
# Intervention for bilingual children with speech sound disorders:

# A description of three English/isiXhosa speaking children

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# Declaration

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"My help comes from the Lord, who made heaven and earth." Psalm 121v2.

## Abstract

IsiXhosa is a language that is widely spoken in South Africa. Bilingualism is common in South Africa, with many children learning isiXhosa as a home language and English from a young age. This study investigated three case studies of bilingual children with speech sound disorders. It aimed to describe changes in their speech following intervention according to a tailor made intervention plan. The project aimed to add to the limited research available on intervention for bilingual children with speech sound disorders. The speech of Gcobisa* (4;2), Lulama* (4;0) and Ntando* (3;0) were assessed and their speech sound disorders categorized according to Dodd's diagnostic subcategories. From this, intervention was planned and the language of intervention was selected. Following intervention, the speech of the children was reassessed. Gcobisa's speech was categorized as a consistent phonological delay, and she was provided with intervention using a minimal pairs approach with isiXhosa targets, and showed evidence of generalizing the target phoneme to English words. Lulama's speech was categorized as a consistent phonological disorder, and she received intervention based on an adapted cycles approach in English, with little evidence of change in her phonological systems in English and isiXhosa, but increased intelligibility. Ntando's speech, although more difficult to categorize, was categorized as presenting with a consistent phonological disorder, and he received intervention based on core vocabulary in English. He showed an increase in his consistency and intelligibility in both English and isiXhosa. The data has theoretical implications regarding bilingual development of isiXhosa-English, as it highlights the ways bilingual development may differ from the monolingual development of this language pair, as well as adding to the small set of intervention studies investigating the changes in the speech of bilingual children following intervention. In addition, clinical implications can be drawn, as it provides a possible framework to guide intervention for isiXhosa-English bilingual children with speech sound disorders.

*Pseudonyms were used to ensure anonymity.

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## Conventions

1. In this study, 4;6 refers to a child's age (e.g. 4 years 6 months)

2. Words in italics refer to target words in either English or isiXhosa, while words in square brackets refer to the English translation of isiXhosa words (e.g. *ibhola* [ball]).

3. Words in forward slashes refer to International Phonetic Alphabet transcriptions (e.g. /pleɪ/).

4. The words multilingualism and bilingualism are used to refer to a child who is acquiring two or more languages.

# Chapter 1: Literature review

This study aims to add to the evidence-base regarding intervention for bilingual children with speech sound disorders within the context of South Africa. It will focus on the language pair isiXhosa-English, two widely spoken languages in South Africa.

## 1.1 IsiXhosa and English

IsiXhosa is one of the eleven official languages of South Africa. It is the second most widely spoken language in South Africa, with 16% of the population speaking it as a home language (Statistics South Africa, 2012). Within the Western Cape region of the country alone, approximately 1,4 million people speak isiXhosa as their home language, which is 24.7% of the population of the province (Statistics South Africa, 2012). IsiXhosa, Afrikaans and English are the most widely spoken languages in the Western Cape (Statistics South Africa, 2012). This study will focus on two of these languages, isiXhosa and English.

isiXhosa is a language from the Bantu family of languages, in the Nguni group along with isiZulu, SiSwati and isiNdebele (van der Merwe & le Roux, 2014). In contrast, English is a Germanic language (van der Merwe & le Roux, 2014) related to languages such as Dutch and German. There are a range of linguistic differences – including phonological, lexical, and syntactic differences – that characterize these different languages.

All languages from the Bantu family are tone languages, meaning contrasts in pitch at word level have an effect on the word's meaning (van der Merwe & le Roux, 2014). These contrasts may be with regard to the length of a vowel in a word, high and low tones across a word, and the intensity in intonation (Zerbian & Barnard, 2008). In contrast, although Germanic languages do make use of varying pitch, this is to signify stress or communicative aspects of speech (e.g. to signify a question) and the variation does not have an effect on the meaning of the word as it does in tone languages (Wong, Perrachione, Gunasekera, & Chandrasekaran, 2009).

