de historische taalkunde van het Afrikaans. *Afrikaans: een drieluik,* 234-252.

Dodd, B., A. Holm, Z. Hua and S. Crosbie. 2003. Phonological development: A normative study of British English-speaking children. *Clinical Linguistics and Phonetics,* 17(8)**:** 617-643.

Dodd, B. and T. Iacano. 1989. Comparison of cross-language generalisation following speech therapy. *British Journal of Disorders of Communication,* 24: 333-351.

Fringi, E., J. F. Lehman and M. Russell. 2015. Evidence of phonological processes in automatic recognition of children's speech. *Proceedings of the Annual Conference of the International Speech Communication Association, INTERSPEECH 2015,* 1621-1624.

Giovanelli, M. and D. Clayton 2016. *Knowing about language linguistics and the secondary English classroom*. Routledge.

Goldstein, B. and P. S. Washington. 2001. An initial investigation of phonological patterns in typically developing 4-year-old Spanish-English bilingual children. *Language, Speech, and Hearing Services in Schools,* 32(3)**:** 153-164.

Goldstein, B. A. and A. Iglesias. 1996. Phonological patterns in Puerto Rican Spanish-speaking children with phonological disorders. *Journal of Communication Disorders,* 29(5)**:** 367-387.

Heeringa, W., F. de Wet and G. B. van Huyssteen. 2015. Afrikaans and Dutch as closely-related languages: A comparison to west germanic languages and Dutch dialects. *Stellenbosch Papers in Linguistics Plus,* 47(0)**:** 1-18.

Hodson, B. W. 2011. Enhancing phonological patterns of young children with highly unintelligible speech. *American Journal of Speech-Language Pathology,* 16(4)**:** 16-19.

Hustad, K. C., T. Mahr, P. E. M. Natzke and P. J. Rathouz. 2020. Development of speech intelligibility between 30 and 47 months in typically developing children: A cross-sectional study of growth. *Journal of Speech, Language, and Hearing Research,* 63(6)**:** 1675-1687.

Hustad, K. C., T. J. Mahr, P. Natzke and P. J. Rathouz. 2021. Speech development between 30 and 119 months in typical children: Intelligibility growth curves for single-word and multiword productions. *Journal of Speech, Language, and Hearing Research,* 64(10)**:** 3707-3719.

Kirk, C. and L. Vigeland. 2014. A psychometric review of norm-referenced tests used to assess phonological error patterns. *Language, Speech, and Hearing Services in Schools,* 45(October)**:** 365-377.

Kirk, C. and L. Vigeland. 2015. Content coverage of single-word tests used to assess common phonological error patterns. *Language, Speech, and Hearing Services in Schools,* 46(January)**:** 14-29.

Leon, A. C., L. L., Davis & H. C. Kraemer. 2011. The role and interpretation of pilot studies in clinical research. *Journal of psychiatric research*, 45(5): 626–629.

Lin, L. C. and C. J. Johnson. 2010. Phonological patterns in Mandarin-English bilingual children. *Clinical Linguistics and Phonetics,* 24(4-5)**:** 369-386.

Lotter, E. C. 1974. Die ontwikkeling en toetsing van artikulasievermoens by die Afrikaanssprekende kind. *Tydskrif van die Suid-Afrikaanse Vereniging vir Spraak- en Gehoorheelkunde,* 21: 33-42.

McLeod, S. 2017. Speech sound acquisition. In Bernthal, J. E., Bankson, N. W. & Flipsen, P. (eds.) Pearson.

McLeod, S. and K. Crowe. 2018. Children's consonant acquisition in 27 languages: A cross-linguistic review. *American Journal of Speech-Language Pathology,* 27(4)**:** 1546-1571.

Pascoe, M., O. Mahura and J. Le Roux. 2018. South African English speech development: Preliminary data from typically developing preschool children in Cape Town. *Clinical Linguistics and Phonetics,* 32(12)**:** 1145-1161.

Peeters, M. J. 2016. Practical significance: Moving beyond statistical significance. *Currents in Pharmacy Teaching and Learning,* 8(1)**:** 83-89.

Philippsen, A. 2021. Goal-directed exploration for learning vowels and syllables: A computational model of speech acquisition. *KI - Kunstliche Intelligenz,* 35(1)**:** 53-70.

Pringle, C., M. le Roux, S. Geertsema and M. Graham. 2022. Die verwerwing van Afrikaanse foneme deur kinders van 24-72 maande The acquisition of Afrikaans phonemes in children aged 24–72 months. *Tydskrif vir Geesteswetenskappe,* 62(2)**:** 330-363.

Pyata, R. and A. Banik. 2016. Phonological development profile in typically developing Hindi speaking children. *Language in India,* 16(3)**:** 149-159.

Randolph, C. C. 2017. Overview of phonological disorders: The language-based speech sound disorder. *Journal of Phonetics & Audiology,* 3(1)**:** 1-2.

Rose, Y. and S. Inkelas 2011. *The interpretation of phonological patterns in first-language acquisition*.

Serrat-Sellabona, E., E. Aguilar-Mediavilla, M. Sanz-Torrent, L. Andreu, A. Amadó and M. Serra. 2021. Sociodemographic and pre-linguistic factors in early vocabulary acquisition. *Children,* 8(3)**:** 1-20.

Shipley, K. G. and J. G. McAfee 2016. *Assessment in speech-language pathology - A resource manual*. Cengage Learning.

Smith, S. D., B. F. Pennington, R. Boada, R, and L. D. Shriberg. 2005. Linkage of speech sound disorder to reading disability loci. *Journal of child psychology and psychiatry, and allied disciplines*, 46(10): 1057–1066.

StatsSa. 2018. Community survey of 2018, https://www.statssa.gov.za/publications/P0318/P03182018.pdf

Storkel, H. L. 2019. Using developmental norms for speech sounds as a means of determining treatment eligibility in schools. *Perspectives of the ASHA Special Interest Groups,* 4(1)**:** 67-75.

Sugden, E., E. Baker, N. Munro, L. Williams and C. Trivette. 2018. Service delivery and intervention intensity for phonology-based speech sound disorders. *International Journal of Language and Communication Disorders,* 53(4)**:** 1-119.

Thurmond, V. A. 2001. The point of triangulation. *Journal of Nursing Scholarship,* 33(3)**:** 253-258.

van Haaften, L., S. Diepeveen, L. van den Engel-Hoek, B. de Swart and B. Maassen. 2020. Speech sound development in typically developing 2–7-year-old Dutch-

speaking children: A normative cross-sectional study. *International Journal of Language and Communication Disorders,* 55(6)**:** 971-987.

Viterbori, P., M. Zanobini and F. Cozzani. 2018. Phonological development in children with different lexical skills. *First-language,* 38(5)**:** 538-559.

Wissing, D. 2020. Afrikaans. *Journal of the International Phonetic Association,* 50(1)**:** 127-140.

Chapter Four
Conclusion

Chapter four aims to provide the reader with the outcome of this research study and its results. The clinical implications, study strengths and limitations, and future recommendations are also discussed, after which the chapter closes with final comments on the research study.

"There is in every child at every stage a new miracle of vigorous unfolding." –
Erik Erikson

4.1 Overview

The study aimed to determine and describe PP in the Afrikaans first-language speaking child, between the ages of 24–72 months. The focus of the study was to determine which age group presents with which PP and if these patterns tend to resolve by themselves as age increases. The study also focused on the differences in prevalence rates for each PP between male and female participants within each age group (24–72 months). The study population consisted of 147 participants distributed among five age groups. The retrospective study included previously recorded audio recordings analysed thoroughly by professional SLTs.

Whilst some patterns showed higher prevalence rates than others at 72 months, including consonant harmony or assimilation, reduplication, weak syllable deletion, epenthesis, gliding of liquids and an approximation of the trill /r/, word final devoicing (0.0%) and vocalisation/vowelisation (0.0%) were fully eliminated at this age. Afrikaans children tend to replace the trill /r/ in words with an approximant /ɹ/ or a /j/ or /l/, thus producing an approximation rather than a glide. This approximation and the gliding of liquids displayed the highest prevalence among Afrikaans speakers throughout the investigated cohorts.

The results indicated that for all participants in group one (24–35 months), the highest prevalence of PP recorded were the gliding of liquids and an approximation of the trill /r/, cluster reduction, and weak syllable deletions. For group two (aged 36–47 months), the most common patterns evident in the results were cluster reduction, weak syllable deletion, and velar fronting. The most recorded PP in group three (aged 48–59 months) were gliding of liquids and an approximation of the trill /r/, followed by cluster

reduction and weak syllable deletion. The results of group four (aged 60–71 months) indicated that cluster reduction exhibited the highest percentage of occurrence, followed by gliding of liquids with approximations of the trill /r/ and final consonant deletion. For group five (aged 72 months), the most prevalent patterns recorded were gliding of liquids and an approximation of the trill /r/, cluster reduction, and consonant harmony or assimilation.

Lastly, the study also established that within group one (24–35 months), male participants showed a higher prevalence of phonological patterns, whereas female participants were more likely to show a higher prevalence in groups two (36–47 months), three (48–59 months), and four (60–71 months). In group five (72 months), the prevalence of PP was equally distributed among the gender groups. Significant differences occurred among male (n=74) and female (n=73) participants for many PP. No significant differences between the performance of male and females were found in the studies of Portuguese speaking children in Brazil (Brancalioni et al. 2012, p. 159; Clausen & Fox-Boyer 2017, p. 456).Since there is no consensus between existing studies on differences between gender groups, the influence of gender on phonological development can still be seen as indeterminate until more in-depth studies are done on this. The influence of gender on phonological development remains, however, still undefined (Clausen & Fox-Boyer, 2017).

4.2 Clinical Implications

Production and comprehension of words are both affected by the predictability of a word in a specific context and the knowledge of the language user (Hall et al., 2018). SSDs are among the most common disorders diagnosed by SLTs among young children (Jesus et al., 2015). These cases end up in the caseloads of paediatric SLTs (Waring & Knight, 2013).

The current study determined and described the age at which specific PP are present in the speech of an Afrikaans child (24–72 months). These results provide Afrikaans SLTs with data concerning the occurrence of PP within a specific age group for first-language Afrikaans speakers. The results presented in this study and the normative data by Pringle et al. (2022) can serve as a guideline for Afrikaans SLTs in private practices or at schools to guide assessment and diagnoses. These results can further guide intervention goals and targets for Afrikaans children presenting with a

Developmental Phonological Disorder (DPD). SLTs can make their own conclusions and use these results as a reference to determine high frequency occurences of PP. It is within an SLT's scope of practice to provide evidence-based assessment and intervention that is based on new research. The study provides SLTs, who provide therapy to Afrikaans children, with relevant descriptions of all PP for male and female children between the specific ages of 24–72 months.

4.3 Critical Evaluation of the Study

A critical evaluation of this study is necessary to appraise the study and to ensure that the interpretations of the results are in accordance with the strengths and limitations.

Study strengths

To the researcher's knowledge, this is the first study to date that determines and describes PP within the Afrikaans population aged between 24–72 months. The study is also the first to reveal some statistically significant differences in PP between male and female participants within these age groups. The large sample size, consisting of 147 participants in total, allowed for average values to be more accurate and to determine significant differences among age and gender groups. The research results unearthed multiple statistically significant differences for each PP between genders in each age group. The current study is, furthermore, the first to ascertain functional data regarding age and gender for the prevalence of PP in Afrikaans speaking children in South Africa. Moreover, the study is also a primary study in its acknowledgement and identification of a general deviation that occurs among Afrikaans speakers, where the gliding of liquids was rather simplified into approximations. This can be better explained where the trill /r/, evident in Afrikaans, is substituted with an approximant /ɹ/. The results of the current study agree with Aalto and her colleagues in that phonological development is specific to each language and that there are PP that can be specifically ascribed to an individual language (Aalto et al., 2020; Clausen & Fox-Boyer, 2017). Another strength of the study is that the data analysis were done by professional SLTs with a minimum of three years of knowledge and experience in identifying and treating PP. The results determined by these SLTs were further supported through the process of triangulation. These professional qualifications and expertise helped to support the current results. Although the aim of this study was not to determine the age of elimination of PP, Afrikaans SLTs are well-equipped to be able

to make accurate deductions regarding PP in Afrikaans in practice by referring to the results of this study.

Study limitations

Limitations were identified for the current study. The parent or guardian of each participant had been allowed to indicate if the data of their child, which had been previously collected, may be used for future research. Because of this, the overall number of participants for this study was modified, from 150 in total to 147 participants, which, in return, influenced the desired equal distribution between male and female participants in each age group. There was no longer an equal distribution of 15 male and 15 female participants in each group. The participants were distributed equally in group one and group two (15 males and 15 females), unequally distributed among group three (14 males and 14 females) and unequally distributed in group four and five (15 males and 14 females). Another limitation that needs to be mentioned is that the study used previously collected data that did not include spontaneous speech samples from participants. Studies, however, indicated that adapted single-word tests efficiently record phonological error patterns through phonetically simple words (Kirk & Vigeland, 2015), although spontaneous speech samples are ideal for identifying PP. The researcher, however, strived to ensure validity and reliability even though spontaneous speech samples were not used to expand the results of this study further.

4.4 Recommendations for Future Research

The results of the current study provide Afrikaans SLTs with data and in-depth descriptions of phonological development, specifically focusing on PP. This provision may, in turn, yield efficient person-centred, evidence-based intervention to the Afrikaans paediatric population. Periodical demographic updates should be made to explicitly constitute detailed normative data for the current population (Kirk & Vigeland, 2014). The potential for future research is highlighted in the study. Prospective research studies should focus on the age of elimination for each PP in Afrikaans first-language speakers based on the 10% criterion and include spontaneous speech samples to interpret PP. In accordance with Van Haaften et al. (2020), Dodd et al. (2003), and several other studies (e.g., Clausen & Fox Boyer, 2017; Kirk & Vigeland ,2015; and Pascoe et al., 2018), phonological patterns are still age-appropriate if the presence thereof achieves the 10% criterion. This criterion states that a phonological

pattern is present and age-appropriate in the particular age group if it reaches the criterion of at least 10% occurrence in at least 10% of the participants (van Haaften et al., 2020). Therefore, where this criterion is not realised for a specific age group, the applied pattern may be viewed as an error pattern. PP are categorised as *error patterns* if the phenomenon is present at least four times in the speech of a child, according to Kirk and Vigeland (2015) and Clausen and Fox-Boyer (2017). Through the interim application of this criterion, Afrikaans SLTs will already be able to discern whether phonological development is progressing typically and when the errors become atypical (Pascoe et al., 2018).

4.5 Final Comments

Without any descriptive information regarding the development and occurrence of PP in children aged 24–72 months, SLTs will have no culturally and linguistically appropriate guidelines for phonological development to distinguish between delayed or disordered speech. The current study found significantly differing prevalence rates between male and female participants for specific PP. No results were found to be similar to the results of other studies regarding prevalence rates or the age of elimination for PP. The development of PP is stated to be language-specific.

References

Aalto, E., K. Saaristo-Helin & S. Stolt. (2020). Phonological development of Finnish speaking children at 3;6 and associations to previous and simultaneous lexical ability. *Clinical Linguistics and Phonetics*, *34*(7), 617-633. https://doi.org/10.1080/02699206.2019.1681517

Abbott, K. V., Barton, B. F., Terhorst, L., & Shembel, A. (2016). Retrospective studies: A fresh look. *Americal Journal of Speech Language Pathology*, *25*(2), 157-163. https://doi.org/10.1044/2016_AJSLP-16-0025

Abou-Elsaad, T., Afsah, O., & Rabea, M. (2019). Identification of phonological processes in Arabic–speaking Egyptian children by single-word test. *Journal of Communication Disorders*, *77*(10), 80-93. https://doi.org/10.1016/j.jcomdis.2018.10.003

Ahmed, R. Z., & Bidin, S. J. B. (2016). The effect of task-based language teaching on writing skills of EFL learners in Malaysia. *Open Journal of Modern Linguistics*, *6*, 207-218. https://doi.org/10.4236/ojml.2022.121003

Alduais, A. (2015). An account of phonetics and phonology as similar identical or different. *The International Journal of Indian Psychology*, *3*(1), 157-165. https://doi.org/10.25215/0301.069

Alexander, M. (2021). *South Africa gateway*. https://southafrica-info.com/arts-culture/11-languages-south-africa/.

American Speech Language Hearing Association. (2016). *Scope of practice in speech-language pathology*. www.asha.org/policy.

Asad, A. N., Purdy, S. C., Ballard, E., Fairgray, L., & Bowen, C. (2018). Phonological processes in the speech of school-age children with hearing loss: Comparisons with children with normal hearing. *Journal of Communication Disorders*, *74*(4), 10-22. https://doi.org/10.1016/j.jcomdis.2018.04.004

Bailoor, P., Rai, M., & Krishnan, L. (2014). Development of phonological processes in typically developing 3-4 year old Indian bilingual children. *European Journal of Educational and Development Psychology*, *2*(2), 1-9.

Bauman-Waengler, J. (2014). *Articulatory and phonological impairment - A clinical focus* (4th ed.). Pearson.

Beers, W. (1995). The phonology of normally developing and language-impaired children. Doctoral Thesis, University of Amsterdam

Berent, I. (2013). The phonological mind. *Trends in Cognitive Sciences*, *17*(7), 319-327. https://doi.org/10.1016/j.tics.2013.05.004

Bernthal, J. E., Bankson, N. W., & Flipsen, P., Jr. (2017). *Articulation and phonological disorders - Speech sound disorders in children* (8th ed.). Pearson.

Bland-Stewart, L. M. (2016). Phonetic inventories and phonological patterns of African American two-year-olds: A preliminary investigation. *Communication Disorders Quarterly*, *24*(3), 109-120. https://doi.org/10.1177/15257401030240030201

Blevins, J. (2006). New perspectives on english sound patterns: “Natural” and “unnatural” in evolutionary phonology. *Journal of English Linguistics*, *34*(1), 6-25. https://doi.org/10.1177/0075424206287585

Bos, K. (2016). *From Cape Dutch to Afrikaans a comparison of phonemic inventories* https://dspace.library.uu.nl/handle/1874/328364

Bowen, C. (2015). *Children's speech sound disorders* (2nd ed.). John Wiley & Sons, Ltd.

Brancalioni, A. R., Bertagnolli, A. P. C., Bonini, J. B., Gubiani, M. B., & Keske-Soares, M. (2012). The relation between auditory discrimination and phonological disorder tt - a relação entre a discriminação auditiva e o desvio fonológico. *Jornal da Sociedade Brasileira de Fonoaudiologia*, *24*(2), 157-161. http://www.scielo.br/scielo.php?script=sci_arttext&amp%0Apid=S2179-64912012000200012

Brink, H., van der Walt, C., & van Rensburg, G. (2018). *Fundamentals of research methodology for healthcare professionals* (4th ed.). Juta and Company (Pty) Ltd.

Carstens, W., & Bosman, N. (2014). *Kontemporêre Afrikaanse taalkunde* (1st ed.). Van Schaiks.

Ceron, M. I., Gubiani, M. B., de Oliveira, C. R., Gubiani, M. B., & Keske-Soares, M. (2017). Prevalence of phonological disorders and phonological processes in typical and atypical phonological development. *Codas*, *29*(3), 1-9. https://doi.org/10.1590/2317-1782/20172015306

Clausen, M. C., & Fox-Boyer, A. (2017). Phonological development of Danish-speaking children: A normative cross-sectional study. *Clinical Linguistics and Phonetics*, *31*(6), 440-458. https://doi.org/10.1080/02699206.2017.1308014

Coetzee, A. E. (2018). *Fonetiek* (5th ed.). Van Schaiks.

Collée, E. (2018). *A new Dutch non-word-repetition task to test the production of consonant clusters with and without /s/ by TD Dutch children.* https://dspace.library.uu.nl/bitstream/handle/1874/368787/Final_Thesis_Ellen_Collee.pdf?sequence=2&isAllowed=y

Combiths, P. N., Barlow, J., & Sanchez, E. (2019). Quantifying phonological knowledge in children with phonological disorder. *Clinical Linguistics and Phonetics*, *33*(10-11), 885-898. https://doi.org/:10.1080/02699206.2019.1584247.

Crowe, K., & McLeod, S. (2020). Children's english consonant acquisition in the United States: A review. *American Journal of Speech-Language Pathology*, *29*(4), 2155-2165. https://doi.org/10.1044/2020_AJSLP-19-00168

Crowley, C., & Baigorri, M. (2015). The Crowley and Baigorri school-age language assessment measures.