Although there are many phonemes common in both isiXhosa and English, some are unique to each language, and isiXhosa and English are said to be phonetically dissimilar (Niesler, Louw, & Roux, 2005). IsiXhosa has a larger inventory of phonemes than English, making it phonetically more complex (Niesler et al., 2005). IsiXhosa and some other Bantu languages make use of click

sounds (Gxilishe, 2004). IsiXhosa has three basic clicks: dental, represented by the letter *c*; palatal, represented by the letter *q*; and alveo-lateral, represented by the letter *x* (van der Merwe & le Roux, 2014). These clicks may be produced as nasalized (*nc, nq, nx*), aspirated (*ch, qh, xh*), voiced (*gc, gq, gx*), nasalized voiced (*ngc, ngq, ngx*) and nasal and click combination (*nkc, nkq, nkx)* (Gxilishe, 2004). Other phonemes found in isiXhosa but not English include the plosives *dy* /ɟ/ and *ty* /c/; fricatives *hl* /ɬ/, *dl* /ɮ/, *rh* /x/, *gr* /ɣ/; affricate *tl* /tɬ/, *kx* /kx/; and nasal *ny* /ɲ/ (Finlayson, Jones, Podile, & Snyman, 1994). Conversely, English has two phonemes not present in isiXhosa: voiced and voiceless fricatives *th* /ð/ and /θ/. Appendix A lists the isiXhosa phonemes according to their placement and manner.

The production of isiXhosa plosives differs somewhat to English. In isiXhosa, plosives are ejective, aspirated or implosive. Ejectives rely on laryngeal airflow; aspirated plosives are evident by the strong release of pulmonic air following the production of the plosive and are usually represented orthographically by the letter *h* following the letter representing the plosive; while the implosive is produced using oral as well as laryngeal airstream (Finlayson et al., 1994). The use of ejective and aspirated features is also evident in the affricates in isiXhosa. IsiXhosa contains only one implosive: /ɓ/.

IsiXhosa does not contain the liquid /ɹ/, but rather a dialectical variant of this phoneme, the trill /r/ (Mowrer & Burger, 1991; Pascoe et al., 2015). This phoneme usually only occurs in loan words in isiXhosa, such as *iorenji* [orange] (Finlayson et al., 1994).

Consonant clusters are not typically found in Bantu languages, and those that are present in isiXhosa only occur in loan words from other languages (e.g. *ibrushi* [brush] or *igreyivi* [gravy]) (Maphalala, Pascoe, & Smouse, 2014; van der Merwe & le Roux, 2014). Prenasalised consonants, however, are present in many Bantu languages (Hubbard, 1995) and some authors consider these to be consonant clusters (Mwita, 2007). Prenasalised consonants are sequences of consonants that include a nasal followed by an oral phoneme, often a plosive or a fricative (Mwita, 2007). However, these prenasalised consonants can be considered as single segments, not as clusters for a few reasons: the two phonemes making up the segment are homorganic;

together they have a similar length to other simple consonants; and they are found within syllables, not across syllable boundaries (Herbert, 1975; Hubbard, 1995).

Previous research suggests isiXhosa contains five (Maphalala et al., 2014; Vanderstouwe, 2009) or seven (Finlayson et al., 1994; Mowrer & Burger, 1991) vowels. The five vowels include the high front vowel /i/ represented orthographically as *i*, the high back vowel /u/ represented orthographically as *u*, the low vowel /ʌ/ represented orthographically as *a*, the mid front vowel /ɛ/ represented orthographically as *e* and the mid back vowel /ɔ/ represented orthographically as *o*. Finlayson et al. (1994) and Mowrer and Burger (1991) suggest that the mid vowels /ɛ/ and /ɔ/ are mid low vowels, and their phonetic context may result in these vowels being produced as mid high vowels, /e/ and /o/, bringing the total isiXhosa vowels to seven. *Masincokoleni,* an isiXhosa speech assessment for children (Maphalala, Pascoe, & Smouse, 2012), only differentiates between the five isiXhosa vowels as described in Figure 1. In comparison to English, isiXhosa does not contain any diphthongs.

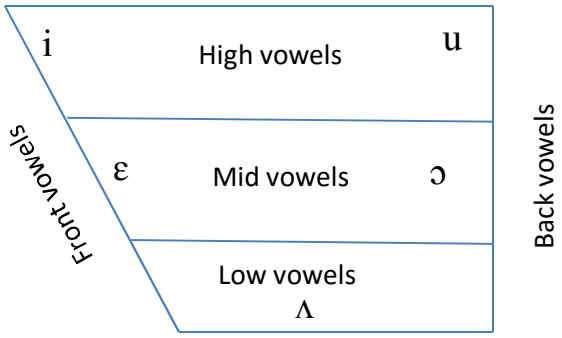



Figure 1: isiXhosa vowels

Relatively little is known about speech development in isiXhosa. Research suggests that isiXhosa speaking children acquire consonants earlier than their English speaking peers (Mowrer & Burger, 1991). This was also noted in two case studies conducted by Pascoe et al. (2016), who found that the two children in their study had acquired all of their vowels and many of their consonants by the age of 2;5 and 2;8. Acquisition was defined as producing the phoneme in words. Affricates have been identified as later developing phonemes (Maphalala et al., 2014; Mowrer & Burger, 1991; Tuomi, Gxilishe, & Matomela, 2001). Clicks, one of the

most well-studied aspects of isiXhosa phonology, are acquired between the ages of 1;0 and 3;0 (Gxilishe, 2004; Tuomi et al., 2001). Research has also described the typical simplifications used by young isiXhosa speaking children as they are acquiring clicks (Lewis & Roux, 1996). IsiXhosa speaking children make use of phonological processes for other consonants, most commonly gliding of liquids, stopping, depalatalization, deaspiration and denasalization (Maphalala et al., 2014). This small body of research is summarized in Table 1.

**Table 1: Summary of research of speech development in isiXhosa**

| Study | Age or participants and focus of study | Summary of findings |
|---|---|---|
| **Mowrer and Burger (1991)** | 2;6 – 6;0 years<br>Consonants | IsiXhosa speaking children acquire consonants earlier than English-speaking peers.<br>IsiXhosa speaking children make similar types and percentages of errors as English speaking children, with the exception of plosives and fricatives where they make fewer errors. |
| **Lewis and Roux (1996)** | 1;6 – 5;5 years – isiXhosa speaking children (as well as children acquiring isiXhosa as a third language and isiXhosa-speaking aphasic adults), focusing on phonological processes used for clicks. | Four major phonological processes used for clicks: reduction, simplification, substitution and nasalization processes. |
| **Tuomi et al. (2001)** | 1;0 – 3;0 years<br>Vowels and consonants | Clicks produced correctly with increased frequency between 2;7 – 3;0 years.<br>Vowels emerge by 1;6 years.<br>Consonants emerge between 1;0 and 3;0 years. |
| **Gxilishe (2004)** | 1;0 – 3;0 years<br>Clicks | All basic clicks are present by the age of 1;0 – 1;6 years |

| | | |
|---|---|---|
| **Maphalala, Pascoe and Smouse (2014)** | 3;0 – 6;0 years<br>Consonants, word shapes, phonological processes. | By 3;0 years, many of the children showed evidence of acquiring most isiXhosa phonemes, but affricates and aspirated plosives were later developing phonemes, with 5;0 year old children still acquiring these phonemes.<br>Use of substitution processes. Gliding of liquids, stopping, depalatalization, deaspiration and denasalization most common phonological processes.<br>Later acquired phonemes were fricatives, affricates, complex clicks and aspirated plosives.<br>Able to produce complex word shapes. |
| **Pascoe et al. (2016)** | Two children, aged 2;5 and 2;8.<br>Speech production and perception. | The children had acquired all vowels, and many consonants. Affricates were the most difficult sound class. The repetition and auditory discrimination skills of the children were described, and the importance of assessing beyond a naming task was highlighted. |