Cushing, I., & Hellmuth, S. (2016). Phonetics and phonology. In M. Giovanelli & D. Clayton (Eds.), (pp. 90-102). https://eprints.whiterose.ac.uk/100169/

Den Besten, J. B. (2009). Desiderata voor de historische taalkunde van het Afrikaans. *Afrikaans: een drieluik*, 234-252. https://hdl.handle.net/11245/1.308841

Dodd, B., Holm, A., Hua, Z., & Crosbie, S. (2003). Phonological development: A normative study of British English-speaking children. *Clinical Linguistics and Phonetics*, *17*(8), 617-643. https://doi.org/10.1080/0269920031000111348

Dodd, B., & Iacano, T. (1989). Comparison of cross-language generalisation following speech therapy. *British Journal of Disorders of Communication*, *24*, 333-351. https://doi.org/10.1159/000052671

Elmlinger, S. L., Schwade, J. A., & Goldstein, M. H. (2019). The ecology of prelinguistic vocal learning: Parents simplify the structure of their speech in response to babbling. *Journal of Child Language*, 1-14. https://doi.org/10.1017/S0305000919000291

Fringi, E., Lehman, J. F., & Russell, M. (2015). Evidence of phonological processes in automatic recognition of children's speech. *Proceedings of the Annual Conference of the International Speech Communication Association, INTERSPEECH 2015*, 1621-1624. https://doi.org/10.21437/interspeech.2015-375

Goldstein, B., & Washington, P. S. (2001). An initial investigation of phonological patterns in typically developing 4-year-old Spanish-English bilingual children. *Language, Speech, and Hearing Services in Schools*, *32*(3), 153-164. https://doi.org/10.1044/0161-1461(2001/014)

Goldstein, B. A., & Iglesias, A. (1996). Phonological patterns in Puerto Rican Spanish-speaking children with phonological disorders. *Journal of Communication Disorders*, *29*(5), 367-387. https://doi.org/10.1016/0021-9924(95)00022-4

Grunwell, P., (1975). The phonological analysis of articulation disorders. *British Journal of Disorders of Communication*, *10*(1), pp. 31-42.

Hall, K. C., Hume, E., Jaeger, T. F., & Wedel, A. (2018). The role of predictability in shaping phonological patterns. *Linguistics Vanguard*, *4*(s2), 2017-2027. https://doi.org/10.1515/lingvan-2017-0027

Heeringa, W., de Wet, F., & van Huyssteen, G. B. (2015). Afrikaans and Dutch as closely-related languages: A comparison to west germanic languages and Dutch dialects. *Stellenbosch Papers in Linguistics Plus*, *47*(0), 1-18. https://doi.org/10.5842/47-0-649

Hodson, B. W. (2011). Enhancing phonological patterns of young children with highly unintelligible speech. *American Journal of Speech-Language Pathology*, *16*(4), 16-19. https://doi.org/https://doi.org/10.1044/leader.FTR2.16042011.16

Hodson, B. W. & Paden, E. P. (1983) *Targeting intelligible speech: A phonological approach to remediation*. College-Hill Press.

Howard, S. J., & Melhuish, E. (2017). An early years toolbox for assessing early executive function, language, self-regulation, and social development: Validity, reliability, and preliminary norms. *Journal of Psychoeducational Assessment*, *35*(3), 255–275. https://doi.org/10.1177/0734282916633009

Hustad, K. C., Mahr, T., Natzke, P. E. M., & Rathouz, P. J. (2020). Development of speech intelligibility between 30 and 47 months in typically developing children: A cross-sectional study of growth. *Journal of Speech, Language, and Hearing Research*, *63*(6), 1675-1687. https://doi.org/10.1044/2020_JSLHR-20-00008

Hustad, K. C., Mahr, T. J., Natzke, P., & Rathouz, P. J. (2021). Speech development between 30 and 119 months in typical children: Intelligibility growth curves for single-word and multiword productions. *Journal of Speech, Language, and Hearing Research*, *64*(10), 3707-3719. https://doi.org/10.1044/2021_JSLHR-21-00142

In, J. (2017). Introduction of a pilot study. *Korean Journal of Anesthesiology*, *70*(6), 601-605. https://doi.org/10.4097/kjae.2017.70.6.601

Ingram, D., (1976). *Phonological disability in children* (Vol. 2). Elsevier Publishing Company

Ismail, N., Kinchin, G., & Edwards, J.-A. (2018). Pilot study, does it really matter? Learning lessons from conducting a pilot study for a qualitative phd thesis. *International Journal of Social Science Research*, *6*(1), 1-17. https://doi.org/10.5296/ijssr.v6i1.11720

Jesus, L. M. T., Lousada, M., Domingues, D., Hall, A., & Tomé, D. (2015). Phonological processes in Portuguese children with speech sound disorders. *Poznan Studies in Contemporary Linguistics*, *51*(1), 75-88. https://doi.org/10.1515/psicl-2015-0003

Kawahara, S. (2020). Sound symbolism and theoretical phonology. *Language and Linguistics Compass*, *14*(8), 1-17. https://doi.org/10.1111/lnc3.12372

Kirk, C., & Vigeland, L. (2014). A psychometric review of norm-referenced tests used to assess phonological error patterns. *Language, Speech, and Hearing Services in Schools*, *45*(October), 365-377. https://doi.org/10.1044/2014

Kirk, C., & Vigeland, L. (2015). Content coverage of single-word tests used to assess common phonological error patterns. *Language, Speech, and Hearing Services in Schools*, *46*(January), 14-29. https://doi.org/10.1044/2014

Leon, A. C., Davis, L. L., & Kraemer, H. C. (2011). The role and interpretation of pilot studies in clinical research. *Journal of psychiatric research*, *45*(5), 626–629. https://doi.org/10.1016/j.jpsychires.2010.10.008

Lin, L. C., & Johnson, C. J. (2010). Phonological patterns in Mandarin-English bilingual children. *Clinical Linguistics and Phonetics*, *24*(4-5), 369-386. https://doi.org/10.3109/02699200903532482

Lotter, E. C. (1974). Die ontwikkeling en toetsing van artikulasievermoëns by die Afrikaanssprekende kind. *Tydskrif van die Suid-Afrikaanse Vereniging vir Spraak-en Gehoorheelkunde*, *21*, 33-42. https://doi.org/https://doi.org/10.4102/sajcd.v21i1.399

Lowe, N. K. (2019). What is a pilot study? *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *48*(2), 117-118. https://doi.org/10.1016/j.jogn.2019.01.005

McLeod, S. & Crowe, K. (2017). Speech sound acquisition. In J. E. Bernthal, N. W. Bankson, & P. Flipsen (Eds.), *Speech sound disorders in children* (8th ed., pp. 49-92). Pearson.

McLeod, S., & Crowe, K. (2018). Children's consonant acquisition in 27 languages: A cross-linguistic review. *American Journal of Speech-Language Pathology*, *27*(4), 1546-1571. https://doi.org/10.1044/2018_AJSLP-17-0100

Namasivayam, A. K., Coleman, D., Dwyer, A. O., & Preston, J. L. (2020). Speech sound disorders in children: An articulatory phonology perspective. *10*(1), 1-22. https://doi.org/10.3389/fpsyg.2019.02998

Pascoe, M., Mahura, O., & Le Roux, J. (2018). South African English speech development: Preliminary data from typically developing preschool children in Cape Town. *Clinical Linguistics and Phonetics*, *32*(12), 1145-1161. https://doi.org/10.1080/02699206.2018.1510985

Peña-Brooks, A., & Hegde, M. N. (2015). *Assessment and treatment of speech sound disorders in children*. PRO-ED.

Philippsen, A. (2021). Goal-directed exploration for learning vowels and syllables: A computational model of speech acquisition. *KI - Kunstliche Intelligenz*, *35*(1), 53-70. https://doi.org/10.1007/s13218-021-00704-y

Poole, I., (1934). Genetic development of articulation of consonant sounds in speech. *The Elementary English Review*, *11*(6), pp.159-161

Pringle, C., le Roux, M., Geertsema, S., & Graham, M. (2022). Die verwerwing van Afrikaanse foneme deur kinders van 24-72 maande The acquisition of Afrikaans phonemes in children aged 24–72 months. *Tydskrif vir Geesteswetenskappe*, *62*(2), 330-363. https://doi.org/doi.10.17159/2224-7912/2022/v62n2a5

Pyata, R., & Banik, A. (2016). Phonological development profile in typically developing Hindi speaking children. *Language in India*, *16*(3), 149-159. www.languageinindia.com

Randolph, C. C. (2017). Overview of phonological disorders: The language-based speech sound disorder. *Journal of Phonetics & Audiology*, *3*(1), 1-2. https://doi.org/10.4172/2471-9455.1000128

Ranganathan, P., & Aggarwal, R. (2018). Study designs: Part 1- An overview and classification. *Perspectives in Clinical Research*, *9*(4), 184-186. https://doi.org/10.4103/picr.PICR_124_18

Rose, Y., & Inkelas, S. (2011). *The interpretation of phonological patterns in first-language acquisition*. https://doi.org/10.1002/9781444335262.wbctp0101

Serrat-Sellabona, E., Aguilar-Mediavilla, E., Sanz-Torrent, M., Andreu, L., Amadó, A., & Serra, M. (2021). Sociodemographic and pre-linguistic factors in early vocabulary acquisition. *Children*, *8*(3), 1-20. https://doi.org/10.3390/children8030206

Shipley, K. G., & McAfee, J. G. (2016). *Assessment in speech-language pathology - A resource manual* (5th ed.). Cengage Learning.

Smit A. B. (1986). Ages of Speech Sound Acquisition. Language, Speech and Hearing Services in Schools: Comparison and Critiques of Several Normative Studies, 17:175–186.

Smith, S. D., Pennington, B. F., Boada, R., & Shriberg, L. D. (2005). Linkage of speech sound disorder to reading disability loci. *Journal of child psychology and psychiatry, and allied disciplines*, *46*(10), 1057–1066. https://doi.org/10.1111/j.1469-7610.2005.01534.x

Stampe, D., (1973). *A dissertation on Natural Phonology* (Doctoral dissertation, The University of Chicago).

StatsSa. (2018). *Community survey of 2018*. https://www.statssa.gov.za/publications/P0318/P03182018.pdf

Storkel, H. L. (2019). Using developmental norms for speech sounds as a means of determining treatment eligibility in schools. *Perspectives of the ASHA Special Interest Groups*, *4*(1), 67-75. https://doi.org/10.1044/2018_pers-sig1-2018-0014

Sugden, E., Baker, E., Munro, N., Williams, L., & Trivette, C. (2018). Service delivery and intervention intensity for phonology- based speech sound disorders. *International Journal of Language and Communication Disorders*, *53*(4), 1-119. https://doi.org/https://doi.org/10.1111/1460-6984.12399

Talari, K., & Goyal, M. (2020). Retrospective studies - utility and caveats. *Journal of the Royal College of Physicians of Edinburgh*, *50*(4), 398-402. https://doi.org/10.4997/JRCPE.2020.409

Templin, M.C., (1957). *Certain language skills in children: Their development and interrelationships* (Vol. 10). Minneapolis: University of Minnesota Press.

Thurmond, V. A. (2001). The point of triangulation. *Journal of Nursing Scholarship*, *33*(3), 253-258. https://doi.org/10.1111/j.1547-5069.2001.00253.x

van Haaften, L., Diepeveen, S., van den Engel-Hoek, L., de Swart, B., & Maassen, B. (2020). Speech sound development in typically developing 2–7-year-old Dutch-speaking children: A normative cross-sectional study. *International Journal of Language and Communication Disorders*, *55*(6), 971-987. https://doi.org/10.1111/1460-6984.12575

Van Riper, C., (1939). Ear training in the treatment of articulation disorders. *Journal of Speech Disorders*, *4*(2), 141-142.

Viterbori, P., Zanobini, M., & Cozzani, F. (2018). Phonological development in children with different lexical skills. *First-language*, *38*(5), 538-559. https://doi.org/10.1177/0142723718784369

Waring, R., & Knight, R. (2013). How should children with speech sound disorders be classified? A review and critical evaluation of current classification systems. *International Journal of Language and Communication Disorders*, *48*(1), 25-40. https://doi.org/10.1111/j.1460-6984.2012.00195.x

Wissing, D. (2020). Afrikaans. *Journal of the International Phonetic Association*, *50*(1), 127-140. https://doi.org/https://doi.org/10.1017/S0025100318000269

Appendices

Appendix A: Ethical Clearance

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Humanities 100
Since 1919

29 June 2022

Dear Miss S du Plessis

Project Title:	A description of phonological patterns in Afrikaans speaking children aged 24-72 months: A retrospective study
Researcher:	Miss S du Plessis
Supervisor(s):	Dr M le Roux
Department:	Speech Language Pathology and Audiology
Reference number:	17104522 (HUM007/0422)
Degree:	Masters

Thank you for the application that was submitted for ethical consideration.

The Research Ethics Committee notes that this is a literature-based study and no human subjects are involved. The application has been **approved** on 29 June 2022 with the assumption that the document(s) are in the public domain. Data collection may therefore commence, along these guidelines.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid outin the proposal. However, should the actual research depart significantly from the proposed research, a new research proposal and application for ethical clearance will have to be submitted for approval.

We wish you success with the project.

Sincerely,

Prof Karen Harris
Chair: Research Ethics Committee
Faculty of Humanities
University of Pretoria
e-mail: tracey.andrew@up.ac.za

Appendix B1: Information leaflet and informed consent letter to parents or guardians from the initial study- English

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Humanities 100.
1919 - 2019
Department of Speech-Language Pathology & Audiology

PARENT / GUARDIAN INFORMATION LEAFLET AND INFORMED CONSENT (ORIGINAL STUDY)

The acquisition of Afrikaans phonemes in children aged 24-72 months

Dear Parent / Guardian,

1. INTRODUCTION

Your child is invited to participate in a research study from the Department of Speech-Language Pathology and Audiology, Faculty of Humanities, University of Pretoria. This information leaflet will help you to decide if you would like your child to participate. Before you agree to take part in this study you should fully understand what is involved. Should you have any questions, which are not fully explained in this leaflet, do not hesitate to contact the researcher, Chanté Pringle (main researcher) at 0767451365. You should not agree to let your child take part unless you are completely content about all the procedures involved.

2. THE NATURE AND PURPOSE OF THE STUDY

The purpose of this research study is to describe the age of acquisition of the various Afrikaansphonemes according to the theoretical framework (75% correct production) in children aged 24-72 months. The study will also determine the number of correctly produced syllables in multisyllabic words for each of the age groups.

EXPLANATION OF PROCEDURES TO BE FOLLOWED

Your child as a participant will firstly be screened to determine if he / she meet the inclusion criteria of the study. The screening procedures will include the following:

Test or screening procedure	**Expectations from the participant**
Afrikaans case history and developmental questionnaire	The case history and developmental questionnaire will be handed out to you as the parent / guardian of the participant. A developmental questionnaire will also be handed out to the teacher of the participantto complete.
Oral-facial examination	The participant will be asked to perform tasks with his / her oral-facial structures, including smiling, sticking out their tongue, moving the tongue up and down and sideways and opening and closing the mouth.
Hearing screening	Hearing screening involves two procedures namely Otoacoustic Emissions (OAE) screening and an otoscopic examination. The OAE screening procedure will be performed by asking the participant to keep still while the researcher places a probe into his / her ears. The researcher will press start and the equipment will make beeping sounds ranging from high pitch to low pitch. The equipment will then indicate whether a participant passes or fails the hearing screening. The otoscopic examination will be performed to determine the condition of the ears.
Language screening	The Crowley and Baigorri School Age Language Assessment Measures (SLAM)cards will be used in order to screen language discourse skills of the participant.

Following the screening procedures, three tests / tasks will be performed with the participant. Audio recordings will be made during each of these tasks for later data analysis by the researcher. The following tests / tasks will be done with the participant:

Tests / tasks	Expectations from the participant
Afrikaanse dieptetoets vir die artikulasie van foneme	The participant will be asked to name the two pictures on each page consecutively, for example “kar-kat”.
Afrikaanse Artikulasie Ondersoek	The participant will be requested to name all picture items presented to him / her.
Syllable repetition task	The researcher will model the multisyllabic words after which the participant will be asked to repeat the words as he / she heard it.

1. RISK AND DISCOMFORT INVOLVED

There are no risks involved in participating in this research study. No physiological and psychological harm will be brought to any of the participants during any point of the study. Participants will be assessed in a familiar setting at the school they attend every day in order to not disrupt their normal daily setting and context. The assessment will take approximately 55 minutes to conduct. The participant will have rest periods where they will be allowed to play with the toys provided.

2. POSSIBLE BENEFITS OF THIS STUDY

You will not be paid to let your child participate in the study. By participating in the study, your child will receive a free speech -, language -, and hearing screening. If concerns regarding the development of speech, language or language or hearing are noted, the researcher will write a confidential referral letter in hardcopy or via email to you for an in-depth evaluation.

WHAT ARE YOUR CHILD'S RIGHTS AS A PARTICIPANT?

Participation in this research study is completely voluntary. The participant can, therefore, withdraw at any time, if he / she wishes to do so. In this event, data already collected will be excluded from the study. Participant assent will be requested by asking the participants to indicate whether they would like to participate by pointing to the happy face or not by pointing to the sad face. The researcher will also explain to the participants that they can indicate at any point in time that they do not want to participate anymore by either getting up or pointing to the sad face.

3. HAS THIS STUDY RECEIVED ETHICAL APPROVAL?

The study has applied for ethical clearance from the Research Ethics Committee of the Faculty of Humanities, telephone number: (012) 420 850, at the University of Pretoria.

4. COMPENSATION

Participants will not receive any financial compensation for participating in the study. No extra costs are expected to be paid by the participant.

5. CONFIDENTIALITY AND ANONYMITY

Your child will be given a number in order to keep all information about your child strictly confidential. Once we have analysed the information no one will be able to identify your child. Research reports and articles in scientific journals will not include any information that may identify your child. All the results will be kept private and confidential. All data collected will be securely stored in hard copy and electronically for research and archiving purposes for a minimum of 15 years at the Communication Pathology Building, University of Pretoria.

6. CONSENT TO LET YOUR CHILD PARTICIPATE IN THIS RESEARCH STUDY

If you are willing to let your child participate in this research study, please sign the consent form that is attached. If you have any further questions, please contact me at (076) 745 1365or my supervisors at (012) 420 2381 / (012) 420 3614.

Kind regards

C.Pringle

Ms. Chanté PringleResearcher

Dr Mia le Roux

Supervisor

Dr Salomé Geertsema

Supervisor

Prof Jeannie van der Linde

Head: Department of Speech-Language Pathology and Audiology

INFORMED CONSENT FOR PARENTS

I hereby confirm that I have been informed by the researcher about the nature, process, risks, discomforts, and benefits of this study. I have also received, read and understood the above-written information (information leaflet and informed consent) regarding the study. I am aware that the results of the study, including personal details, will be anonymously processed and presented in research reports.

I am giving consent for my child to participate willingly. I have the contact details of the researcher should I have any questions. I have no objection to my child participating in the study. I understand that my child will not be penalised in any way should I wish for my child to discontinue the study.

Please mark whether you give permission that the data collected may be used for future research. Herewith I give consent that the information that was obtained in this study maybe used for future research.

Yes □ No □

Parent/Caregivers Name:_____(Please print)

Parent / Caregivers Signature:_____Date: _____

Participant's name: _____

Researcher's Name: Chanté Pringle

Researcher's Signature:_____Date: _____

Witness's Name: _____

Witness's Signature:_____Date: _____

Appendix B2: Information leaflet and informed consent letter to parents or guardians from the initial study - Afrikaans

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Humanities 100.
1919 - 2019
Department of Speech-Language Pathology & Audiology

OUER / VOOG INLIGTING - EN TOESTEMMINGSBRIEF (ORIGINAL STUDY)

Die verwerwing van Afrikaanse foneme in kinders in die onderskeie ouderdomsperiodes 24 tot 72 maande

Geagte Ouer / Voog

1. INLEIDING

U kind word uitgenooi om deel te neem aan 'n navorsingstudie aan die Departement Spraak- Taalpatologie en Oudiologie, Fakulteit Geesteswetenskappe, by die Universiteit van Pretoria. Hierdie inligtingsbrief sal u help om te besluit of u wil hê u kind moet deelneem. Voordat u instem om u kind aan hierdie studie te laat deelneem, moet u ten volle begryp van wat betrokke is. Indien u vrae het wat nie beantwoord is deur die inligtingsbrief nie, moet u nie huiwer om die navorser, Chanté Pringle (hoofnavorser), te kontak by 0767451365 nie. U moet nie toestemming gee dat u kind deelneem, tensy u heeltemal tevrede is met die prosedures wat gevolg gaan word.

2. DIE AARD EN DOEL VAN DIE NAVORSING

Die doel van hierdie navorsing is om die ouderdom van verwerwing van die verskillende Afrikaanse foneme volgens die teoretiese raamwerk (75% korrekte produksie) by kinders in die onderskeie ouderdomsperiodes 24 tot 72 maande te beskryf. Die studie sal ook die aantal korrek geproduseerde lettergrepe in multisillabiese woorde bepaal vir die verskeie ouderdomsgroepe

VERDUIDELIKING VAN DIE PROSEDURES WAT GEVOLG GAAN WORD

U kind as deelnemer sal eerstens gekeur word om te bepaal of hy / sy aan die insluitingskriteria van die studie voldoen. Die keuringsprosedures sal die volgende insluit:

Toets of siftingsprosedure	**Verwagtinge van die deelnemer**
Afrikaanse geskiedenis vorm en ontwikkelingsvraelys	Die geskiedenis vorm en ontwikkelingsvraelys sal aan u as ouer / voog van die deelnemer uitgedeel word. 'n Ontwikkelingsvraelys sal ook aan die onderwysers van die deelnemers uitgedeel word.
Mond- en gesigsondersoek	Die deelnemers sal gevra word om take met hulle mond-en-gesigsstrukture uit te voer, insluitend om te glimlag, tong uit te steek, die tong op en af en sywaarts te beweeg en om die mond oop- en toe te maak.
Gehoorsifting	Gehoorsifting behels twee prosedures naamlik Otoakoestiese Emissies (OAE) sifting en 'n otoskopiese ondersoek. Die OAE-siftingsprosedure sal uitgevoer word deur die deelnemers te vra om stil te bly terwyl die navorser 'n draadjie se punt in hulle ore plaas. Die navorser sal “begin” op die masjien druk en die toerusting sal piepgeluide maak wat wissel van hoë toonhoogte tot lae toonhoogte. Die toerusting sal dan aandui of 'n deelnemer die gehoorsifting slaag of nie. Die otoskopiese ondersoek sal uitgevoer word om die toestand van die ore te bepaal.
Taalsifting	Die “Crowley and Baigorri School Age Language Assessment Measures (SLAM)” kaarte sal gebruik word om die deelnemers se taalgespreksvaardighede te assesseer.

Na die keuringsprosedures sal drie toetse / take met die deelnemers gedoen word. Klankopnames sal tydens elkeen van hierdie take gemaak word vir latere data-ontleding deur die navorser. Die volgende toetse / take sal met die deelnemers gedoen word:

Toetse/Assesserings	Wat van u kind verwag gaan word
‘n Afrikaanse Dieptetoets vir die Artikulasie van Foneme	Die deelnemers sal gevra word om die twee prente op elke bladsy opeenvolgend te noem, byvoorbeeld “kar-kat”.
Die Afrikaanse Artikulasie Ondersoek	Die deelnemers sal gevra word om alle prentitems wat aan hulle aangebied word, te benoem.
‘n Sillabiese herhalingstaak	Die navorser sal die multisillabiese woorde vir die deelnemers modelleer, waarna die deelnemers gevra sal word om die woorde te herhaal soos hulle dit gehoor het.

3. RISIKOS AND ONGEMAK BETROKKE

Daar is geen risiko's verbonde aan die deelname aan hierdie navorsingstudie nie. Geen fisiologiese en sielkundige skade sal gedurende enige stadium van die studie aan enige van die deelnemers aangerig word nie. Deelnemers sal in 'n bekende omgewing by die skool wat hulle elke dag bywoon geassesseer word om sodoende nie hul normale daaglikse omgewing en konteks te ontwrig nie. Die assessering sal ongeveer 55 minute neem om uit te voer. Die deelnemers sal rusperiodes hê waar hulle toegelaat sal word om met die speelgoed te speel.

4. MOONTLIKE VOORDELE VAN DIE STUDIE

U sal nie betaal word om u kind aan die studie te laat deelneem nie. Deur aan die studie deel te neem, sal u kind 'n gratis spraak-, taal- en gehoorsifting ontvang. Indien die navorser enige bekommernisse oor die ontwikkeling van spraak, taal of gehoor het wat opgetel word tydens enige van die prosedures, sal ‘n konfidensiële verwysingsbrief aan die ouers / toesighouers geskryf word.

WAT IS U KIND SE REGTE AS ‘N DEELNEMER VAN DIE STUDIE

Deelname aan hierdie navorsingstudie is heeltemal vrywillig. Die deelnemers kan dus enige tyd onttrek as hulle dit wil doen. In hierdie geval sal data wat reeds ingesamel is, nie in die studie ingesluit word nie. Die toestemming van die deelnemer sal gevra word deur elke deelnemer te vra om aan te dui of hulle wil deelneem deur na die gelukkige gesig te wys. Indien nie, na die hartseer gesig te wys. Die navorser sal ook aan die deelnemers verduidelik dat hulle op enige tyd kan aandui dat hulle nie meer wil deelneem nie, deur op te staan of na die hartseer gesig te wys.

5. HET DIE STUDIE ETIESE KLARING ONTVANG

Die studie het etiese klaring ontvang deur die etiese navorsingskomitee van die Fakulteit Geesteswetenskappe, telefoonnommer: (012) 420 850, aan die Universiteit van Pretoria.

6. VERGOEDING

Deelnemers sal geen finansiële vergoeding vir deelname aan die studie ontvang nie. Daar sal nie verwag word dat die deelnemers ekstra kostes moet betaal nie.

7. VERTROULIKHEID EN ANONIMITEIT

U kind sal 'n nommer kry om alle inligting oor u kind streng vertroulik te hou. Sodra die inligting gefinaliseer is, sal niemand u kind kan identifiseer nie. Navorsingsverslae en artikels in wetenskaplike vaktydskrifte sal geen inligting wat u kind kan identifiseer bevat nie. Al die uitslae sal privaat en vertroulik gehou word. Alle inligting wat ingesamel is, sal vir ten minste 15 jaar veilig in harde kopie en elektronies gestoor word vir navorsings- en argief doeleindes in die Kommunikasiepatologie-gebou, Universiteit van Pretoria.

12.TOESTEMMING OM U KIND TE LAAT DEELNEEM AAN HIERDIENAVORSINGSTUDIE

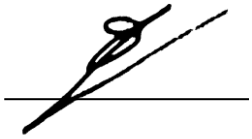
As u bereid is om u kind aan hierdie navorsingstudie te laat deelneem, teken dan asseblief die toestemmingsvorm wat hierby aangeheg is. As u nog vrae het, kontak my gerus by (076)745 1365 of my toesighouers by (012) 420 2381 / (012) 420 3614.

Vriendelike groete

C.Pringle

Ms. Chanté Pringle

Navorser



Dr Salomé Geertsema

Dr Mia le Roux

Studieleier

Studieleier

Prof Jeannie van der Linde

Hoof: Departement Spraak -Taalpatologie en Oudiologie

OUER / VOOG INLIGTING - EN TOESTEMMINGSBRIEF

Hiermee bevestig ek dat ek deur die navorser ingelig is oor die aard, proses, risiko's, ongemak en voordele van hierdie studie. Ek het ook bogenoemde skriftelike inligting (inligting- en toestemmingsbrief) rakende die studie ontvang, gelees en verstaan. Ek is bewus daarvan dat die resultate van die studie, insluitend persoonlike besonderhede, anoniem verwerk sal word en in navorsingsverslae aangebied sal word.

Ek gee toestemming dat my kind sal kan deelneem. Ek het die kontakbesonderhede van die navorser as ek enige vrae het. Ek het geen beswaar dat my kind aan die studie sal deelneem nie. Ek verstaan dat my kind op geen manier gepenaliseer sal word as ek wil hê dat my kind die studie moet staak nie.

Merk of u toestemming gee dat die versamelde data vir toekomstige navorsing gebruik kan word. Hiermee gee ek toestemming dat die inligting wat in hierdie studie verkry is, vir toekomstige navorsing gebruik kan word.
JA □ NEE □

Ouer / voog se name:_____(DRUK ASSEBLIEF)

Ouer / Voog handtekening:_____Datum: _____

Deelnemer se name: _____

Navorser se name: Chanté Pringle

Navorser se handtekening:_____Datum: _____

Getuie se name: _____

Getuie se handtekening:_____Datum: _____

Appendix C1: Participant Assent Letter - English

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Humanities 100.
1919 - 2019
Department of Speech-Language Pathology & Audiology

Dear_____

My name is Chanté. I work at a big place where we would like to know how well you can talk already. May I please show you pictures and ask you to repeat a few words after me? You can say at any time if you do not want to play anymore. Can you please show to the green happy face if you want to play or to the red sad face if you do not want to play?

Room 2-11, Communication Pathology Building
University of Pretoria, Private Bag X20
Hatfield 0028, South Africa
Tel +27 (0)12 420 2949 | Fax +27 (0)12 420 3517
Email esedra.kruger@up.ac.za | www.up.ac.za/faculty-of-humanities

Appendix C2: Participant Assent Letter - Afrikaans

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Humanities 100.
1919 - 2019
Department of Speech-Language Pathology & Audiology

Beste_____

My naam is Chanté. Ek werk by ‘n groot plek waar ons graag wil weet hoe oulik praat jy al. Mag ek asb vir jou ‘n paar prentjies wys en woordjies sê om te herhaal? Jy mag sê as jy nie meer wil saamspeel nie. Wys vir my op die groen gelukkige gesiggie as dit reg is, of op die rooi ongelukkige gesiggie as jy nie meer saam wil speel nie.

Room 2-11, Communication Pathology Building
University of Pretoria, Private Bag X20
Hatfield 0028, South Africa
Tel +27 (0)12 420 2949 | Fax +27 (0)12 420 3517
Email esedra.kruger@up.ac.za | www.up.ac.za/faculty-of-humanities

Appendix D: Non-disclosure agreement for panel members

PANEEL LUISTERAAR TOESTEMMINGSBRIEF EN ETIESE KLARING

Studie Titel: A description of phonological patterns in Afrikaans speaking children aged 24-72 months: A retrospective study

Geagte luisteraar,

U is uitgenooi om deel te wees van ‘n paneel luisteraars in ‘n navorsingstudie aan die Departement van Spraak-en Taalpatologie en Oudiologie, Fakulteit van Geesteswetenskappe, Universiteit van Pretoria.

Indien u instem om deel te wees van die studie en die betrokke paneel word u daaraan herinner dat alle inligting streng konfidensieel aangestuur sal word en dat die inligting onder geen omstandighede aangestuur, gedeel of bespreek mag word nie. Indien u instem om deel te wees van hierdie studie bevestig u ook dat die data eties en akkuraat geanaliseer sal word.

As u bereid is om aan hierdie navorsingstudie deel te neem en te dien as ‘n luisteraar op die paneel, teken asseblief onderaan. Indien u enige ander vrae het kan u my gerus kontak by (sduplessis167@gmail.com) of my studieleiers by (mia.leroux@up.ac.za) of (salome.geertsema@up.ac.za).

Vriendelike groete

Simone du Plessis (Navorser)

Dr. Mia le Roux (Studieleier) Paneel luisteraar (Handtekening)

Dr. Salomé Geertsema (Studieleier) Datum

Appendix E: Panel analysis checklist (up to ten participants)

Instructions:
Four assessment tools will be listened to and analysed for each participant. The assessment tool is indicated at the beginning of each section. Use the below key and symbols to determine which type of error pattern you hear. Indicate it in the block next to the specific participants number and the word in which the pattern occurred, e.g. "kat – tat = fronting → S4".

Instruksies:
Vier assesseringstake sal na geluister en ontleed word vir elke deelnemer. Die assesseringstaak word aan die begin van elke afdeling aangedui. Die onderstaande sleutel en simbole moet gebruik word om te bepaal watter tipe fonologiese patroon u hoor en identifiseer. Indien u 'n patroon geidentifiseer het, dui dit asseblief aan in die blokkie langs die teikenwoord en onder die korrekte kolom volgens die deelnemer se nommer. Gebruik die sleutel en simbole om die patroon te benoem bv. "kat → tat = fronting (S4)". Indien geen patroon voorkom nie, kan die blokkie oopgelos word. In enkele gevalle waar meer as een patroon voorkom, word u toegelaat om die twee mees relevante patrone neer te skryf.

Key/ *Sleutel:*

Assimilation patterns:	**Modification patterns:**	**Substitution patterns:**
A1: Consonant harmony/ Assimilation A2: Context sensitive voicing/ pre-vocalic voicing A3: Word-final devoicing A4: Coalescence A5: Reduplication	M1: Cluster reduction M2: Final consonant deletion M3: Initial consonant deletion M4: Weak syllable deletion M5: Epenthesis M6: Metathesis/Transposition	S1: Alveolarization S2: Labialization S3: Vocalisation/Vowelisation S4: Velar fronting S5: Backing S6: Palatal fronting/ Depalatalization S7: Gliding of liquids S8: Deaffrication S9: Affrication S10: Stopping

Task 1: Afrikaans Articulation test/ *Afrikaanse Artikulasietoets*

Participant:	P1:	P2:	P3:	P4:	P5:	P6:	P7:	P8:	P9:	P10:
Word:										
perd										
lepel										
seep										
boom										
baba										
mielie										
emmer										
vurk										
olifant										
stoof										
water										
kraan										
druiwe										
tafel										
brood										
deur										
sjokolade										
neus										
skoene										
rok										
blare										
piesang										
kat										
geld										
gogga										
vliegtuig										
vingers										
huis										
jas										
gholf										
masjien										
zebra										
pleister										
sleutels										
klip										
glas										
prop										
trein										
gras										
swem										
kwas										
knoop										
spieël										
spring										
stryk										
skryf										

skulp										
wolke										
berg										
drink										
fiets										
boks										
seuntjie										

Task 2: Dieptetoets

Participant:	P1:	P2:	P3:	P4:	P5:	P6:	P7:	P8:	P9:	P10:
Word:										
karvis										
karmes										
karperd										
karhand										
karkat										
karseep										
karring										
kartent										
karbeen										
kargeld										
kardeur										
karleer										
karnaald										
karwater										
karjas										
boomrok										
visrok										
vurkrok										
oogrok										
balrok										
katrok										
seeprok										
ringrok										
stoofrok										
beenrok										
huisvis										
huismes										
huisperd										
huishond										
huiskat										
huisseep										
huisring										
huistent										
huisbeen										
huisgeld										
huisdeur										
huisleer										
huisnaald										

huiswater										
huisjas										
boomson										
oorson										
vurkson										
oogson										
balson										
katson										
seepson										
ringson										
stoofson										
beenson										
sonvis										
sonmes										
sonperd										
sonhond										
sonkat										
sonseep										
sonring										
sontent										
sonbeen										
songeld										
sondeur										
sonleer										
sonnaald										
sonwater										
sonjas										
boomnaald										
oornaald										
vurknaald										
oognaald										
neusnaald										
katnaald										
seepnaald										
ringnaald										
stoofnaald										
lepelnaald										
balvis										
balmes										
balperd										
balhond										
balkat										
balseep										
balring										
baltent										
balbeen										
balgeld										
baldeur										
ballepel										

balnaald										
balwater										
baljas										
boomleer										
oorleer										
vurkleer										
oogleer										
visleer										
katleer										
seepleer										
ringleer										
stoofleer										
beenleer										
hondvis										
hondmes										
hondperd										
hondkat										
hondseep										
hondring										
hondtent										
hondbeen										
hondgeld										
honddeur										
hondleer										
hondnaald										
hondwater										
hondjas										
boomtent										
oortent										
vurktent										
oogtent										
vistent										
tafeltent										
seeptent										
ringtent										
stooftent										
beentent										

Task 3: Syllables/ *Lettergrepe*

Participant:	P1:	P2:	P3:	P4:	P5:	P6:	P7:	P8:	P9:	P10:
Word:										
pampoen										
appel										
sondag										
winkel										
prentjie										
kinders										
biltong										
stoeltjie										

venter										
lemoen										
pampoenpit										
perskeboom										
sondagskool										
perdestal										
lemoene										
rekening										
kameelperd										
skildery										
gelukkig										
oorhaastig										
televisie										
onderwyser										
ongemaklik										
ongelukkig										
kombuistafel										
kameelperde										
tandeborsel										
verwoestende										
aanbeveling										
aandeelhouers										
universiteit										
diskriminasie										
elektrisiteit										
organisasie										
intimiderend										
kommunikasie										
alliterasie										
akkomodasie										
belangstellings										
eksperimente										
gediskwalifiseer										
gestandaardiseerde										
antibiotika										
musiekinstrumente										
opleidingsprogramme										
rekeningkundige										
sjokoladefabriek										
universiteite										
wêreldgeskiedenis										
jeugorganisasie										

Task 4: Other words/ *Ander woorde/ Vokale*

Participant:	P1:	P2:	P3:	P4:	P5:	P6:	P7:	P8:	P9:	P10:
Word:										
diep										
vis										
as										
nuut										
hemp										
klop										
bed										
ek										
forel										
neut										
hut										
hoed										
tier										
muur										
bene										
wîe										
lê										
skêr										
brûe										
kaart										
môre										
glo										
vloer										
katjie										
hondjie										
tjek										
jellie										
berge										

(Adapted from Pringle et al. 2022)

Appendix F: Declaration regarding plagiarism

University of Pretoria

DEPARTMENT OF SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY

Declaration regarding Plagiarism

The Department of Speech-Language Pathology and Audiology emphasises integrity and ethical behaviour with regard to the preparation of all written assignments.

Although the lecturer/course facilitator will provide you with information regarding reference techniques, as well as ways to avoid plagiarism, you also have a responsibility to fulfil in this regard. Should you at any time feel unsure about the requirements, you must consult the lecturer/course facilitator concerned before submitting an assignment.

You are guilty of plagiarism whenever you extract information from a book, article, web page or any other information source without acknowledging the source and pretend that it is your own work. This does not only apply to cases where you quote verbatim, but also when you present someone else's work in a somewhat amended (paraphrased) format or when you use someone else's arguments or ideas without the necessary acknowledgement. You are also guilty of plagiarism if you copy and paste information directly from an electronic source (eg a website, e-mail message, electronic journal article, or CD ROM), even if you acknowledge the source.

You are not allowed to submit another student's previous work as your own. You are furthermore not allowed to let anyone copy or use your work with the intention of presenting it as his/her own.

Students who are guilty of plagiarism will forfeit all credits for the work concerned. In addition, the matter will be referred to the Committee for Discipline (Students) for a ruling. Plagiarism is considered a serious violation of the University's regulations and may lead to your suspension from the University. The University's policy regarding plagiarism is available on the Internet at http://upetd.up.ac.za/authors/create/plagiarism/students.htm.

For the period that you are a student at the Division of Human Nutrition, the following declaration must accompany **all** written work that is submitted for evaluation. No written work will be accepted unless the declaration has been completed and is included in the particular assignment.

I (full names and surname):	Simone du Plessis
Student number:	17104522
Module code: SPP 890	Assignment: Dissertation

Declare the following:

1. I understand what plagiarism entails and am aware of the University's policy in this regard.
2. I declare that this assignment is my own, original work. Where someone else's work was used (whether from a printed source, the Internet or any other source) due acknowledgement was given and reference was made according to departmental requirements.
3. I did not copy and paste any information directly from an electronic source (e.g., a web page, electronic journal article or CD ROM) into this document.
4. I did not make use of another student's previous work and submitted it as my own.
5. I did not allow and will not allow anyone to copy my work with the intention of presenting it as his/her own work.

Signature

2022/02/03

Date

Appendix G: Article submitted to “LitNet Akademies”

‘n Beskrywing van fonologiese patrone by Afrikaanse kinders van 24–72 maande: ‘n Retrospektiewe studie

A description of phonological patterns in Afrikaans children aged 24–72 months: A retrospective study

Opsomming:

Doelwit/Navorsingsvraag: Alhoewel Afrikaans een van elf amptelike tale in Suid-Afrika is, is daar beperkte inligting oor fonologiese ontwikkeling. Die studie verskaf ‘n waardevolle bydrae tot die ontwikkeling van fonologiese patrone (FP) by 24–72 maande oue kinders in die Afrikaanse bevolking. Daarbenewens lewer die studie ook kommentaar op die verskille in die voorkoms van FP tussen manlike en vroulike sprekers. Die rasionaal het ingesluit die verskaffing van bewysgebaseerde riglyne en data vir die beskrywing van FP aan spraakterapeute. Die navorsingsvraag vir hierdie studie was: Wat is die kenmerkende beskrywing van ‘n fonologiese patroon by ‘n Afrikaanse eerstetaalspreker in die ouderdomsgroepe 24–72 maande?

Teoretiese raamwerk/Vertrekpunt: Tot op datum het geen ander studies die verskynsel van FP by Afrikaanssprekende kinders geëvalueer nie. Geen normatiewe data is voorheen ingesamel om die voorkoms van FP binne die Afrikaanssprekende groep of die verskille tussen manlike en vroulike sprekers te bepaal nie.

Metode: Die doel van die studie was om FP in die Afrikaans eerstetaalsprekende kind in die ouderdomsgroepe 24–72 maande te bepaal en te beskryf. Die studie het ‘n retrospektiewe, beskrywende studieontwerp gebruik en in totaal 147 deelnemers ingesluit. Hierdie retrospektiewe studie het voorheen versamelde elektroniese oudio-opnames van die navorsing deur Pringle e. a. (2022) gebruik. Twaalf deskundige spraakterapeute was deel van die data-ontledingsprosedures om FP binne die data te bepaal. Vyf luisteraarspanele is vir die ontledingsprosedures op die been gebring, waarna statistiese ontledings gedoen is om gevorderde resultate te bepaal.