In contrast to isiXhosa, the acquisition of English speech has been researched extensively from as early as the 1930s (Smit, Hand, Freilinger, Bernthal, & Bird, 1990). In addition, English speech acquisition has been researched in many different countries, including Britain, America and Australia (McLeod & Bleile, 2003), but there is very little information regarding the acquisition of South African English. South African English is a dialect of Southern British English that developed in South Africa following colonization by the British from the late 1700s (Lass, 2002). Pascoe et al. (2015) considered the English speech of 150 three year old children acquiring English in Cape Town. Considering the linguistic diversity of the province, many of these children were also acquiring other languages (e.g. Afrikaans, isiXhosa). Findings suggest that the acquisition of South African English in Cape Town is broadly similar to previous research into the acquisition of English in other countries, but influences from other languages

need to be taken into account when considering the speech of bilingual children (Pascoe et al., 2015). For example, the acquisition of both English and either Afrikaans or isiXhosa may result in the production of /f/ for /θ/, the use of the alveolar trill /r/ as opposed to the English production of /ɹ/, or the common use of word-final devoicing (Pascoe et al., 2015).

Dodd, Holm, Hua and Crosbie (2003) investigated the acquisition of phonemes by British English-speaking children between 3;0 and 6;11. They found that plosives, nasals, some fricatives and most approximants are acquired earlier than affricates (/tʃ/ and /dʒ/), some fricatives (/ʃ/, /θ/ and /ð/) and the approximant /ɹ/ (Dodd, Holm, Hua, & Crosbie, 2003). Common phonological processes include gliding, de-affrication, cluster reduction, fronting, weak syllable deletion and stopping, with these decreasing in frequency in older groups of children (Dodd et al., 2003). Considering that the acquisition of South African English is broadly similar to the acquisition of English in other countries, these norms can help guide assessment of speech development and disorder, but should be used with caution.

## 1.2 Bilingualism in South Africa

Multilingualism is typical in South Africa due to the diversity of the population in terms of culture and languages, as well as the mobility of the population and its historical and political background (Mesthrie, 2002b). Many people speak two or more languages in their day to day life, with this type of functional multilingualism being common (Mesthrie, 2002a). A certain degree of multilingualism is compulsory at school level, as all learners are required to study at least two South African languages at senior high school level (Department of Basic Education, 2014). The use of different languages in South Africa has been influenced by the history of the country. During Apartheid, many African nationalist movements favoured English as the language to be used in political spheres, and it continues to be valued in terms of employment and international interaction (Alexander, 1997). However, indigenous languages, which include the Bantu languages spoken in South Africa, do not have the same status as English, and although these languages are spoken by the majority of the population, without the knowledge of English it is difficult to achieve adequate employment or pursue a career (Alexander, 1997). Bantu languages in South Africa are considered marginalised languages or minority languages,

as they are not often used in government or for important public events and major economic uses (Kamwangamalu, 2000; Webb, 2002) and there is less opportunity to develop these languages (Kohnert, 2010). Although the Constitution states that all of the official languages should be treated with equal esteem, and that children have the right to receive education in any of the official languages (*Constitution of the Republic of South Africa*, 1996), many parents want their children to be educated in English, rather than in their home language due to the status of English (Granville, Janks, & Mphahlele, 2010).

This multilingual environment creates challenges for speech language pathologists (SLPs) working within the South African context. The population of qualified SLPs is not as linguistically and culturally diverse as the South African population, as the majority of SLPs speak English and/or Afrikaans (Pascoe & Norman, 2011), although this is gradually changing to reflect a more diverse demographic. As a result, there is often a language mismatch between SLP and client (Pascoe, Rogers, & Norman, 2013). Globally, this is also a common problem as discussed in a tutorial paper by McLeod, Verdon, and the International Expert Panel on Multilingual Children's Speech (in press) entitled 'Speech assessment for multilingual children who do not speak the same language(s) as the speech-language pathologist'. Around the world, SLPs face further challenges in providing appropriate intervention for children who are multilingual, as there is limited research on the appropriate approach for intervention for this population (Yavas & Goldstein, 1998).