Bevindinge: Alle patrone het na 72 maande voortgeduur, behalwe vir die inisiële konsonant stemgewing en vokalisasie wat ten volle uitgeskakel is. Die gly van likwiedes en die approksimasie van die trilklank /r/ het die hoogste voorkoms getoon en beduidende verskille tussen die prestasies van seuns en dogters is gevind. Resultate het aan die lig gebring dat eerstetaal Afrikaanssprekende kinders verskillende voorkomssyfers vir spesifieke FP toon as ander kinders van dieselfde ouderdom in ander tale.

Sleutelwoorde: Afrikaans; foneme; fonologiese patrone; fonologiese versteuring; konsonantkombinasies; normatiewe data; ouderdom van uitskakeling; spraakklankversteuring; spraak-taalterapeut; verstaanbaarheid

1. Inleiding en rasionaal vir die studie

Babas toon pre-linguistiese gedrag vanaf die oomblik dat hulle gebore word en voeg betekenis by hul spraak teen die einde van 12 maande oud (Serrat-Sellabona e. a. 2021:1). Die fisiologiese strukture en –funksies, sowel as die persepsie- en produksiesisteme, van die spraakklanke van die eerste taal neem tyd om te ontwikkel (Philippsen 2021:56). Die ontwikkeling van die fonologiese sisteem verwys na die verwerwing van die vorm *[struktuur]* en funksie *[doel]* van spraakklanke binne 'n taalsisteem (Ahmed en Bidin 2016:210). Die funksionele ontwikkeling van hierdie aspekte is deurslaggewend vir verstaanbaarheid, aangesien sosiale deelname, opvoedkundige betrokkenheid, prestasie, en die algehele lewensgehalte van 'n kind negatief beïnvloed kan word deur onverstaanbare spraak (Hustad e. a. 2021:3707).

Verstaanbare spraak inkorporeer akkurate lengte en aard van spraak, akkurate produksie van vokale en konsonante, lettergreepstrukture en prosodie (Hustad e. a. 2020:1675). Hierdie beskrywing kan verder omlyn word deur die volgorde van spraakklankverwerwing. Dit sluit in: Fase 1 - Lê die grondslag vir spraak (geboorte tot een jaar), Fase 2 – Oorgang van woorde na kort sinne (een tot twee jaar), Fase 3 – Die ontwikkeling van die foneeminventaris en lettergreepstrukture sowel as grammatikale en sintaktiese strukture (twee tot vyf jaar); en Fase 4 – Bemeestering van spraak insluitend tydsberekening, prosodie, akkuraatheid en geletterdheid (vyf+ jaar) (Mcleod 2017:64). Deur die taalreëls en foneeminventarisse van 'n bepaalde taal te volg, word woorde deur spesifieke klankkombinasies gevorm (Alduais 2015:158). Die term fonologie verwys na die proses om klanke in 'n taal te gebruik (Cushing en Hellmuth 2016:90).

Fonologiese patrone (FP), voorheen bekend as fonologiese prosesse, verwys na 'n afwyking of beperking in die produksie en persepsie van taal. Dit lei tot onvoldoende linguistiese kognitiewe vermoëns wat sleutelfonologiese komponente vervang of uitsluit (Rose en Inkelas 2011:1–2; Asad e. a. 2018:11). Die gebrek aan volledige konseptuele begrip van die korrekte produksie van klanke lei tot 'n bepaalde FP (Fringi e. a. 2015:1621). Variasies ontstaan in die kombinasie van foneme (Abou-Elsaad e. a. 2019:87) wat lei tot 'n fonologiese versteuring (FV). 'n Fonologiese versteuring wys na 'n afwyking in die begrip en gebruik van die spraakklankstelsel en die fonologiese reëls eie aan 'n spesifieke taal (Randolph 2017:1). Gevolglik vind produksiefoute plaas as gevolg van die kompleksiteit van die korrekte produksie- en artikulasiekenmerke (McLeod en Crowe, 2018:1652). Die atipiese aanleer van fonologiese vaardighede teen die verwagte ouderdom verwys na die onvermoë om 'n gegewe foneem te produseer as gevolg van swak koördinasie en aktivering van spiere (Ceron e. a. 2017:2). Inligting rakende spraakontwikkeling is noodsaaklik om kliniessensitiewe navorsing in kinderfonologie verder te ondersoek en te verskaf (Pascoe e. a. 2018:1146).

Geskiedkundige uitgangspunt van fonologiese versteuring

Verskeie langdurige longitudinale studies (Poole 1934; Van Riper 1939; Templin 1957; Stampe 1973; Grunwell 1975; Ingram 1976; Hodson en Paden 1983; Smit 1986) was daarop gemik om die fonologiese patroonraamwerk vir normale fonemiese verwerwing en foutpatrone te ontwikkel (Bowen 2015:22). As gevolg hiervan het hierdie pogings gelei tot die ontwikkeling van strategieë wat afwykende spraakpatrone beskryf, FP teiken, en die toepassing van hierdie strategieë verander (Dodd en Iacano 1989:334).

Vertraging in spraak word gemanifesteer as FP voortduur na die ouderdom van uitskakeling (Abou-Elsaad e. a. 2019:81). Die resultate van Bailoor e. a. (2014:2), Bland-Stewart (2016:106), Ceron e. a. (2017:2), en Goldstein en Iglesias (1996:378) dui aan dat verskeie lande reeds studies gedoen het om die voorkoms van FP in hul huistale uit te wys.

Slegs 'n paar studies het gepoog om die ouderdom waarop FP nog teenwoordig is in die spraak van funksioneel ontwikkelende kinders binne spesifieke linguistiese bevolkings uit te wys (Dodd e. a. 2003:623). Tot op datum het geen ander studies pogings aangewend om die verskynsel van FP by Afrikaanssprekende kinders te evalueer nie. Boonop is geen normatiewe data voorheen ingesamel om die voorkoms van FP binne die Afrikaanssprekende groep van 24–72 maande of die verskille tussen manlike en vroulike sprekers te bepaal nie. Drie moontlike gevolge wat verband hou met 'n gebrek aan fonologiese ontwikkelingsdata vir 'n spesifieke teikenpopulasie is voorgestel. Hierdie gevolge is a) 'n vertraging of afwesigheid van diagnostiese en terapeutiese dienste, b) die verkeerdelike etikettering van fonologiese vaardighede in beide tipies ontwikkelende en fonologies versteurde kinders, en c) 'n verkeerde diagnose van FV as gevolg van die gebrek aan betroubare data (Goldstein en Iglesias 1996:368). As gevolg van hierdie rede is die huidige studie 'n nuwe bydrae aangesien dit klem lê op akkurate en betroubare inligting rakende die ontwikkeling van FP in spesifieke ouderdomsgroepe in die Afrikaans eerstetaalspreker.

Afrikaanse taalstelsel

Afrikaans is verwant aan die Europese tale Engels, Duits en Nederlands, aangesien dit deel is van die Wes-Germaanse taalgroep (Heeringa e. a. 2015:15). Alhoewel Afrikaans hoogs deur Nederlands beïnvloed is, het Afrikaans in relatiewe afsondering in Afrika ontwikkel en sy eie kenmerkende foneeminventaris ontwikkel (Bos 2016:7–8; Den Besten 2009:4).

Twee hoofafdelings bestaan vir die klassifikasie van Afrikaanse foneme, naamlik vokale en konsonante (Coetzee 2018:35). Die monoftonge en tweeklanke van Afrikaans, saam met 'n voorbeeld van 'n Afrikaanse woord wat die vokaal bevat, word in Tabel 1 voorgestel.

TABEL 1: Die vokale van Afrikaans

Monoftonge	**Voorbeeld van 'n Afrikaanse woord wat die monoftong bevat**	**Die Engelse vertaling van die Afrikaanse woord**
Kort Afrikaanse monoftonge		
/i/	D**ie**p	Deep
/j/	N**uu**t	New
/ə/	V**i**s	Fish
/ɛ/	H**e**mp	Shirt
/œ/	H**u**t	Hut
/ɑ/	J**as**	Coat
/ɔ/	Kl**o**p	Knock
/u/	H**oe**d	Hat
Lang Afrikaanse monoftonge		
/e:/	B**e**ne	Legs
/ø/	N**eu**t	Nut
/a:/	K**aa**rt	Map / card
/o:/	Gl**o**	Believe
Afrikaanse tweeklanke		
Tweeklanke	**Voorbeeld van 'n Afrikaanse woord wat die tweeklank bevat**	**Die Engelse vertaling van die Afrikaanse woord**
/əi/	Br**ei**	Knit

/œu/	K**ou**s	Sock
/œj/	H**ui**s	House

Aangepas uit Coetzee (2018:35), Carstens en Bosman (2014:91–125), en Wissing (2020:134–135).

Afrikaanse konsonante word in veelvuldige groepe verdeel wat verband hou met hul wyse van produksie (Carstens en Bosman 2014:115). Afrikaans sluit ook konsonantkombinasies in wat meer as een konsonant bevat. Die konsonante van Afrikaans–enkelkonsonante en kombinasies word saam met 'n voorbeeldwoord in Tabel 2 aangebied.

TABEL 2: Die konsonante en konsonantkombinasies van Afrikaans

Konsonante	**Voorbeeld van 'n Afrikaanse woord wat die konsonant bevat**	**Die Engelse vertaling van die Afrikaanse woord**
Plosiewe		
/p/	**P**adda	Frog
/t/	**T**abel	Table
/k/	**K**ind	Child
/b/	**B**adkamer	Bathroom
/d/	**D**eksel	Lid
/g/	Ber**g**e	Mountains
Frikatiewe		
/ʧ/	**Tj**ek	Cheque
/dʒ/	**J**ellie	Jelly
Nasale		
/m/	**M**aan	Moon
/n/	**N**et	Net
/ɲ/	Ho**n**djie	Doggie
/ŋ/	Ha**ng**er	Hanger
Alveolêre trilklank		
/r/	**R**uik	Smell

Uvulêre trilklank		
/R/	**R**ooi (dialek in Wes-Kaap)	Red
Frikatiewe		
/f/	**V**ee	Sweep
/s/	Pie**s**ang	Banana
/ʃ/	**Sj**okolade	Chocolate
/x/	**G**eel	Yellow
/v/	**W**olke	Clouds
/z/	**Z**oeloe	Zulu
/ɦ/	**H**elp	Help
Glyklank		
/j/	**J**a	Yes
Lateraal		
/l/	**L**aai	Drawer
Konsonantkombinasies van Afrikaans		
Konsonant-foneemgroepe wat uit twee foneme bestaan		**Konsonant-foneemgroepe wat uit drie foneme bestaan**
/rt/, /rk/, /nt/, /st/, /kr/, /dr/, /br/, /sk/, /bl/, /pl/, /xl/, /kl/, /fl /, /lt/, /lf/, /lp/, /lk/, /rs/, /sl/, /ls/, /ts/, /ks/, /sp/, /pr/, /tr/, /rx/, /xr/, /sw/, /kw/, /kn/ en /ŋk/		/spr/, /str/, en /skr/

Aangepas uit Coetzee (2018:35-36), Lotter (1974:153-154), en Wissing (2020:130).

In Tabel 3 word die ouderdomme van aanleer van die klanke van Afrikaans soos bepaal deur Pringle e. a. (2022) uitgebeeld.

TABEL 3: Ouderdom van aanleer van die klanke van Afrikaans (Pringle e. a., 2022)

Tipe foneem	Ouderdom van Afrikaanse verwerwing
Klinkers	Alle vokale word op die ouderdom van twee jaar verwerf.
Konsonante: 24–35 maande	**Plosiewe:** Alle eksplosiewe, /p/, /t/, /k/, /b/, /d/, en /g/ word teen die ouderdom van twee jaar verwerf. **Affrikatiewe**: Die gemiddelde ouderdom van die verwerwing van die /tʃ/ is vier jaar en vir die /dʒ/ drie jaar.

	Nasale: /m/, /n/ en /ɲ/ word reeds op die ouderdom van twee jaar verwerf. **Trilklank**: Die tweejarige groep het nie die /r/ verwerf nie. **Frikatiewe**: /ɦ/, /f/, /v/ en /x/, word verwerf op die ouderdom van twee jaar. Frikatiewe wat nog nie verwerf is nie, sluit in /s/, /z/ en /ʃ/. **Glyklank**: Die palatale approksimant /j/ word verwerf op die ouderdom van twee jaar. **Lateraal**: Die tweejarige groep het nie die /l/ verwerf nie.
Konsonante: 36–47 maande	**Affrikatiewe**: Die /ʧ/ word deur die driejarige groep verwerf. Die /ʤ/ word kenmerkend teen die ouderdom van drie jaar verwerf. **Nasale**: Die driejarige groep het die velêre /ŋ/ verwerf. **Trilklank**: Die driejarige groep het nie die /r/ verwerf nie. **Frikatiewe**: Die driejarige groep het nie die /s/, /z/ en /ʃ/ verwerf nie. **Lateraal**: Die laterale /l/ word verwerf teen die ouderdom van drie jaar.
Konsonante: 48–59 maande	**Trilklank**: Die trilklank /r/ is nog nie teen die ouderdom van vier jaar verwerf nie. **Frikatiewe**: /s/, /ʃ/ en /z/ word op die ouderdom van vier jaar verwerf.
Konsonante: 60–71 maande	**Trilklank**: Die trilklank /r/ word verwerf op die ouderdom van vyf jaar.
Konsonante: 72 maande	Alle foneme word bemeester (90% korrek geproduseer) teen die ouderdom van ses jaar.
Konsonantkombinasies: Invoegings-, skrappings, metatese en substitusiefoute kan gemaak word terwyl kinders konsonantkombinasies produseer (Collée 2018:44).	**24–35 maande**: Het die /nt/-, /kl/-, /lk/- en /kw/ -kombinasies verwerf. **36–47 maande**: Verwerf nege konsonantkombinasies, naamlik /bl/, /pl/, /xl/, /fl/, /lt/, /lf/, /lp/, /kn/ en /ŋk/. **48–59 maande**: Verwerf tien konsonantkombinasies naamlik /st/, /sk/, /rs/, /sl/, /ls/, /ts/, /ks/, /sp/, /rx/ en /sw/. **60–71 maande**: Die konsonantkombinasies verwerf teen die ouderdom van vyf jaar is /rt/, /rk/, /kr/, /dr/, /br/, /pr/, /tr/, /xr/, /spr , /str/ en /skr/. **72 maande**: Alle konsonantkombinasies oorskry die werwerwingskriterium op ses jaar aangesien hulle teen die ouderdom van vyf jaar verwerf word.

Aangepas uit Pringle e. a. (2022:344-360).

Teen die ouderdom van vyf jaar het die meeste kinders die akkurate produksie van konsonante in woorde verwerf en kan hulle die spraakklanke van hul moedertaal akkuraat in alle posisies gebruik en produseer (Brancalioni e. a. 2012:158; McLeod en Crowe 2018:1563). Die normatiewe data vir die verwerwing van Afrikaanse foneme, soos gesien in Tabel 3, het aangedui dat alle Afrikaanse foneme teen die ouderdom van vyf jaar verwerf word (Pringle e. a. 2022:360).

Taalspesifieke ontwikkelingsnorme kan funksioneel wees om te bepaal of ‘n spraakklankversteuring (SKV) afwesig of teenwoordig is, aangesien taalspesifieke FP voorkom (Lin en Johnson 2010:383). Storkel (2019) voer egter aan dat die verwerwing van spraakklanke te kompleks is om slegs deur ‘n eksklusiewe datapunt

gemeet te word wat kenmerkende ontwikkeling verteenwoordig. Die tipe foute wat gemaak word moet eerder die prioriteit wees tydens 'n assessering (Storkel 2019:69). Talle maatstawwe van ontwikkeling moet klem lê daarop op a) die totale aantal foute, b) verstaanbaarheid, c) foutpatrone en d) tipes foute in te sluit (Storkel 2019:69). Assessering en terapie moet aandag gee aan die identifisering en behandeling van FP (Hodson 2011:17).

Abou-Elsaad e. a. (2019) en Bernthal e. a. (2017) het drie groepe uiteengesit wat ontwikkel is om die natuurlike, mees algemene patrone te groepeer. Dit sluit in a) assimilasie (wanneer 'n klank in die woord soortgelyk word aan 'n aangrensende klank in die woord, b) wysiging van lettergreepstrukture (klankveranderinge wat die struktuur van die lettergreep in die teikenwoord beïnvloed, en c) substitusie (wanneer 'n klank sistematies deur 'n ander vervang word) (Bernthal e. a. 2017:83; Abou-Elsaad e. a. 2019:81). Die mees algemene FP en die benaderde ouderdomme van uitskakeling tydens die tipiese taalaanlering van Engels word in Tabel 4 aangebied.

TABEL 4: Die algemene FP en ouderdom van uitskakeling tydens die tipiese taalaanlering van Engels

Fonologiese patroon:	**Definisie:**	**Voorbeeld in Engels:**	**Ouderdom van uitskakeling:**
Assimilasiepatrone			
Konsonantharmonie/ Assimilasie	Die uitspraak van ander konsonante in 'n woord word beïnvloed deur die teenwoordigheid van 'n bepaalde konsonant in daardie woord.	Bed: /bed/ /beb/ Dog : /dɒg/ /gɒg/	3:0-4:0
Inisiële konsonant stemgewing	'n Stemlose klank wat 'n klinker voorafgaan, word deur 'n stemhebbende klank vervang.	Pig: /pɪg/ /bɪg/ Kiss : /kɪs/ /gɪs/	3;0
Finale konsonant ontstemming	Vervanging van 'n finale stemhebbende konsonant met 'n stemlose konsonant.	Red: /red/ /ret/ Bag: /bæg/ /bæk/	3;0
Samesmelting	Vervanging van twee foneme (konsonantkombinasies) met 'n ander foneem.	Smoke: /sməʊk/ /fəʊk/ Spoon: /spu:n/ /fu:n/	--
Reduplikasie	Herhaling van 'n volledige of onvolledige lettergreep.	Water: /ˈwɔ:tə(ɹ)/ /wawa/	2;5-3;0
Modifikasie patrone (lettergreepstruktuur)			
Klusterreduksie	Konsonantkombinasies kom voor wanneer twee of drie konsonante in 'n ry in 'n woord voorkom. 'n Deel van die groep is weggelaat.	Plane : /pleɪn/ /peɪn/ Blue: /blu:/ /bu:/	4;0

Finale konsonantweglating	Weglating van die finale konsonant in die woord.	Dog : /dɒg/ /dɒ/ Home: /həʊm/ /həʊ/	3;3
Inisiële konsonantweglating	Weglating van die eerste konsonant of konsonantkluster in ‘n woord.	Toy: /tɔi/ /ɔi/	2;0
Swak lettergreepweglating	Weglating van óf beklemtoonde óf onbeklemtoonde lettergrepe.	Banana: /bəˈnɑːnə/ /nɑːnə/ Telephone: /ˈtelɪfəʊn/ /ˈtefəʊn/	4;0
Epentese	Invoeging/byvoeging van ‘n ander foneem.	Blue: /bluː/ /beluː/ Plate: /pleɪt/ /pʌhleɪt/	8;0
Metatese/ Transposisionering	Transposisie van klanke binne ‘n woord.	Spaghetti**:** /spɑghettɪ/ /bɑskettɪ/	7;0
Substitusiepatrone			
Alveolarisasie	Vervanging van ‘n nie-alveolêre met ‘n alveolêre klank /t/, /d/, /s/.	Chew: /tʃuː/ /tuː/ Shop: /ʃɒp/ /tɒp/	5;0
Labialisering	Vervanging van ‘n nie-labiale met ‘n labiale klank /m/, /p/, /b/.	Take: /teɪk/ /beɪk/	6;0
Vokalisasie	Vervanging van /l/ of /-er/ klanke in die finale posisie, met ‘n vokaal.	People: /ˈpiːpl/ /pɪpo/ Teacher: /tiətʃe(r)/ /tiətʃo/	--
Vorentoeplasing	‘n Velêre stop of velêre nasaal word onderskeidelik met ‘n alveolêre stop of aleolêre nasaal vervang.	Car: /kɑː(r)/ /tɑː(r)/ Wing: /wɪŋ/ /wɪn/	3;6
Agtertoeplasing	Vervanging van ‘n meer anterior geproduseerde foneem met ‘n posterior geproduseerde foneem.	Boat: /bəʊt/ /bəʊk/ Tap: /tæp/ /cæp/	4;0-5;0
Depalatalisering	Vervanging van die palato-alveolêre frikatiewe /ʃ/ en /ʒ/ deur alveolêre frikatiewe /s/ en /z/.	Ship: /ʃɪp/ /sɪp/ Fish: /fɪʃ/ /fɪs/	3;9

Gly van likwiedes	Vervanging van likwiedes /l/, /r/* deur 'n glyklank /w/, /j/ of 'n ander likwiede.	Rabbit: /ˈræbɪt/ /wæbɪt/ Leg: /leg/ /jeg/	5;0
Deaffrikasie	Vervanging van affrikate met frikatiewe.	Church: /tʃɜːtʃ/ /ʃɜːtʃ/ Page: /peɪdʒ/ /peɪdz/	4;0
Affrikasie	Vervanging van 'n nie-affikaat met 'n affrikaat.	Sheep: /ʃiːp/ /tʃIːp/ Door: /dɔː(ɹ)/ /dʒɔː(ɹ)/	3;0
Stop van konsonante	'n Frikatief of 'n affrikaat word vervang deur 'n stopkonsonant.	Funny: /ˈfʌnɪ/ /pʌnɪ/ Jump:/dʒʌmp/ /dʌmp/	Sien onder
Geskatte ouderdomme van uitskakeling vir die stop van frikatiewe en affrikate by Engelssprekende kinders			
/f/, /s/	Funny: /fʌni/→/pʌni/	Sip: /sɪp/→ /tɪp/	3;0
/v/, /z/	Van: /væn/ → /bæn/	Zoo: /zuː/ → /duː/	3;6
/ʃ/, /dʒ/, /tʃ/	Ship: /ʃɪp/ → /dɪp/	Chip: /tʃɪp/ → /tɪp/	4;6
/θ/, /ð/	Thing: /tɪŋ/ → /tɪŋ/	Them: /ðəm/ → /dəm/	5;0

Aangepas uit Bauman-Waengler (2014:103–106), Bernthal e. a. (2017:83) en Grunwell (1987, uit Bowen 2015:73; Shipley en McAfee 2016:197–200). * In Afrikaans vind 'n aanpassing plaas, wat betref die gly van 'n likwied en die trilklank /r/. Kinders is meer geneig om die trilklank /r/ in woorde te vervang met 'n approksimant /ɹ/, /j/ of /l/.