## 1.3 Bilingualism

### 1.3.1 Definition

The definition of multilingualism has been widely debated (see Cruz-Ferreira, 2012; Grech & McLeod, 2012; Hua & Dodd, 2006 for examples of varying definitions). Grech and McLeod (2012) summarise three definitions as follows: firstly, those who have learnt two or more languages from birth; secondly, those who use more than one language in their everyday life; and third those who have communication skills in more than one language, regardless of the level of proficiency of these skills. For the purposes of this study, the second and third

definition will be used, as most multilingual speakers in South Africa have not acquired all their languages from birth, but are functionally multilingual (Mesthrie, 2002a).

### 1.3.2 Simultaneous and sequential acquisition

Children who develop two or more languages can be said to have acquired these languages simultaneously or sequentially. Simultaneous acquisition refers to a child who has been exposed to more than one language from birth and is developing the phonological systems for these languages simultaneously, while sequential acquisition refers to children who begin learning their second language at a later stage, often when they first enter school, and their phonological system for their home language is already evident (Hua & Dodd, 2006). It has been suggested that the development of speech in children who acquire two languages sequentially but before the age of five is similar but not identical to the development of speech in children who acquire two languages simultaneously (Fabiano-Smith & Goldstein, 2010a; Kehoe, 2015).

### 1.3.3 Acquisition – interaction between two phonological systems

When considering the phonological acquisition of a multilingual child, it is important to consider the child's phonological systems. In terms of simultaneous acquisition, two main viewpoints have been debated: the *unitary system model*, which states that a bilingual child will have one phonological system for both their languages that will later differentiate into two systems (e.g. Ray, 2002; Vihman, 1982, 1985; Yavas, 1995); or the *dual systems model*, that argues that bilingual children have two separate phonological systems from a young age, and that these systems do not interact (e.g. Dodd, Holm, & Wei, 1997; Holm, Dodd, Stow, & Pert, 1999; Holm & Dodd, 1999b, 1999c). More recently, however, Paradis (2001) suggested that there may be a third possibility, the *interactional dual systems model*, which states that bilingual speakers have two separate phonological systems, but there are cross linguistic interactions. This view has been widely accepted (e.g. Burrows & Goldstein, 2010; Fabiano-Smith & Goldstein, 2010b; Goldstein & Gildersleeve-Neumann, 2015; Grech & Dodd, 2008; Hambly, Wren, McLeod, & Roulstone, 2013; Kim, 2015; Prezas, Hodson, & Schommer-Aikins, 2014; Salameh, Nettelbladt, & Norlin, 2003; Tamburelli, Sanoudaki, Jones, & Sowinska, 2015; Twinky, 2011; Vihman, 2015). In addition, Goldstein and Gildersleeve-Neumann (2015) emphasised that the interaction

between the two phonological systems may result in regression or progression (also known as positive or negative transfer) at various points during development, and may be more accurately described using a *dynamic systems theory*. *Dynamic systems theory* has previously been used to explain the interconnections between autonomous units in motor learning, but has recently been applied to the phonological acquisition of bilingual children, and can be used to explain the regression and progression commonly observed amongst this population (Goldstein & Gildersleeve-Neumann, 2015).

The issue of how the two phonological systems interact could be influenced by various personal factors. For example, if a child acquires two languages sequentially, one phonological system will already be developed when the second is introduced (Holm & Dodd, 1999a). This may result in the child imposing the more established phonological system's rules onto the new language they are acquiring, initially resulting in a phonological system with characteristics of both languages, but later separating into two systems (Holm & Dodd, 1999a). Although it has been suggested that simultaneous and early sequential acquisition is similar (Kehoe, 2015), it is important to be aware of these possible differences when considering the speech of an individual child.