Tipiese fonologiese ontwikkeling impliseer dat die algehele groei van taal nou verband hou met die verwerwing van 'n funksionele foneeminventaris (Pyata en Banik 2016:150). Kennis oor die tipiese patroon van fonologiese ontwikkeling sal help om individue wat afwykings van die aanvaarbare patroon toon uit te wys (Bland-Stewart 2016:109).

Die kliënte van spraak-taalterapeute bestaan hoofsaaklik uit kinders met SKVs, insluitend FV. Dit is die verantwoordelikheid van die spraakterapeute om te assesseer en besluite te neem of 'n kind se spraak tipies ontwikkel of nie, met betrekking tot beste praktyk (American Speech–Language–Hearing 2016; Storkel 2019:73). Die aard en hoeveelheid van spesifieke patroontipes moet deur spraakterapeute tydens 'n assessering ondersoek word (Goldstein en Washington 2001:160).

Die twee mees toepaslike geskiedkundige studies gedoen oor FP met betrekking tot Germaanse tale, is die Engelse studie van Dodd e. a. (2003) en dié van Beers (1995) oor Nederlands. Hierdie resultate het aangedui dat FP wel in verskillende tale voorkom, maar hulle word nie op dieselfde ouderdom geëlimineer nie (Clausen en Fox-Boyer 2017:441). Tot op hede is geen soortgelyke studie oor Afrikaans gedoen nie.

Afrikaans is die derde mees gesproke van die 11 amptelike tale in Suid-Afrika (StatsSa 2018:8). Met 'n definitiewe behoefte wat onder spraakterapeute geïdentifiseer is, aangesien latere taalafwykings deur vroeë atipiese fonologiese ontwikkeling bepaal word (Viterbori e. a. 2018:540), gee die huidige studie aandag aan die beskrywing van FP by Afrikaanssprekende kinders tussen 24–72 maande. Sonder die vereiste

ondersteuning deur die toepaslike tipe en hoeveelheid terapie gedurende die voorskoolse jare, gebaseer op verteenwoordigende normatiewe data, verhoog die risiko vir akademiese en sosio-emosionele probleme (Dodd e. a. 2003:638; Sugden e. a. 2018:3).

Min tot geen inligting is beskikbaar rakende die beskrywing van PV by Afrikaans eerstetaalsprekers tussen die ouderdom van 24–72 maande nie. Die huidige studie het ook 'n beskrywing van die voorkoms van PV onder manlike en vroulike deelnemers binne die onderskeie ouderdomsgroepe ingesluit. Wanneer die ontwikkelingsnorme van Pringle e. a. (2022) in Tabel 3, gepaardgaan met bykomende maatstawwe, insluitend die fouttipes en foutpatrone, sal spraakterapeute 'n akkurate en insiggewende diagnose (Storkel 2019:73) vir die Afrikaanse bevolking kan maak. Daarom was die rasionaal van die studie om SLT'e te voorsien van bewysgebaseerde riglyne en data vir die beskrywing van FP in Afrikaanssprekende kinders. Dit lei tot die navorsingsvraag: Wat is die tipiese beskrywing van 'n fonologiese patroon by 'n Afrikaans eerstetaalspreker tussen die ouderdomme van 24–72 maande?

2. Metode

2.1 Doel en doelwitte van die studie

Die doel van die studie was om FP in die Afrikaans eerstetaalsprekende kind, ouderdomsgroepe 24–72 maande, te bepaal en te beskryf. Die studie het twee doelwitte gehad. Die eerste was om die verskillende FP wat per genoemde ouderdomsgroep geproduseer word, te beskryf. Die tweede doelwit was om die resultate van manlike en vroulike deelnemers vir verskeie FP per ouderdomsgroep te vergelyk.

2.2 Ontwerp

Die studie het 'n retrospektiewe, beskrywende studieontwerp met vergelykende komponente gebruik.

2.3 Studiekonteks

Terwyl die data-ontleding van die aanvanklike studie by die huis van die hoofondersoeker gedoen is, het dié van die huidige studie in die huise van elke lid van die luisteraarpaneel plaasgevind, aangesien hulle toegelaat is om die ontleding op hul eie tyd te doen, binne 'n beperkte tydsbestek.

2.4 Deelnemers

Die aanvanklike studiepopulasie het uit 150 deelnemers bestaan, waarvan daar 30 deelnemers (15 manlik en 15 vroulik) in elke ouderdomsgroep was. Aangesien ouers of voogde versoek is om afsonderlike toestemming te gee vir toekomstige datagebruik vir navorsingsdoeleindes, het die huidige studie altesaam 147 deelnemers ingesluit. Die verspreiding van deelnemers in elke ouderdomsgroep het ingesluit: 24–35 maande: 30 deelnemers; 36–47 maande: 30 deelnemers; 48–59 maande: 28 deelnemers; 60–71 maande: 29 deelnemers, en 72 maande: 30 deelnemers.

2.5 Keuringsrosedures vir deelnemers

Tydens die insameling van data in 2020 en 2021 deur Pringle e. a. (2022), is toestemming van alle ouers en voogde van die deelnemers, behalwe drie, ontvang om die versamelde data vir toekomstige studies en publikasies te gebruik. Hierdie drie deelnemers se data is dus uitgesluit van die huidige studie.

Aanvanklik het die keuringsprosedures geskied by Afrikaans-medium privaat kleuterskole en laerskole in Pretoria, Suid-Afrika. Aanpassings moes aan die aanvanklike keuringsprosedures gemaak word weens die COVID-19-pandemie en inperking. Die oorblywende deelnemers is privaat of via Afrikaanse kleuterskole en laerskole gekontak. Ouers wat in die studie belangestel het, is toegelaat om die hoofondersoeker persoonlik te kontak. As gevolg van die onvermoë van die hoofondersoeker van die aanvanklike studie om die anatomiese en fisiologiese funksies in persoon te ontleed, is toepaslike vrae rakende gehoor- en taalontwikkeling in 'n vraelys ingesluit. Die vraelys was gevoelig genoeg om deelnemers met 'n risiko van gehoorverlies uit te wys. Deelnemers wat atipiese ontwikkeling getoon het, is van 'n unieke vertroulike verwysingsbrief voorsien vir 'n in-diepte assessering en is uitgesluit van die studie.

2.6 Navorsingsprosedures

2.6.1 Loodsstudie

‘n Loodsstudie is uitgevoer met die doel om te bepaal of die gewenste uitkoms/te van die huidige studie bereik kan word en het aangedui of aanpassings aan die metode van die groter magisterstudie gemaak moes word. Die doel van die loodsstudie was om een ewekansig geselekteerde steekproef uit die oudio-opnames te ontleed om te bepaal of die prosedure om FP binne die data uit te wys, akkuraat werk.

Die data wat in die loodsstudie gebruik is, het bestaan uit een ewekansig geselekteerde deelnemer uit een ouderdomsgroep van die versamelde oudio-opnames. Die loodsprosedure het bestaan uit ‘n self saamgestelde kontrolelys aangepas van Pringle e. a. (2022), waarop tipes foute en foutpatrone aangeteken is.

Daar is gevind dat die beplande metode vir data-ontleding akkuraat en betroubaar is. Daar is besluit dat dieselfde metode, insluitend die self-saamgestelde kontrolelys met die definisies van elke FP en die sleutel met al die simbole, gebruik moet word in die uitvoering van die hoofstudie. Aanpassings is gemaak met betrekking tot die lys van FP-definisies, waar sommige FP in die ontleding sigbaar was, maar nie op die lys voorgekom het nie. Om hierdie rede is die lys van FP aangepas met die doel om die produksies van die deelnemers te ontleed. Aanpassings met betrekking tot die gebruik van meer as een paneel is gemaak om die aantal opnames wat ontleed moes word, te verminder.

2.6.2 Data-insameling

Hierdie retrospektiewe studie het voorheen versamelde elektroniese oudio-opnames van die navorsing deur Pringle e. a. (2022) gebruik. Hierdie oudio-opnames is van die Universiteit van Pretoria se argief versamel vir verdere gebruik in die huidige studie. Al die toetse (Afrikaanse Artikulasie Ondersoek ontwikkel deur Lotter [1974] en die Afrikaanse Dieptetoets vir die Artikulasie van Foneme ontwikkel deur Venter [1977]) is volgens hul instruksies uitgevoer. Datavaslegging het die stoor van die resultate met alfanumeriese kodes vir elke deelnemer ingesluit.

2.6.3 Data-ontleding

Daar was altesaam 12 gekwalifiseerde en ervare spraakterapeute met normale gehoor, op die data-ontledingspaneel. Sommige spraakterapeute het die data van meer as een ouderdomsgroep ontleed, afhangend van hul beskikbaarheid en gewilligheid. Vyf luisteraarspanele is saamgestel vir die ontledingsprosedures van die retrospektiewe data. Elke paneel het uit drie Afrikaans-eerstetaalsprekende spraakterapeute bestaan. Die panele is spesifiek gekies aangesien alle luisteraars teoretiese en praktiese kennis en ervaring oor FP moes hê. Dit het verseker dat die akkuraatheid van die resultate deur middel van triangulasie bevestig is. Triangulasie is gebruik as ‘n wyse om ‘n vlak van geldigheid te verseker en vertroue in die waarde van die resultate te verhoog (Thurmond 2001:255). Die deelnemers was onbekend aan die panele.

Die data van die betrokke ouderdomsgroepe, sowel as die kontrolelyste en instruksies, is gestuur aan die paneellid wat verantwoordelik was vir die ontleding van ‘n spesifieke ouderdomsgroep. Geen persoonlike inligting is gedeel nie, aangesien ‘n alfanumeriese kode aan alle deelnemers toegeken is. Die panele kon die data op hul eie tyd binne ‘n tydperk voor ‘n afsnydatum ontleed. Paneellede is nie toegelaat om resultate met mekaar te bespreek nie en het ‘n nie-openbaarmakingsdokument onderteken om alle inligting vertroulik te hou.

‘n Kontrolelys is gebruik om die tipe foute en foutpatrone te bepaal nadat na die oudiospraakmonsters geluister is. Die naam van elke assesseringsinstrument was sigbaar bo-aan die kontrolelys en die teikenwoorde van elke assessering was aan die linkerkant aangebring. ‘n Lys van die mees algemene FP en ‘n definisie van elke patroon, sowel as ‘n sleutel waar elke FP ‘n spesifieke simbool verteenwoordig, is aan die lede gegee. Die panele is gevra om die simbool van die uitwysende FP in die blokkie daarlangs die teikenwoord neer te skryf sodra hul na die opname geluister het. Indien geen FP duidelik was nie, is die blokkie oopgelaat. Die hoofondersoeker het die data ingesamel, waarna die resultate vergelyk is en statisties ontleed is om die uitkoms en resultate van die studie te bepaal. ‘n Voorkomskoers is gerapporteer volgens die persentasie van voorkoms van elke FP. Statistiese ontledings is gedoen, o.a. die onafhanklike monsters twee-proporsie z-toets, om betekenisvolle verskille ($p<0.05$) tussen ouderdomsgroepe en geslagsgroepe te bepaal.

2.6.4 Etiese oorwegings

Etiese klaring vir die aanvanklike studie (HUM015/1219), sowel as vir die huidige studie (HUM007/0422), is van die Navorsings- en Etiekkomitee van die Fakulteit Geesteswetenskappe aan die Universiteit van Pretoria

ontvang. Nadat die hoofondersoeker seker gemaak het dat alle etiese riglyne vir die doel van die aanvanklike studie gevolg is, het die hoofnavorser van die huidige studie alle beginsels gekruiskontroleer om die geldigheid daarvan te bevestig. Hierdie etiese beginsels het outonomie, goedwilligheid, vertroulikheid, nie-kwaadwilligheid en eerlikheid ingesluit.

2.6.5 Betroubaarheid en geldigheid

Betroubaarheid in die huidige studie is vasgestel deur tussen-beoordelaarsbetroubaarheid te gebruik. Vyf luisteraarspanele is gevorm om die data te ontleed. Die panele het bestaan uit 'n ongelyke aantal lede (drie in elke paneel). Indien 'n uitskieter tussen die resultate van die lede voorgekom het, is die meerderheid se mening as die ware maatstaf aanvaar. Geen besprekings is tydens die ontleding toegelaat nie en alle paneellede is gevra om vooraf 'n nie-openbaarmakingsdokument te onderteken.

Geldigheid is vasgestel deur gebruik te maak van sig-, kriterium- en konstrukgeldigheid toe data-insameling in die aanvanklike studie gedoen is. Die hoofondersoeker het siggeldigheid verseker deur kultureel-, linguisties- en ouderdomstoepaslike assesseringsinstrumente vir die Afrikaanse bevolking te gebruik. 'n Verskeidenheid assesseringsinstrumente *(Afrikaanse Artikulasie Ondersoek* en die *Afrikaanse Dieptetoets van Foneme)* het kriteriumgeldigheid (gelyktydige geldigheid) verseker om die produksie van foneme te assesseer en om die voorkoms van FP in die huidige studie te assesseer. Konstrukgeldigheid is verseker deur formele assesseringsinstrumente te gebruik. Aangesien die huidige studie retrospektief was, is die voorheen aangetekende data wat in hierdie studie gebruik is, reeds deur hierdie prosedures bekragtig.

3. Resultate

Die doel van die studie was om FP in die Afrikaans eerstetaalsprekende kind, ouderdomsgroepe 24–72 maande, te bepaal en te beskryf. Geen vorige studies het die beskrywing van FP by Afrikaans-eerstetaalsprekers tussen die ouderdomme van 24–72 maande gerapporteer nie, ten spyte van die noodsaaklikheid vir hierdie maatreëls om 'n diagnose van SKVs te ondersteun. Om hierdie rede is die resultate in hierdie studie vergelyk met die ontwikkeling van FP by Engelse en Nederlandse kinders. Tabel 5 verteenwoordig die persentasie voorkoms van elke FP onder manlike en vroulike deelnemers, per ouderdomsgroep (Groep: 24–35 maande, Groep 2: 36–47 maande, Groep 3: 48–59 maande, Groep 4: 60–71 maande en Groep 5: 72 maande) en die *p*-waarde daarvan. Die eerste ry van elke FP bevat die persentasies (%), terwyl die tweede ry die *z*-toetsstatistiek en die *p*-waarde tussen hakies bevat.

TABEL 5: Illustrasie van die persentasie voorkoms van elke FP in geslag per ouderdomsgroep

		Twee jaar			Drie jaar			Vier jaar			Vyf jare			Ses jaar		
		Almal	Manlik	Vroulik	Almal	Manlik	Vroulik	Almal	Manlik	Vroulik	Almal	Manlik	Vroulik	Almal	Manlik	Vroulik
Fonologiese patrone:																
A1: Konsonant-harmonie/ Assimilasie	Assimilasie patrone:	3.2	2.9	3.5	7.1	5.8	8.9	3.9	3.1	5.1	8.5	5.9	15.4	11.6	10.8	13.3
		(1.438, 0.151)			(3.332, 0.001*)			(2.413, 0.016*)			(5.832, <0.001*)			(1.467, 0.142)		
A2: Kontekssensitiewe stemming/pre-vokaliese stemming		0.3	0.3	0.2	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.0	0.5	0.1	0.1	0.0
		(0.681, 0.496)			(1.678, 0.093)			(0.293, 0.769)			(2.298, 0.022*)			(0.670, 0.503)		
A3: Inisiële konsonant stemgewing		0.0	0.0	0.0	0.1	0.1	0.0	0.3	0.1	0.6	0.1	0.0	0.5	0.0	0.0	0.0
		(1.002, 0.316)			(1.193, 0.233)			(1.915, 0.055)			(2.298, 0.022*)			(0.000, 1.000)		
A4: Samesmelting		0.5	0.6	0.3	0.2	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0
		(1.853, 0.064)			(0.409, 0.683)			(1.196, 0.232)			(0.616, 0.538)			(0.670, 0.503)		
A5: Reduplikasie		0.5	0.4	0.6	0.5	0.5	0.4	0.2	0.1	0.2	0.3	0.3	0.5	1.6	1.0	2.9
		(1.013, 0.311)			(0.444, 0.657)			(0.338, 0.735)			(0.627, 0.531)			(2.727, 0.006*)		
M1: Kombinasie-vermindering	Modifikasiepatrone:	25.5	26.1	24.9	23.2	21.3	26.0	19.3	21.7	15.9	23.5	21.6	28.4	13.7	11.3	18.9
		(1.151, 0.250)			(3.045, 0.002*)			(3.533, <0.001*)			(2.742, 0.006*)			(4.029, <0.001*)		
M2: Finale konsonantweglating		7.2	6.3	8.2	8.1	7.4	9.1	8.7	10.2	6.6	13.7	15.8	8.1	9.5	10.7	6.8
		(3.175, 0.001*)			(1.609, 0.108)			(3.083, 0.002)			(3.863, <0.001*)			(2.451, 0.014*)		
M3: Inisiële konsonantweglating		2.4	2.7	2.0	2.8	3.1	2.4	0.9	0.8	1.1	0.5	0.6	0.0	0.2	0.3	0.0
		(2.066, 0.039*)			(1.135, 0.256)			(0.796, 0.426)			(1.633, 0.102)			(1.162, 0.245)		
M4: Swak lettergreepweglating		17.3	14.8	19.8	16.1	16.1	16.2	10.5	10.2	10.9	6.3	4.5	10.8	9.0	9.8	7.2
		(5.539, <0.001*)			(0.119, 0.906)			(0.497, 0.619)			(4.418, <0.001*)			(1.658, 0.097)		
M5: Epentese		2.8	1.9	3.7	3.7	3.1	4.6	4.6	3.8	5.7	6.0	4.4	10.3	10.2	9.0	12.9
		(4.676, <0.001*)			(2.150, 0.032*)			(2.104, 0.035*)			(4.289, <0.001*)			(2.359, 0.018*)		

M6: Metatese/ Transposisionering		1.6	1.4	1.8	0.6	0.6	0.6	5.5	4.1	7.5	2.0	1.8	2.7	1.0	1.1	0.6
		(1.530, 0.126)			(0.251, 0.802)			(3.628, <0.001*)			(1.135, 0.256)			(0.924, 0.355)		
S1: Alveolarisasie	Substitusiepatrone:	0.2	0.2	0.2	3.4	2.6	4.4	2.3	1.4	3.4	1.1	1.3	0.7	0.9	1.0	0.6
		(0.528, 0.597)			(2.687, 0.007*)			(3.210, 0.001*)			(0.916, 0.360)			(0.777, 0.437)		
S2: Labialisering		0.8	0.8	0.8	3.3	3.7	2.8	0.6	0.4	0.9	1.3	0.9	2.2	0.9	0.8	1.0
		(0.117, 0.907)			(1.507, 0.132)			(1.721, 0.085)			(1.951, 0.051)			(0.385, 0.701)		
S3: Vokalisasie		0.1	0.1	0.1	0.0	0.0	0.0	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0
		(0.813, 0.417)			(0.000, 1.000)			(0.415, 0.678)			(0.000, 1.000)			(0.000, 1.000)		
S4: Vorentoeplasing		5.6	7.5	3.6	12.6	14.8	9.5	5.8	5.2	6.6	3.1	2.4	4.9	2.5	2.1	3.5
		(7.353, <0.001*)			(4.308, <0.001*)			(1.412, 0.158)			(2.465, 0.014*)			(1.596, 0.111)		
S5: Agtertoeplasing		0.7	0.3	1.2	2.4	1.7	3.4	1.4	0.7	2.4	2.2	1.6	3.9	1.6	1.7	1.2
		(4.111, <0.001*)			(2.927, 0.003*)			(3.445, 0.001*)			(2.729, 0.006*)			(0.761, 0.447)		
S6A: Depalatalisering		0.4	0.5	0.4	0.7	0.6	0.7	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.3	0.0
		(0.890, 0.374)			(0.315, 0.753)			(0.239, 0.811)			(0.616, 0.538)			(1.162, 0.245)		
S6B: Palatalisering		0.2	0.3	0.1	3.3	4.4	1.7	0.2	0.2	0.2	10.4	14.0	0.7	0.1	0.2	0.0
		(2.319, 0.020*)			(4.032, <0.001*)			(0.076, 0.939)			(7.502, <0.001*)			(0.948, 0.343)		
S7: Gly van likwiedes		27.3	27.7	26.9	6.6	7.1	6.0	30.7	32.5	28.3	17.9	22.4	6.1	34.3	36.9	28.7
		(0.830, 0.407)			(1.228, 0.219)			(2.166, 0.030*)			(7.298, <0.001*)			(3.170, 0.002*)		
S8: Deaffrikasie		0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.2
		(0.271, 0.786)			(0.243, 0.808)			(1.196, 0.232)			(0.000, 1.000)			(1.493, 0.136)		
S9: Affrikasie		0.4	0.3	0.4	0.1	0.1	0.0	2.2	1.7	2.9	1.6	1.2	2.7	1.5	1.8	0.6
		(0.588, 0.557)			(1.193, 0.233)			(2.085, 0.037*)			(2.027, 0.043*)			(1.874, 0.061)		
S10: Stop van konsonante		3.0	4.6	1.4	5.1	6.7	2.9	2.2	2.8	1.2	1.3	1.1	1.7	1.2	1.0	1.6
		(7.813, <0.001*)			(4.693, <0.001*)			(2.657, 0.008*)			(0.917, 0.359)			(1.055, 0.292)		

* *p*-waarde <0.05 statisties betekenisvol

3.1 Beskrywing van die verskillende FP geproduseer per ouderdomsgroep

3.1.1 Groep 1: (24–35 maande oud)

Assimilasiepatrone

Onder die vyf assimilasiepatrone, insluitend konsonantharmonie/assimilasie, kontekssensitiewe stemming/pre-vokaliese stemming, finale konsonant ontstemming, samesmelting en reduplikasie, het konsonantharmonie/assimilasie die hoogste voorkoms onder groep een getoon met 3.2%. Die oorblywende vier patrone het resultate van 0.50% en laer getoon, met die laagste 0.01% vir slotkonsonantontstemming.