### 1.3.4 Positive and negative transfer

Considering the heterogeneity of bilingual acquisition, there is a great variation in the effect bilingualism has on a child's phonological development (Hambly et al., 2013). In some instances, positive transfer may occur. This refers to a bilingual child who shows phonological skills that are commensurate or beyond those of their monolingual peers (Goldstein & Bunta, 2011). For example, Grech and Dodd (2008) found children who spoke both Maltese and English had a higher percentage consonants correct than their monolingual peers; and Fabiano-Smith and Goldstein (2010b) found children who acquired both English and Spanish had age appropriate consonant accuracies in both languages when compared to monolingual norms. This often occurs when there are common characteristics between two languages, and the frequent use of these structures allows the child's knowledge in one language to aid the acquisition in the other (Kehoe, 2015). In contrast to this, negative transfer may occur, where phonological acquisition in bilingual children appears slower than that of their monolingual

peers (Goldstein & Bunta, 2011). For example, Gildersleeve-Neumann, Kester, Davis, and Peña (2008) found children acquiring both English and Spanish presented with more errors in their English speech than their monolingual peers; and Goldstein and Washington (2001) found Spanish-English bilingual children had less accurate production of aspirants, flap and trill phonemes in Spanish.

What is clear is that the nature of phonological development differs in bilingual children as opposed to children who are only acquiring one language (Goldstein & Gildersleeve-Neumann, 2015; Hambly et al., 2013; McLeod, 2014). Bilingual children are likely to present with more variation in their speech and interaction between the two languages can be expected (Hambly et al., 2013). This presents SLPs with the challenge of differentiating between a speech sound disorder, and a speech difference that has been caused by cross-linguistic transfer or other differences between monolingual and bilingual phonological development (McLeod et al., in press).

## 1.4 Speech Sound Disorders

SLPs working with young children will typically support a substantial proportion of children with speech sound disorders (Pascoe et al., 2010). However, children with speech sound disorders are a heterogeneous group (Dodd, 2005). This highlights the need for a classification system, and although interest in the classification of speech sound disorders has grown, there is not a single classification system that is used universally (Waring & Knight, 2013). Classification systems include those based on severity (Dodd, 2005); aetiology (Waring & Knight, 2013); psycholinguistic profiles (Stackhouse & Wells, 1997); as well as subgroups of functional speech disorders (Dodd, 2005).

One classification based on aetiology and typology is the Speech Disorders Classifications System (SDCS), that focuses on the underlying cause of a speech sound disorder (Shriberg et al., 2010). The SDCS classifies speech disorders according to four types: typical speech acquisition, a speech delay, a motor speech disorder and speech errors (Shriberg et al., 2010). In addition to this, the different types of speech sound disorders can be further classified into one of eight groups depending on their aetiology. Speech delays may be caused by auditory processing

difficulties caused by genetics, auditory processing difficulties caused by otitis media, or temperamental aspects with psychosocial involvement (Shriberg et al., 2010). Motor speech disorders may be classified as being caused by apraxia of speech, or dysarthria, or by an unknown cause. Speech errors can be classified into two groups: those involving the phoneme /s/ and those involving the phoneme /r/ (Shriberg et al., 2010). There have been some concerns regarding the use of this classification system, as many speech sound disorders, particularly those that would be classified as speech delays, are of unknown aetiology, and therefore could not be classified by this system (Waring & Knight, 2013). In addition, there are no clear guidelines on how intervention should differ for each of the classifications (Waring & Knight, 2013).

The psycholinguistic approach is based on the premise that a chain of processes is required in order to produce intelligible speech, and speech difficulties will result if there is a breakdown along this processing chain (Stackhouse & Wells, 1997). This chain includes elements of perception of speech sounds, processing these speech sounds and accessing stored representations, and then developing a motor plan in order to produce speech (Pascoe, Stackhouse, & Wells, 2006). The approach takes into account the underlying processes required to produce speech rather than simply describing the resulting production of speech (Pascoe et al., 2006). A child's individual profile of specific strengths and weaknesses along the processing chain is described (Pascoe et al., 2006). This is aided by a series of questions that can be asked regarding the child's speech in order to determine where the level of breakdown occurs. For example, by asking "Can the child discriminate speech sounds without reference to lexical representations?" (Pascoe et al., 2006, p. 28), one is able to establish whether auditory discrimination is an area of strength or weakness. If a child presents with a severe speech sound disorder, it suggests there are multiple areas along the processing chain where they are experiencing breakdowns. Intervention should address the appropriate level of breakdown, but this can be challenging due to the interactive nature of the levels of processing (Pascoe et al., 2006). This approach allows for an individual classification of a heterogeneous population, although it does not necessarily consider co-morbid conditions that may be affecting the

speech processing chain, or consider skills that are based at a more central level, such as the acquisition of phonological constraints (Waring & Knight, 2013).