Modifikasiepatrone

Ses modifikasiepatrone is toegepas en aangeteken. Die resultate vir hierdie patrone het merkwaardig verskil. Klusterreduksie en swak lettergreepweglating het 'n hoë voorkomssyfer getoon, met laasgenoemde aangeteken as 17.3%, en klusterreduksie as 25.5%. Finale konsonantweglating (7.2%), inisiële konsonantweglating (2.4%), epentese (2.8%) en metatese/transposisionering (1.6%) is nie algemeen aangeteken onder groep een (24-35 maande oud) nie.

Substitusiepatrone

Die hoogste voorkoms wat onder substitusiepatrone aangeteken is, was die gly van likwiedes of die approksimasie van die trilklank /r/, met 27.3%. Die oorblywende patrone was almal onder 10% met vorentoeplasing wat vanaf 'n 5.6% tot 'n 3% voorkoms vertoon het. Alveolarisasie (0.2%), labialisering (0.8%), vokalisasie (0.1%), agterkant (backing) (0.8%), depalatalisering (0.4%), palatalisering (0.2%), deaffrikasie (0.2%) en affrikasie (0.4%) het almal voorkomssyfers laer as 1.0% getoon.

3.1.2 Groep 2: (36–47 maande oud)

Assimilasiepatrone

Alhoewel die voorkoms van konsonantharmonie/-assimilasie gerapporteer is as minder as 10% (teen 7.1%), is aangeteken dat dit die hoogste voorkoms onder die vyf assimilasiepatrone het. Resultate vir kontekssensitiewe stemming/pre-vokaliese stemming (0.1%), inisiële konsonant stemgewing (0.1%), samesmelting (0.2%) en reduplikasie (0.5%) het voorkomssyfers gelyk aan of onder 0.5% aangedui.

Modifikasiepatrone

Soortgelyke resultate het voorgekom in groep twee (36–47 maande) in vergelyking met groep een (24–35 maande) se modifikasiepatrone. Klusterreduksie en swak lettergreepweglating is met die hoogste voorkomssyfers aangeteken met die eerste genoemde op 23.2% en laasgenoemde met 16.1%. Die oorblywende patrone het almal voorkomssyfers onder 10% getoon, insluitend finale konsonantweglating (8.1%), inisiële konsonantweglating (2.9%), epentese (3.7%) en metatese/transposisionering (0.6%).

Substitusiepatrone

Soortgelyk aan groep een, is die gly van likwiedes of die approksimant van die trilklank /r/ (6.6%) en vorentoeplasing (12.6%) aangeteken om die hoogste voorkoms onder die substitusiepatrone te hê. 'n Statisties beduidende verskil ($p<0.05$) het egter voorgekom tussen die voorkoms van die gly van likwiedes of die approksimant van die trilklank (afgeneem van groep een na groep twee) en dié van vorentoeplasing (toegeneem van groep een na groep twee) tussen groep een en groep twee. Beide hierdie groepe het p-waardes van <0,001* getoon wanneer hulle met mekaaar vergelyk was. Alveolarisasie (3.4%), labialisering (3.3%), vokalisasie (0.00%), agterkant (2.2%), depalatalisering (0.7%), palatalisering (3.3%), deaffrikasie (0.1%) affrikasie (0.1%), en stop van konsonante (5.1%) het almal voorkomsgetalle onder 10% getoon. Die voorkoms van hierdie patrone, behalwe vir vokalisasie, die gly van likwiedes of die approksimasie van

die trilklank /r/, deaffrikasie en affrikasie, het almal verhoogde voorkomsgetalle vanaf ouderdom 24–35 maande tot 36–47 maande getoon. Dit kan 'n aanduiding wees dat hierdie patrone nog nie uitgeskakel is teen ouderdom 36–47 maande nie.

3.1.3 Groep 3: (48–59 maande oud)

Assimilasiepatrone

Die resultate het aangedui dat 'n konsekwente patroon onder die vyf assimilasiepatrone voorkom. Hierdie ooreenkoms dui op konsonantharmonie/-assimilasie wat die hoogste voorkomssyfer het (3.9%). Vir groep drie het die voorkomssyfer 'n beduidende verskil van $p<0.05$ (p-waarde = <0.001*) getoon en van groep twee (36–47 maande) na groep drie (48–59 maande) afgeneem wanneer die groepe met mekaar vergelyk is. Kontekssensitiewe stemming/pre-vokaliese stemming (0.1%) en slotkonsonantontstemming (0.3%) het effens toegeneem in voorkoms, alhoewel die verskille baie klein is. Daar is gerapporteer dat samevloeiing (0.1%) en reduplikasie (0.2%) afgeneem het, hoewel nie ten volle uitgeskakel is nie.

Modifikasiepatrone

Parallel met die resultate van groepe een en twee vir wysigingspatrone, het groep drie ook uitruilbare resultate getoon met klusterreduksie (19.3%) en swak lettergreepweglating (10.5%) wat die hoogste voorkoms het. Statisties beduidende verskille ($p<0.05$) is gerapporteer vir hierdie patrone tussen groepe twee (36–47 maande) en drie (48-59 maande). Inisiële konsonantweglating (0.9%) het aansienlik afgeneem van groep twee na groep drie, met p-waarde = <0.001*, terwyl finale konsonantweglating (8.7%), epentese (4.6%) en metatese/transposisionering (5.5%) almal saam toegeneem het met die toename in ouderdomsgroepe.

Substitusiepatrone

Alhoewel die gly van likwiedes of die approksimant van die trilklank /r/ klaarblyklik verminder in voorkoms, het 'n aansienlike toename tussen groep twee tot groep drie plaasgevind met persentasies vir hierdie beduidende verskil wat gestrek het van 6.6% tot 30.7%. Die voorkoms van vorentoeplasing is gerapporteer as 5.8% wat ook 'n beduidende verskil tussen groepe twee (35–47 maande) en drie (48–59 maande) aangedui het. Alveolarisasie (2.3%), labialisering (0.6%), agtertoeplasing (1.4%), depalatalisering (0.1%), palatalisering (0.2%) en stop van konsonante (2.2%) het almal in voorkoms afgeneem namate die ouderdom van die groep toegeneem het, wat 'n aanduiding kan wees dat self-uitskakeling mettertyd plaasvind. Vokalisasie (0.3%), deaffrikasie (0.1%) en affrikasie (2.2%) het egter kleinskaalse toenames in voorkoms getoon.

3.1.4 Groep 4: (60–71 maande oud)

Assimilasiepatrone

Ooreenstemmende resultate bepaal dat konsonantharmonie/assimilasie (8.5%) die hoogste voorkoms onder alle assimilasiepatrone het. Reduplikasie het ook in voorkoms van 0.2% (48–59 maande) tot 0.3% toegeneem (60–71 maande), hoewel geen betekenisvolle verskil tussen die groepe gerapporteer is nie (p-waarde = 0.295). Kontekssensitiewe stem/pre-vokaliese stem (0.1%), woord-finale ontbinding (0.1%), en samesmelting (0.1%) het in voorkoms in groep vier afgeneem.

Modifikasiepatrone

Alhoewel klusterreduksie in voorkoms afgeneem het, het 'n aansienlike toename tussen 48–59 maande (19.3%) en 60-71 maande (23.5%) voorgekom. Dit blyk dat uit die ouer ouderdomsgroepe, die 60–71 maande oue kinders, klusterreduksie die meeste gebruik het. Daar is ook gerapporteer dat die finale konsonantweglating die hoogste voorkoms onder al vyf ouderdomsgroepe met 13.7% het. Parallel met vorige resultate het

epentese in groep vier teen 'n voorkomskoers van 6% toegeneem. Die voorkomssyfers vir inisiële konsonantweglating (0.5%), swak lettergreepweglating (6.3%) en metatese/transposisionering (2%) het almal in voorkoms afgeneem, alhoewel hierdie patrone nie ten volle uitgeskakel is nie.

Substitusiepatrone

Palatalisering was 'n uitskieter in hierdie groep op substitusiepatrone en het 'n uitgebreide toename in voorkoms getoon met 10.4% vir 60–71 maande oue kinders. Ander patrone waar 'n effense toename aangeteken is was labialisasie (1.3%) en agtertoeplasing (2.2%). Alle ander patrone binne hierdie groep het in voorkoms afgeneem, insluitend alveolarisasie (1.1%), vorentoeplasing (3.1%), depalatalitalisasie (0.1%), die gly van likwiedes insluitend die approksimasie van die trilklank /r/ (17.9%), deaffrikasie (0.0%) affrikasie (1.6%) en stop van konsonante (1.3%), hoewel dit nie ten volle uitgeskakel is nie.

3.1.5 Groep 5: (72 maande oud)

Assimilasiepatrone

Die voorkoms van konsonantharmonie/assimilasie was die hoogste in groep vyf met 11.6%. Statisties beduidende verskille ($p<0.05$) het tussen alle groepvergelykings vir konsonantharmonie/-assimilasie voorgekom, behalwe vir groep een teenoor groep drie, en groepe twee teenoor vier. Dit kan 'n aanduiding wees dat konsonantharmonie/-assimilasie 'n patroon is wat meer voorkom namate die kind ouer word, aangesien die kompleksiteit van woorde toeneem. Reduplikasie (1.6%) het ook geleidelik toegeneem in voorkoms binne die laaste drie ouderdomsgroepe. Teen die ouderdom van 72 maande lyk dit of kontekssensitiewe stem/pre-vokaliese stem (0.1%) en samesmelting (0.1%) afneem en begin om van self uit te skakel. Slotkonsonantontstemming (0.0%) is ten volle uitgeskakel teen 72 maande oud.

Modifikasiepatrone

Klusterreduksie (13.7%), finale konsonantweglating (9.5%), inisiële konsonantweglating (0.2%) en metatese/transposisionering (1%) het 'n afname in voorkoms van groep vier na groep vyf (72 maande) getoon. Hierdie neiging kan 'n aanduiding wees dat die natuurlike proses van uitskakeling binne hierdie patrone kan plaasvind. Swak lettergreepweglating (9%) en epentese (10.2%) het egter in voorkoms toegeneem binne die 72 maande oue groep. Dit kan 'n aanduiding wees dat hierdie patrone eers later gebruik word, aangesien die kind ouer word en woordeskatvoorraad toeneem. Geen wysigingspatroon word teen die ouderdom van 72 maande ten volle by eerste-taal Afrikaanssprekende kinders uitgeskakel nie.

Substitusiepatrone

Depalatalisering (0.2%) en deaffrikasie het effens toegeneem binne die 72 maande ouderdomsgroep, hoewel geen statisties beduidende verskille ($p>0.05$) vir hierdie patrone tussen groep een (24–35 maande) en groep vyf (72 maande) aangeteken is nie. Die p-waarde vir depalatalisering was 0,168 en 0.295 vir deaffrikasie. Die gly van likwiedes, of die approksimant van die trilklank /r/, het weereens 'n beduidende toename van 60–71 maande tot 72 maande getoon met 'n 34.4% voorkoms aangeteken. Die oorblywende patrone, insluitend alveolarisasie (0.9%), labialisasie (0.9%), vorentoeplasing (2.5%), rugkant (1.6%), palatalisering (0.1%), affrikasie (1.5%) en stop van konsonante (1.2%) het almal 'n afname in voorkoms getoon. Hierdie getalle kan 'n aanduiding wees dat die patrone geleidelik uitgeskakel word namate die kind ouer word.

3.2 Die resultate van manlike en vroulike deelnemers vir verskeie FP per ouderdomsgroep (24–72 maande)

Die volgende afdeling verduidelik die verskille wat vir die deelnemende seuns en dogters in elke ouderdomsgroep aangeteken is. Alhoewel fonologiese patrone onder sekere ouderdomme in die algemeen teenwoordig is, is verskille in persentasies tussen seuns en dogters ook duidelik. Afsonderlike ouderdomsgroepbesprekings sal eerstens klem lê op die tipe patrone wat beduidende geslagsverskille getoon het. Tweedens sal die top-FP met die hoogste persentasies, of FP waar die voorkomssyfers met 3% of meer tussen manlike en vroulike deelnemers in elke ouderdomsgroep verskil het, individueel onder elke afdeling bespreek word. Vir verskille tussen manlike en vroulike groepe het die twee-proporsies z-toets baie verskille as betekenisvol aangedui met hierdie beduidende verskille wat wissel van 0.25% tot 16.24%. Baie navorsers bepleit egter dat 'n mens nie hierdie klein verskille moet rapporteer nie, aangesien 'n statisties beduidende resultaat vir 'n klein uitwerking statistiese betekenis kan hê ($p<0.05$), maar nie noodwendig werklike of praktiese betekenis nie (Baicus en Caraiola 2009; Peeters 2016). Onafhanklike steekproewe vir die twee-proporsie z-toets is gebruik om die p-waarde tussen manlike en vroulike deelnemers vir elke patroon in elke ouderdomsgroep te bepaal.

3.2.1 Groep 1 (24–35 maande) – Manlik versus Vroulik:

Beduidende geslagsverskille ($p<0.05$) het voorgekom binne die ouderdomsgroep 24-35 maande in die FP van finale konsonantweglating (M2) (p-waarde = 0.001), inisiële konsonantweglating (M3) (p-waarde = 0.039), swak lettergreepweglating (M4) (p-waarde = <0.001), epentese (M5) (p-waarde = <0.001), vorentoeplasing (S4) (p-waarde = <0.001), agtertoeplasing (S5) (p-waarde = <0.001), palatalisering (S6B) (p-waarde = 0.020), en stop van konsonante (S10) (p-waarde = <0.001).

Negentien punt agt persent (19.8%) (n=15) van vroulike deelnemers het swak lettergreepweglating toegepas in vergelyking met 14.8% (n=15) vir die manlike eweknieë. Manlike deelnemers het egter 'n groter toepassing van vorentoeplasing 7.5% getoon; (n=15) in vergelyking met hul vroulike eweknieë 3.6%; (n=15), asook om te stop van konsonante met 4.6% (n=15) vir seuns en 1.4% (n=15) vir dogters.

3.2.2 Groep 2 (36–47 maande) - Manlik versus vroulik:

Beduidende geslagsverskille ($p<0.05$) binne hierdie ouderdomsgroep het voorgekom in FP van konsonantharmonie/assimilasie (A1) (p-waarde = 0.001), klusterreduksie (M1) (p-waarde = 0.002), epentese (M5) (p -waarde = 0.032), alveolarisasie (S1) (p-waarde = 0.007), vorentoeplasing (S4) (p-waarde = <0.001), agtertoeplasing (S5) (p-waarde = 0.003), palatalisering (S6B) (p -waarde = <0.001), en stop van konsonante (S10) (p-waarde = <0.001).

Die resultate het aangedui dat vroulike deelnemers 'n groter persentasie as manlike deelnemers in die toepassing van konsonantharmonie/assimilasiepatrone getoon het, met dogters 8.9% (n=15) en seuns 5.8% (n=15). Hierdie voorkoms word ook in klusterreduksie weerspieël waar die vroulike getalle 26% (n=15) en manlike 21.3% (n=15) is. Die manlike deelnemers het egter meer vorentoeplasing gebruik, wat 'n persentasie van 14.8% (n=15) opgelewer het in vergelyking met die dogters met 9.5% (n=15). Hierdie geneigdheid word ook in palatalisering weerspieël waar 4.3% (n=15) seuns en 1.7% (n=15) dogters die patroon onderskeidelik toepas. Laastens kom stop van konsonante meer gereeld voor onder die manlike groep (6.7%; n=15), en slegs 2.9% (n=15) in die vroulike groep demonstreer hierdie patroon.

3.2.3 Groep 3 (48–59 maande) - Manlik versus vroulik:

Beduidende geslagsverskille ($p<0.05$) vir die 48-59 maande oue groep het voorgekom vir konsonantharmonie/assimilasie (A1) (p-waarde = 0.016), klusterreduksie (M1) (p-waarde = <0.001), finale konsonantweglating (M2) (p-waarde = 0.002), epentese (M5) (p-waarde = 0.035), metatese/transposisionering (M6) (p-waarde = <0.001), alveolarisasie (S1) (p-waarde = 0.001), agtertoeplasing (S5) (p-waarde = 0.001), die

gly van likwiedes of die approksimasie van die trilklank (S7) (p-waarde = 0.030), affrikasie (S9) (p-waarde = 0.037), en stop van konsonante (S10) (p-waarde = 0.008).

Die resultate vir hierdie groep het aangedui dat die gebruik van klusterreduksie buitensporig was binne beide geslagte, alhoewel seuns 21.7% (n=14) van die voorkomsgevalle vertoon het, terwyl vroulike deelnemers 'n effens verminderde getal van n=14 (15.9%) getoon het. Opmerklike verskille is ook aangeteken vir finale konsonantweglating met seuns op 10.2% (n=14) en dogters 6.6% (n=14). Daarbenewens het die gly van likwiedes of die approksimasie van die trilklank /r/ verskil in manlike deelenemers wat 32.5% (n=14) van die voorkomste verteenwoordig, teenoor dogters met 28.3% (n=14). Vir sommige patrone het die persentasie voorkoms vir vroulike deelnemers gestyg, naamlik: metatese/transposisionering met 'n persentasie van 7.5% (n=14) in vergelyking met 4.1% (n=14), en alveolarisasie met 3.5% (n=14) vir in vergelyking met 1.5% (n=14).

3.2.4 Groep 4 (60–71 maande) - Manlik versus vroulik:

Beduidende geslagsverskille (p<0.05) binne groep vier (60-71 maande) tussen manlike en vroulike deelnemers het voorgekom in konsonantharmonie/assimilasie (A1) (p-waarde = <0.001), kontekssensitiewe stemming/pre-vokaliese stemming (A2) (p-waarde = 0.022), slotkonsonantontstemming (A3) (p-waarde = 0.022), klusterreduksie (M1) (p-waarde = 0.006), finale konsonantweglating (M2) (p-waarde = < 0.001), swak lettergreepweglating (M4) (p-waarde = <0.001), epentese (M5) (p-waarde = <0.001), vorentoeplasing (S4) (p-waarde = 0.014), agtertoeplasing (S5) (p-waarde = 0.006), palatalisering (S6B) (p-waarde = <0.001), die gly van likwiedes of die approksimant van die trilklank (S7) (p-waarde = <0.001), en affrikasie (S9) (p-waarde = 0.043).

Die resultate tussen manlike en vroulike deelnemers in groep vier (60-71 maande) het grootliks verskil van die ander ouderdomsgroepe, aangesien aanhoudende intervalle tussen die seuns en dogters verskyn het. Vroulike deelnemers het 15.4% (n=14) vir konsonantharmonie/-assimilasie vertoon en seuns slegs 5.9% (n=15). Klusterreduksie het ook betekenisvolle verskille weerspieël met 28.3% (n=14) vir dogters en 21.6% (n=15) vir seuns. Dogters het 10.8% (n=14) vir swak lettergreepweglating gedemonstreer en manlike deelnemers 4.6% (n=15). Vir epentese toon 10.3% (n=14) van dogters en 4.4% (n=15) van seuns hierdie FP. Laasgenoemde geslag het nietemin 'n 15.8% (n=15) voorkoms getoon vergeleke met 8.1% (n=14) vir vroulike deelnemers vir finale konsonantweglating, asook 14% (n=15) in vergelyking met 0.7% (n=14) vir palatalisering. Laastens, 22.4% (n=15) van manlike deelnemers gebruik likwiedes in teenstelling met die 6.1% (n=14) van hul vroulike maats.

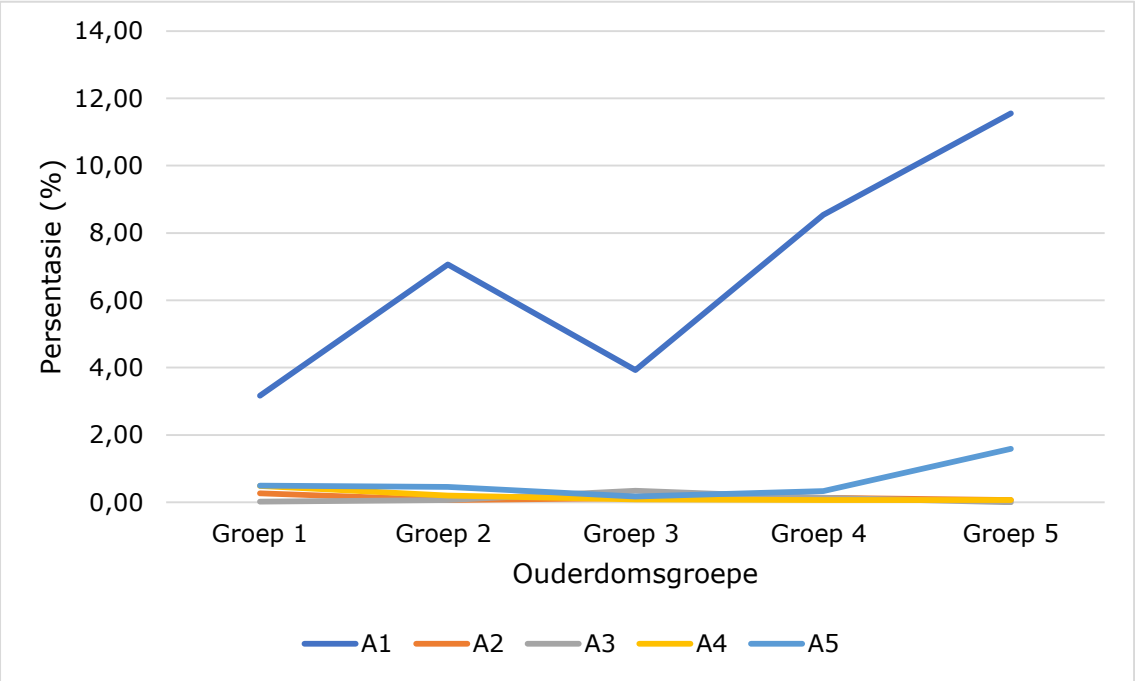
3.2.5 Groep 5 (72 maande) - Manlik versus Vroulik:

Beduidende verskille (p<0.05) tussen groep vyf (72 maande) tussen manlik en vroulik het voorgekom in FP van reduplikasie (A5) (p-waarde = 0.006), klusterreduksie (M1) (p-waarde = <0.001), finale konsonantweglating (M2) (p-waarde = 0.014), epentese (M5) (p-waarde = 0.018), en die gly van likwiedes of die approksimasie van die trilklank (S7) (p-waarde = 0.002).

Die resultate vir groep vyf (72 maande) het aangedui dat vir klusterreduksie, dogters 'n persentasie van 18.9% (n=14) getoon het, in vergelyking met 11.3% (n=15) vir seuns, en 12.9% (n=14) vir epentese teenoor 9% (n=15) vir manlike deelnemers. Manlike deelnemers het egter 10.7% (n=15) vir finale konsonantweglating vertoon, in vergelyking met dogters wat 'n persentasie van 6.8% (n=14) getoon het, en vir die gly van likwiedes of die approksimasie van die trilklank het seuns 'n persentasie van 36.9% getoon (n=15) in vergelyking met dogters wat 28.7% (n=14) getoon het.

3.3 Opsomming

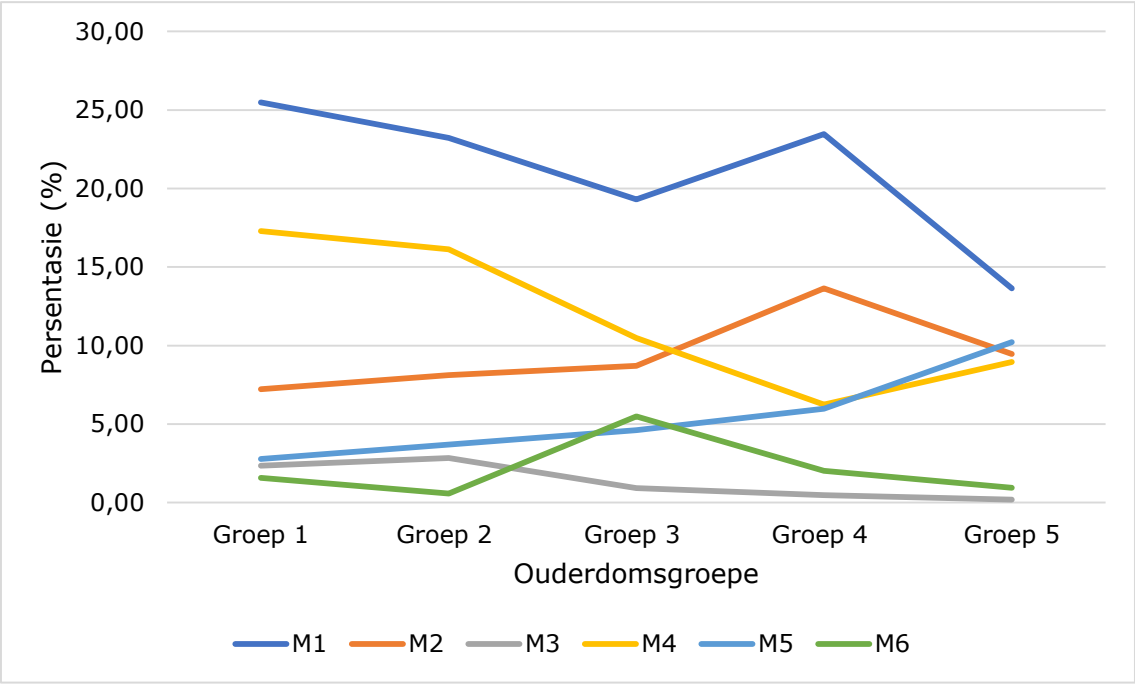
Figure 1–3 verteenwoordig alle FP en hul voorkoms per ouderdomsgroep (groepe een tot vyf). Die patrone word volgens hul klassifiserende groepe verdeel. Elke groep word bespreek onder die betrokke figuur wat die resultate verteenwoordig. Figuur 1 verteenwoordig die patroon van voorkoms vir alle assimilasiepatrone oor al vyf ouderdomsgroepe.



Figuur 1: Assimilasiepatrone vir verskillende ouderdomsgroepe

Dit is duidelik in die figuur dat dit blyk dat die patrone stadig afgeneem het in frekwensie van voorkoms teen die ouderdom van 72 maande vir konteks-sensitiewe stem/pre-vokaliese stem (A2), slotkonsonantontstemming (A3) en samesmelting (A4). 'n Uitskieter het egter voorgekom vir konsonantharmonie/assimilasie (A1) wat deur alle ouderdomsgroepe toegepas is, in vergelyking met die ander assimilasiepatrone. Reduplikasie (A5) was ook 'n patroon wat saam met ouderdomstoename afgeneem het, tot by groep vier (60–71 maande), waarna 'n effense toename in patroonvoorkoms op 72 maande waarneembaar is.

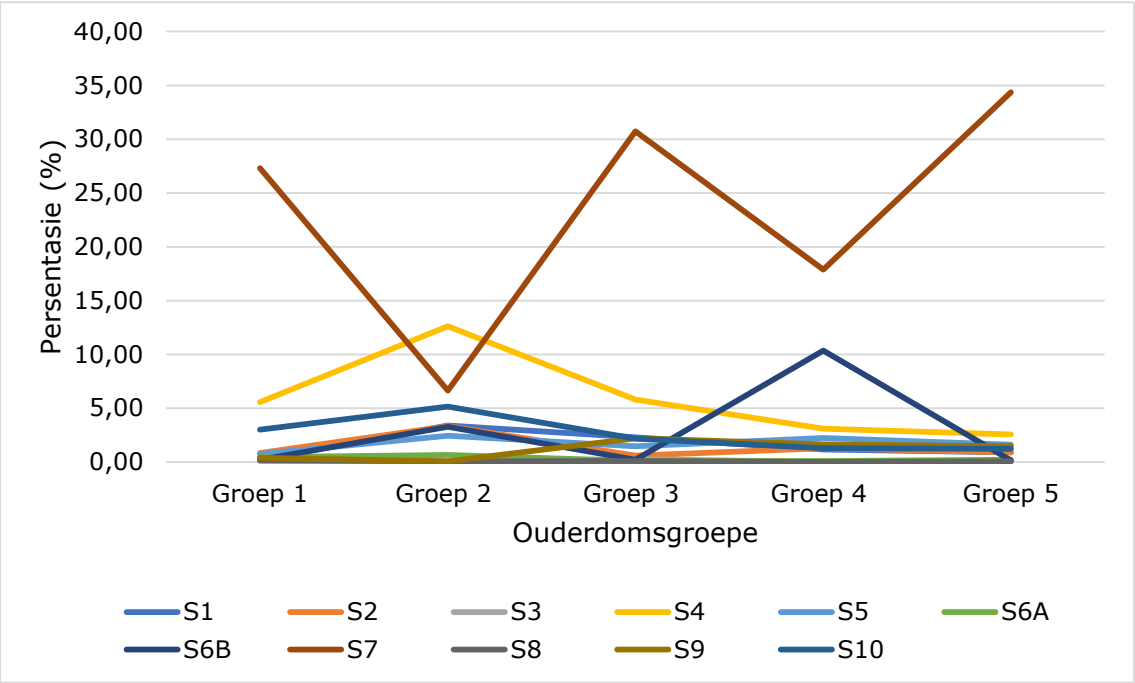
Figuur 2 verteenwoordig die patroon van voorkoms oor alle ouderdomsgroepe vir modifikasiepatrone.



Figuur 2: Modifikasiepatrone vir ouderdomsgroep vir in persentasies

Die meeste patrone, insluitend klusterreduksie (M1), finale konsonantweglating (M2), inisiële konsonantweglating (M3) en metatese/transposisionering (M6) het 'n effense toename in groep drie (48–59 maande) en groep vier (60–71 maande) getoon. Die res van die patrone het 'n geleidelike afname getoon soos ouderdom toegeneem het tot 72 maande (groep vyf). Swak lettergreepweglating (M4) en epentese (M5) het egter nie afgeneem teen die ouderdom van 72 maande nie.

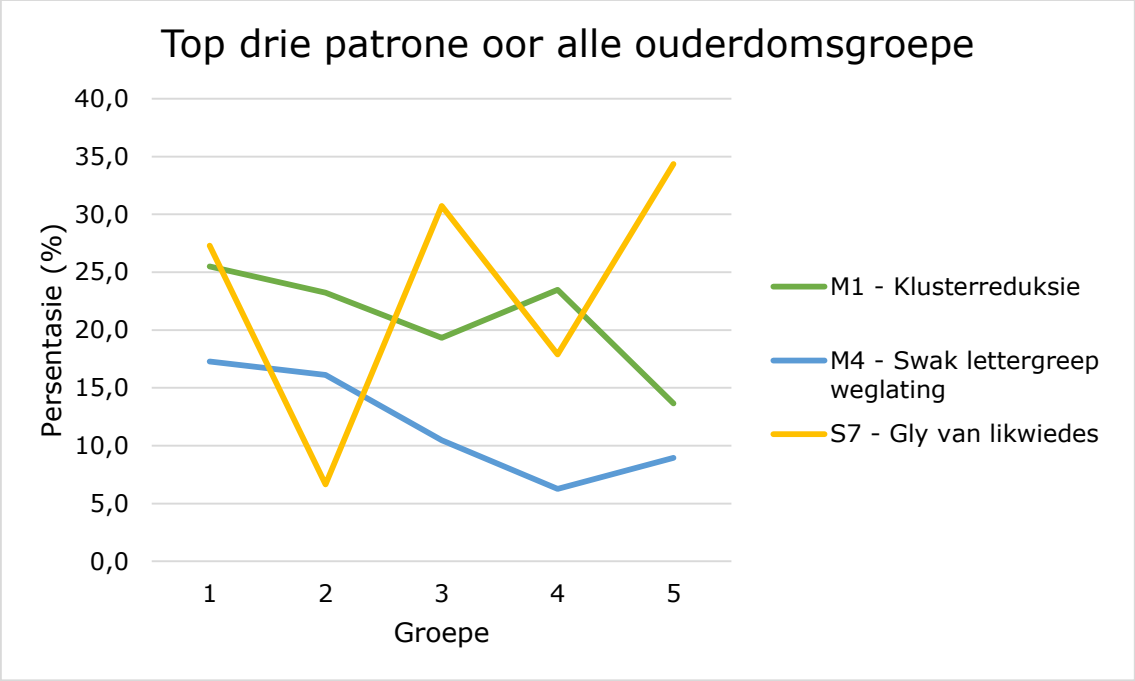
Figuur 3 verteenwoordig die patroon van voorkoms oor alle ouderdomsgroepe vir substitusiepatrone.



Figuur 3: Substitusiepatrone per ouderdomsgroep in persentasies

Die resultate in Figuur 3 toon dat die gly van likwiedes of die approksimasie van die trilklank (S7) 'n uitskieter bo alle ander substitusiepatrone is. Dit is duidelik in die figuur dat alhoewel palatalisering (S6B) ook by groep vier hoog was, dit 'n matige afname teen die ouderdom van 72 maande getoon het. Alle ander patrone wat sigbaar is, het ook 'n beduidende afname teen die ouderdom van 72 maande getoon, alhoewel dit lyk asof dit nie teen daardie tyd ten volle uitgeskakel is nie.

Die volgende bespreking het aandag gegee aan die top drie hoogste persentasie FP in elke ouderdomsgroep. Figuur 4 verteenwoordig 'n lyngrafiek van klusterreduksie (aangeteken in al vyf groepe), swak lettergreepweglating (aangeteken in drie uit vyf groepe) en die gly van likwiedes of approksimasie van die trilklank (aangeteken in vier uit vyf groepe).



Figuur 4: Foutpatrone wat die meeste oor al vyf ouderdomsgroepe (24–72 maande) voorkom

Hierdie FP het die hoogste voorkoms onder al vyf ouderdomsgroepe getoon. Dit is duidelik in die resultate dat klusterreduksie geleidelik afgeneem het namate die ouderdom van die groepe toegeneem het, ten spyte van 'n effense styging in groep vier (ouderdom 60–71 maande). Swak lettergreepweglating het ook 'n duidelike afname getoon, tot by groep vyf (72 maande) waar die kurwe effens toegeneem het (9%), hoewel die kurwe nie die groep een (24–35 maande) persentasie van 17.3% bereik nie. Die gly van likwiedes verwys na die vervanging van likwiedes /l/ deur 'n glyklank /w/, /j/ of 'n ander likwied (Kirk en Vigeland 2015:19). In Afrikaans verwys approksimasie na wanneer die laterale /l/ en trilklank /r/ vervang word met 'n glyklank /w/, /j/ of die Engelse /r/ - dws die approksimant /ɹ/. Soos gerapporteer in Figuur 4, is dit duidelik dat die gly van likwiedes of approksimasie van die trilklank steeds 'n hoë frekwensie van gebruik het as 'n woordvereenvoudigingspatroon vanaf 24 maande tot 72 maande.

4. Bespreking

Alhoewel die voorkoms van patrone 'n geleidelike afname in voorkoms in die huidige resultate getoon het, het alle patrone steeds na 72 maande voortgeduur. Uitskieters het voorgekom, insluitend konsonantharmonie/-assimilasie, reduplikasie, swak lettergreepweglating, epentese en die gly van likwiedes of approksimasie van die trilklank. Volgens die huidige resultate is slotkonsonantontstemming (0.0%) en vokalisasie (0.0%) egter teen 72 maande ten volle uitgeskakel by Afrikaans eerstetaalsprekers.

In ooreenstemming met Van Haaften e. a. (2020), Dodd e. a. (2003), en verskeie ander studies (Clausen en Fox Boyer 2017; Kirk en Vigeland 2015; Pascoe e. a. 2018) is FP steeds ouderdomsgepas indien die voorkoms daarvan nie die 10%-kriterium oorskry nie.

Hierdie kriterium bepaal dat 'n FP teenwoordig en ouderdomsgepas is in die spesifieke ouderdomsgroep, indien dit die kriterium van 10% of minder bereik by minstens 10% van die deelnemers (van Haaften e. a. 2020:977). Dus, waar hierdie spesifieke kriterium meer as 10% bereik, kan die toegepaste patroon as *'n foutpatroon beskou word*. Deur die implementering van hierdie kriterium kan resultate met betrekking tot tipiese en atipiese fonologiese foutpatrone bepaal word. Bewysgebaseerde navorsing sal bevestig of meer patrone teen 72 maande uitgeskakel word.

Die resultate van die huidige studie het aangedui dat vir alle deelnemers in groep een (ouderdom 24–35 maande) (n=30), geen van die FP al uitgeskakel is nie. Die hoogste voorkoms van FP wat aangeteken was, is 27.3% vir die gly van likwiedes of die approksimasie van die trilklank, 25.5% vir klusterreduksie, en 17.3% vir swak lettergreepweglating. Die bevindinge van hierdie studie stem ooreen met dié van Pascoe e. a. (2018) wat vasgestel het dat Afrikaanse tweetalige en Suid-Afrikaanse Engelssprekende kinders in hierdie ouderdomsgroep steeds al die genoemde FP tot 47 maande vertoon (Pascoe e. a. 2018:1154). In die van Haaften e. a. (2020) studie wat handel oor Nederlandssprekende kinders is daar egter gevind dat die gly van likwiedes nie voorgekom het nie. Verder was persentasies vir klusterreduksie vêr bo 10% vir hierdie ouderdomsgroep (van Haaften e. a. 2020:982). Van Haaften e. a. (2020) het egter nie die voorkoms van swak lettergreepweglating by Nederlandse kinders ondersoek nie.

Die resultate vir groep twee (36–47 maande) het aangedui dat daar klaarblyklik 'n proses van natuurlike uitskakeling plaasvind in sommige patrone vanaf groep een tot groep twee (afname in persentasies), hoewel geen FP teen 36-47 maande in Afrikaans-sprekendes uitgeskakel is nie. Hierdie resultate is in ooreenstemming met dié van Ceron e. a. (2017) wat verklaar het dat die voorkoms van FP afneem met ouderdom in tipies ontwikkelende kinders (Ceron e. a. 2017:4). Vir groep twee (ouderdom 36–47 maande) (n=30), was die mees algemene sigbare patrone klusterreduksie teen 23.2%, swak lettergreepweglating teen 16.6% en vorentoeplasing teen 12.6%. Bailoor e. a. (2014) en ander skrywers (Bland-Stewart 2016; Van Haaften e. a. 2020) het verklaar dat vorentoeplasing tussen 36–47 maande steeds voorkom by Standaard-Amerikaanse Engels, Nederlands- en Indiër tweetalige kinders (Bailoor e. a. 2014:8; Bland-Stewart 2016:109; van Haaften e. a. 2020:982). Ooreenstemmende resultate is verkry vir vorentoeplasing in hierdie spesifieke ouderdomsgroep tydens die hudige Afrikaanse studie. Verder het klusterreduksie en swak lettergreepweglating voortgeduur met voorkomssyfers wat die 10%-kriterium bereik het, selfs na 36 maande (Bland-Stewart 2016:109; Pascoe e. a. 2018:1154).

Die gly van likwiedes of die approksimasie van die trilklank was die mees waargenome FP in groep drie (ouderdom 48–59 maande) (n=28) met 'n verhoogde persentasie van groepe twee (6.6%) na drie (30.7%), naas klusterreduksie met 19.3% en swak lettergreepweglating met 10.5%. Die huidige resultate stem ooreen met die bevindinge van Pascoe e. a. (2018), wat eweneens die voorkoms van die gly van likwiedes en swak lettergreepweglating aangeteken het met voorkomssyfers bo 10% in 48–59 maande oue Afrikaanse tweetalige kinders (Pascoe e. a. 2018:1154). In hul studie is klusterreduksie teen die ouderdom van 48–59 maande uitgeskakel. Swak lettergreepweglating het slegs by Afrikaanse tweetalige kinders voorgekom, terwyl geen ander tale waarna verwys word in hierdie studie enige voorkoms van hierdie tipiese patroon vertoon het nie (Pascoe e. a. 2018:1154).

Die resultate van groep vier (ouderdom 60–71 maande) (n=29) het aangedui dat klusterreduksie die hoogste persentasie van voorkoms gehad het teen 23.5%, gevolg deur die gly van likwiedes of die approksimasie van die trilklank (17.9%) en finale konsonantweglating (13.7%). Vokalisasie (0.0%) was die enigste patroon wat klaarblyklik heeltemal uitgeskakel is teen die ouderdom van 60–71 maande. Pascoe e. a. (2018) het opgemerk dat swak lettergreepweglating by Afrikaanse tweetalige kinders

teen die ouderdom van 60 maande uitgeskakel is (Pascoe e. a. 2018:1154). Daarinteen was dit nie die geval in die huidige studie nie. Alhoewel klusterreduksie teen 36–48 maande ten volle uitgeskakel word by Suid-Afrikaanse Engelssprekendes, is die ondersteunende resultate van Bailoor e. a. (2014) nie in ooreenstemming met die huidige studie se bevindinge nie. Klusterreduksie en finale konsonantweglating is na 48 maande konsekwent by die tweetalige Indiërsprekende kinders in hul ondersoek gevind (Bailoor e. a. 2014:8). Net so het Ceron e. a. ook klusterreduksie as die mees algemene FP in hul studie uitgewys (Ceron e. a. 2017:7). Daarteenoor het die voorkoms van finale konsonantweglating reeds teen 36 maande by die Standaard Amerikaanse Engelse kinders begin verminder (Bland-Stewart 2016:109).

Die mees algemene patrone aangeteken in groep vyf (ouderdom 72 maande) (n=29) is die gly van likwiedes of die approksimasie van die trilklank met ‘n gemiddeld van 34.4%, klusterreduksie met 13.7% en konsonantharmonie of assimilasie met 11.6%. Gebaseer op hierdie syfers, is geen patrone teen 72 maande ten volle uitgeskakel nie, behalwe vir slotkonsonantontstemming (0.0%) en vokalisasie (0.0%). Weereens is hierdie resultate in ooreenstemming met Bland-Stewart (2016) en Pascoe e. a. (2018) wat aangedui het dat alhoewel die meeste FP in hul studies na 47 maande uitgeskakel blyk te wees, dit gelyk het of dit langer as 71 maande kan voortduur (Bland-Stewart 2016:109; Pascoe e. a. 2018:1154). Die bevindinge vir hierdie ouderdomsgroep stem ook ooreen met dié van Van Haaften en kollegas wie se Nederlandse deelnemerspersentasies vir klusterreduksie na 72 maande oud bo 10% gebly het. Konsonantharmonie/assimilasie verwys na wanneer die uitspraak van ‘n hele woord beïnvloed word deur die teenwoordigheid van ‘n bepaalde konsonant in die woord. Konsonantharmonie/assimilasie blyk ‘n uitskieter te wees in die spraak van Afrikaanse 72 maande oue kinders, aangesien ander studies gerapporteer het dat assimilasie nie gereeld voorkom nie (Bailoor e. a. 2014:2; Ceron e. a. 2017:5).

Alhoewel klusterreduksie een van die hoogste voorkomssyfers getoon het en beduidende verskille tussen byna alle ouderdomsgroepe getoon het, stem die resultate nie ooreen met die resultate van Van Haaften e. a. (2020) nie. Hulle het berig dat klusterreduksie die langste teenwoordig was. In teenstelling, het die gly van likwiedes en die approksimasie van die trilklank die hoogste voorkoms onder Afrikaanssprekendes getoon. Beide Nederlands en Afrikaans gebruik die trilklank /r/, of die rotiese /r/ in Nederlands, in hul foneeminventarisse (van Haaften e. a. 2020:973). Die verskille in die resultate tussen hierdie tale blyk dat een taalgroep die konsonante in woorde weglaat, terwyl die ander dit eerder vervang (Van Haaften e. a. 2020:13). Bailoor e. a. (2014) het ook herhaal dat die klank waarmee substitusie plaasvind, binne tale verskil (Bailoor e. a. 2014:3). In Finland het ‘n studie deur Aalto e. a. (2020) oor Finssprekende kinders ook aangedui dat taalspesifieke neigings, met betrekking tot spesifieke substitusie- of weglatingspatrone, tussen verskillende tale voorkom. Die uitdaging om die trilklank /r/ te produseer lê in die wyse van artikulasie (Aalto e. a. 2020:628). Aalto e. a. (2020) beskryf dat Finssprekende kinders geneig is om assimilasie meer as weglatings te gebruik om die produksie van woorde wat ‘n trilklank /r/ bevat te vergemaklik (Aalto e. a. 2020:621). In Afrikaans word die trilklank /r/ eerder vervang met /ɹ/, /w/ of /j/ wat in werklikheid ‘n approksimasie van die trilklank is. Die rede waarom die gly van likwiedes of die approksimasie van die trilklank gereeld voorkom, kan ook te wyte wees aan die feit dat die Afrikaanse trilklank /r/ eers op die ouderdom van vyf jaar verwerf word (Pringle e. a. 2022:344-360) en dat fonologiese foute dikwels voor die volle verwerwing van spraakklanke voorkom (Pringle e. a. 2022:361). Die resultate van die huidige studie deel die siening van Aalto e. a. (2020) dat fonologiese ontwikkeling spesifiek vir elke taal is (Aalto e. a. 2020:633) en dat daar FP is wat spesifiek aan ‘n individuele taal toegeskryf kan word (Clausen en Fox-Boyer 2017:454) soos die approksimasie van die trilklank.

Manlik versus Vroulik

Hierdie resultate dui aan dat seuns 'n hoër voorkoms van FP in groep een (24–35 maande) getoon het, terwyl dogters meer geneig was om 'n hoër voorkoms van FP te toon in groep twee (36–47 maande), groep drie (48–59 maande) en groep vier (60–71 maande). In groep vyf (72 maande) was die voorkoms van FP eweredig onder seuns en dogters versprei. Die gemengde resultate van hierdie afdeling oor geslag stem nie ooreen met die resultate van Clausen en Fox-Boyer (2017), of die studie van Brancalioni e. a. (2012) oor Portugese kinders in Brasilië nie. Geen betekenisvolle verskille tussen die resultate van dogters en seuns is in daardie studies gevind nie (Brancalioni e. a. 2012:159; Clausen en Fox-Boyer 2017:456). Die resultate van die huidige studie het egter aangedui dat in sommige FP, soos hierbo bespreek, daar beduidende verskille tussen die voorkoms van 'n spesifieke patroon tussen seuns en dogters was. Aangesien daar klaarblyklik geen konsensus tussen bestaande studies aangeteken is oor verskille tussen geslagsgroepe nie, kan die invloed van geslag op fonologiese ontwikkeling moontlik steeds as onbepaald gesien word (Clausen en Fox-Boyer 2017:444) totdat meer in diepte studies hieroor gedoen word.

5. Gevolgtrekking

Die resultate van die huidige studie het aan die lig gebring dat eerstetaal Afrikaanssprekende kinders verskillende voorkomssyfers vir spesifieke FP toon in vergelyking met ander kinders van dieselfde ouderdom in ander tale. Hierdie gevolgtrekking stem ooreen met die resultate van Lin en Johnson (2010), wat stel dat taalspesifieke FP voorkom (Lin en Johnson 2010:383). Statisties beduidende verskille is opgemerk tussen die voorkomssyfers van FP tussen manlike en vroulike deelnemers in die huidige studie.

Die resultate van die huidige studie voorsien Afrikaanse spraaketerapeute van data en diepgaande beskrywings van fonologiese ontwikkeling, wat spesifiek FP beklemtoon, om doeltreffende persoongesentreerde, bewysgebaseerde terapie aan hierdie bevolkingsgroep te verskaf. Periodieke opdaterings met betrekking tot bevolkingsdemografie moet gemaak word om eksplisiet gedetailleerde normatiewe data vir die huidige bevolking op te stel (Kirk en Vigeland 2014:366). Die potensiaal vir toekomstige navorsing word in die studie uitgelig. Toekomstige navorsing behoort die approksimasie van die trilklank te ondersoek as 'n aparte patroon in tale soos die Afrikatale wat ook die trilklank bevat, aangesien hierdie patroon 'n hoë voorkoms getoon het in die huidige studie. Verder behoort die bepaalde ouderdom van uitskakeling vir elke FP in Afrikaans eerstetaalsprekers gebaseer op die 10%-maatstaf ondersoek te word. Hiermee word FP as foutpatrone beskryf indien die verskynsel minstens vier keer in die spraak van 'n kind aanwesig is volgens Kirk en Vigeland (2015) en Clausen en Fox-Boyer (2017). Deur die gebruik van hierdie maatstaf sal Afrikaanse spraakterapeute kan onderskei of fonologiese ontwikkeling tipies vorder, en wanneer die foute as atipies beskou moet word (Pascoe e. a. 2018:1474).

6. Bibliografie

Aalto, E., K. Saaristo-Helin en S. Stolt. 2020. Phonological development of Finnish speaking children at 3;6 and associations to previous and simultaneous lexical ability. *Clinical Linguistics and Phonetics,* 34(7)**:**617–33.

Abou-Elsaad, T., O. Afsah and M. Rabea. 2019. Identification of phonological processes in Arabic–speaking Egyptian children by single-word test. *Journal of Communication Disorders,* 77(10)**:**80–93.

Ahmed, R.Z. en S.J.B. Bidin. 2016. The effect of task-based language teaching on writing skills of EFL learners in Malaysia. *Open Journal of Modern Linguistics,* 6207–218.

Alduais, A. 2015. An account of phonetics and phonology as similar identical or different. *The International Journal of Indian Psychology,* 3(1)**:**157–65.

American Speech Language Hearing, A. 2016. Scope of practice in speech-language pathology. https://www.asha.org/policy/sp2016-00343/

Asad, A.N., S.C. Purdy, E. Ballard, L. Fairgray en C. Bowen. 2018. Phonological processes in the speech of school-age children with hearing loss: Comparisons with children with normal hearing. *Journal of Communication Disorders,* 74(4)**:**10–22.

Baicus, C. en S. Caraiola. 2009. Effect measure for quantitative endpoints: Statistical versus clinical significance, or "how large the scale is?" *European Journal of Internal Medicine,* 20(5)**:**e124–e25.

Bailoor, P., M. Rai and L. Krishnan. 2014. Development of phonological processes in typically developing 3-4-year-old Indian bilingual children. *European Journal of Educational and Development Psychology,* 2(2)**:**1–9.

Bauman-Waengler, J. 2014. *Articulatory and phonological impairment: A clinical focus*. NJ, Verenigde State van Amerika: Pearson.

Beers, W. 1995. The phonology of normally developing and language-impaired children. Doctoral Thesis, Universiteit van Amsterdam

Bernthal, J.E., N.W. Bankson en P. Flipsen, Jr. 2017. *Articulation and phonological disorders - speech sound disorders in children*. Boston, Verenigde State van Amerika: Pearson.

Bland-Stewart, L.M. 2016. Phonetic inventories and phonological patterns of African American two-year-olds: A preliminary investigation. *Communication Disorders Quarterly,* 24(3)**:**109–20.

Bos, K. 2016. From Cape Dutch to Afrikaans, a comparison of phonemic inventories. Baccalareus tesis, Universiteit van Utrecht.

Bowen, C. 2015. *Children's speech sound disorders*. Londen, Verenigde Koninkryk: John Wiley & Sons, Ltd.

Brancalioni, A.R., A.P.C. Bertagnolli, J.B. Bonini, M.B. Gubiani en M. Keske-Soares. 2012. Relação entre a discriminação auditiva e o desvio fonológico [Die verband tussen ouditiewe diskriminasie en fonologiese versteuring]. Jornal da Sociedade Brasileira de Fonoaudiologia, 24(2)**:**157–61.

Carstens, W. en N. Bosman, 2014. *Kontemporêre Afrikaanse taalkunde*. Pretoria: Van Schaik Uitgewers.

Ceron, M.I., M.B. Gubiani, C.R. de Oliveira, M.B. Gubiani en M. Keske-Soares. 2017. Prevalence of phonological disorders and phonological processes in typical and atypical phonological development. *Codas,* 29(3)**:**1–9.

Clausen, M.C. en A. Fox-Boyer. 2017. Phonological development of Danish-speaking children: A normative cross-sectional study. *Clinical Linguistics and Phonetics,* 31(6)**:**440–58.

Coetzee, A.E. 2018. *Fonetiek*. Pretoria, Suid-Afrika: Van Schaik Uitgewers.

Collée, E. 2018. A new Dutch non-word-repetition task to test the production of consonant clusters with and without /s/ by TD Dutch children*.* Meesters Dissertasie, Universiteit van Utrecht

Cushing, I. en S. Hellmuth. 2016. Phonetics and phonology. In Giovanelli, M. & Clayton, D. (eds.) *Knowing About Language* (pp. 112–24). Oxfordshire, Engeland, Verenigde Koninkryk: Routledge.

Den Besten, J.B. 2009. Desiderata voor de historische taalkunde van het Afrikaans. *Afrikaans: een drieluik,* 234–52.

Dodd, B., A. Holm, Z. Hua en S. Crosbie. 2003. Phonological development: A normative study of British English-speaking children. *Clinical Linguistics and Phonetics,* 17(8)**:**617–43.

Dodd, B. en T. Iacano. 1989. Comparison of cross-language generalisation following speech therapy. *British Journal of Disorders of Communication,* 24:333–51.

Fringi, E., J. F. Lehman and M. Russell. 2015. Evidence of phonological processes in automatic recognition of children's speech. In *Proceedings of the Annual Conference of the International Speech Communication Association, INTERSPEECH 2015,* 1621–624.

Giovanelli, M. en D. Clayton 2016. *Knowing about language linguistics and the secondary English classroom*. Oxfordshire, Engeland, Verenigde Koninkryk:Routledge.

Goldstein, B.A. en A. Iglesias. 1996. Phonological patterns in Puerto Rican Spanish-speaking children with phonological disorders. *Journal of Communication Disorders,* 29(5)**:**367–87

Goldstein, B.A. en P.S. Washington. 2001. An initial investigation of phonological patterns in typically developing 4-year-old Spanish-English bilingual children. *Language, Speech, and Hearing Services in Schools,* 32(3)**:**153–64.

Grunwell, P. 1975. The phonological analysis of articulation disorders. *British Journal of Disorders of Communication*, 10(1):31–42.

Heeringa, W., F. de Wet en G.B. van Huyssteen. 2015. Afrikaans and Dutch as closely-related languages: A comparison to West Germanic languages and Dutch dialects. *Stellenbosch Papers in Linguistics Plus,* 47(0)**:**1–18.

Hodson, B.W. 2011. Enhancing phonological patterns of young children with highly unintelligible speech. *American Journal of Speech-Language Pathology,* 16(4)**:**16–9.

Hodson, B.W. en Paden, E.P. 1983. *Targeting intelligible speech: A phonological approach to remediation*. San Diego, Kalifornië: College-Hill Press.

Hustad, K.C., T. Mahr, P.E.M. Natzke en P.J. Rathouz. 2020. Development of speech intelligibility between 30 and 47 months in typically developing children: A cross-sectional study of growth. *Journal of Speech, Language, and Hearing Research,* 63(6)**:**1675–687.

Hustad, K.C., T. J. Mahr, P.E.M. Natzke en P. J. Rathouz. 2021. Speech development between 30 and 119 months in typical children: Intelligibility growth curves for single-word and multiword productions. *Journal of Speech, Language, and Hearing Research,* 64(10)**:**3707–719.

Ingram, D., 1976. *Phonological disability in children* (Vol. 2). Amsterdam, Nederland: Elsevier Publishing Company.

Kirk, C. en L. Vigeland. 2014. A psychometric review of norm-referenced tests used to assess phonological error patterns. *Language, Speech, and Hearing Services in Schools,* 45(October)**:**365–77.

Kirk, C. en L. Vigeland. 2015. Content coverage of single-word tests used to assess common phonological error patterns. *Language, Speech, and Hearing Services in Schools,* 46(January)**:**14–29.

Lin, L.C. en C.J. Johnson. 2010. Phonological patterns in Mandarin-English bilingual children. *Clinical Linguistics and Phonetics,* 24(4-5)**:**369–86.

Lotter, E.C. 1974. Die ontwikkeling en toetsing van artikulasievermoens by die Afrikaanssprekende kind. *Tydskrif van die Suid-Afrikaanse Vereniging vir Spraak- en Gehoorheelkunde,* 21**:**33–42.

McLeod, S. 2017. Speech sound acquisition. In Bernthal, J. E., Bankson, N. W. & Flipsen, P. (eds.) Pearson.

McLeod, S. en K. Crowe. 2018. Children's consonant acquisition in 27 languages: A cross-linguistic review. *American Journal of Speech-Language Pathology,* 27(4)**:**1546–571.

Pascoe, M., O. Mahura en J. Le Roux. 2018. South African English speech development: Preliminary data from typically developing preschool children in Cape Town. *Clinical Linguistics and Phonetics,* 32(12)**:**1145–161.

Peeters, M.J. 2016. Practical significance: Moving beyond statistical significance. *Currents in Pharmacy Teaching and Learning,* 8(1)**:**83–9.

Poole, I. 1934. Genetic development of articulation of consonant sounds in speech. *The Elementary English Review*, 11(6):159–61.

Philippsen, A. 2021. Goal-directed exploration for learning vowels and syllables: A computational model of speech acquisition. *Kunstliche Intelligenz,* 35(1)**:**53–70.

Pringle, C., M. le Roux, S. Geertsema en M. Graham. 2022. Die verwerwing van Afrikaanse foneme deur kinders van 24-72 maande the acquisition of Afrikaans phonemes in children aged 24–72 months. *Tydskrif vir Geesteswetenskappe,* 62(2)**:**330–63.

Pyata, R. en A. Banik. 2016. Phonological development profile in typically developing Hindi speaking children. *Language in India,* 16(3)**:**149–59.

Randolph, C.C. 2017. Overview of phonological disorders: The language-based speech sound disorder. *Journal of Phonetics & Audiology,* 3(1)**:**1–2.

Rose, Y. en S. Inkelas 2011. The interpretation of phonological patterns in first-language acquisition. *The Blackwell companion to phonology*, *4***:**2414–438.

Serrat-Sellabona, E., E. Aguilar-Mediavilla, M. Sanz-Torrent, L. Andreu, A. Amadó en M. Serra. 2021. Sociodemographic and pre-linguistic factors in early vocabulary acquisition. *Children,* 8(3)**:**1–20.

Shipley, K. G. and J. G. McAfee 2016. *Assessment in speech-language pathology - a resource manual*. Boston, Massachusetts, Verenigde State van Amerika: Cengage Learning.

Smit A.B. 1986. Ages of Speech Sound Acquisition. Language, *Speech and Hearing Services in Schools: Comparison And Critiques of Several Normative Studie*s, 17:175–86.

Stampe, D. 1973. A dissertation on Natural Phonology. Doktorale Tesis, Universiteit van Chicago.

StatsSa. 2018. Community survey of 2018. https://www.statssa.gov.za/publications/P0318/P03182018.pdf

Storkel, H.L. 2019. Using developmental norms for speech sounds as a means of determining treatment eligibility in schools. *Perspectives of the ASHA Special Interest Groups,* 4(1)**:**67–75.

Sugden, E., E. Baker, N. Munro, L. Williams en C. Trivette. 2018. Service delivery and intervention intensity for phonology-based speech sound disorders. *International Journal of Language and Communication Disorders,* 53(4)**:**1-119.

Templin, M.C. 1957. *Certain language skills in children: Their development and interrelationships* (Vol. 10). Minneapolis: Universiteit van Minnesota Press.

Thurmond, V.A. 2001. The point of triangulation. *Journal of Nursing Scholarship,* 33(3)**:**253–58.

van Haaften, L., S. Diepeveen, L. van den Engel-Hoek, B. de Swart en B. Maassen. 2020. Speech sound development in typically developing 2–7-year-old Dutch-speaking children: A normative cross-sectional study. *International Journal of Language and Communication Disorders,* 55(6)**:**971–87.

Van Riper, C., 1939. Ear training in the treatment of articulation disorders. *Journal of Speech Disorders*, *4*(2):141–42.

Viterbori, P., M. Zanobini en F. Cozzani. 2018. Phonological development in children with different lexical skills. *First-language,* 38(5)**:**538–59.

Wissing, D. 2020. Afrikaans. *Journal of the International Phonetic Association,* 50(1)**:**127–40.

Appendix H: Proof of submission to Journal

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Dankie vir die voorlegging van die artikel.

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