A further approach to classifying speech sound disorders is according to functional subgroups outlined by Dodd (2005). There are four subgroups of functional speech disorders: articulation disorder, phonological delay, consistent phonological disorder and inconsistent phonological disorder (Dodd, 2005), summarized in Table 2. The speech sound disorders are classified according to the surface error patterns, but have different underlying deficits (Holm & Dodd, 1999b). Phonological delay is the most common diagnosis, while the inconsistent disorder and articulation disorder subgroupings make up the smallest percentage of diagnoses (Dodd, 2005).

**Table 2: Summary of Dodd's diagnostic subgroups (2005)**

| Subtype | Description | Example |
|---|---|---|
| **Articulation disorder** | A child is unable to produce a specific phoneme, both in words and in isolation, whether spontaneously or by imitation. The child always uses the same substitution or disorder. The child has a phonetic disorder. | A lateral lisp |
| **Phonological delay** | A child makes use of error patterns that are typical of the speech of a younger child. | A 6 year old child who produces /peɪ/ for /pleɪ/: cluster reduction beyond the expected age of elimination |
| **Consistent phonological disorder** | A child makes use of atypical errors that are non-developmental. The child uses these errors consistently. They may also present with typical errors. | /ɪp/ for /ʃɪp/ but /pɪp/ for /pɪp/: all syllable-initial fricatives deleted. |
| **Inconsistent phonological disorder** | A child makes use of non-developmental errors, but uses multiple errors for each target. | /fak/ or /ʃap/ or /dʒa/ for /ʃak/ (*shark*) |

There has been some investigation of underlying areas that may be associated with these subgroups. There are a number of processes involved in the perception and production of speech, and a deficit at one of these levels will affect speech production, and may also affect the ability to complete a task testing another component (Dodd, Holm, Crosbie, & McCormack, 2005). Various experimental tasks were performed by children who had speech sound

disorders categorised as being either a phonological delay, consistent phonological disorder or inconsistent phonological disorder, and the following conclusions could be established:

1. Children who present with a phonological delay may resolve their speech difficulties without intervention and as a result do not appear to present with any specific deficits of underlying processes (Dodd et al., 2005).

2. Children presenting with a consistent phonological disorder are less likely to have an established understanding of the rules of the combinations of phonemes in a language (Dodd et al., 2005). This group also struggles with phonological awareness tasks, particularly rhyme and alliteration tasks (Holm, Farrier, & Dodd, 2008), suggesting their difficulty is cognitive-linguistic in nature and they struggle to organise their phonological system according to the rules of the language they are exposed to (Dodd et al., 2005).

3. Children who fall into the inconsistent phonological disorder may perform lower on an expressive vocabulary assessment than children with other speech sound disorders, as they may have difficulty accessing the phonological pattern of the word, although this hypothesis requires further research (Dodd et al., 2005). In addition, this group has difficulty producing words consistently, suggesting difficulties in developing plans for the words they are producing. Their difficulty may extend to non-speech tasks such as tracing, which may indicate their deficit is based on motor-planning (Bradford & Dodd, 1994; Dodd et al., 2005). Investigation into the production of vowels and consonants by children in this group suggest that their phonological plan may provide parameters to the articulators that are too broad, resulting in their inconsistent productions (Dodd et al., 2005). As their underlying deficit is based on motor planning, and differs from those resulting from a cognitive linguistic deficit, intervention should be different.

4. The final subgrouping of articulation disorder is caused by an anomaly or dysfunction of the articulators or muscles (Dodd et al., 2005).

Dodd's diagnostic subcategories are based on theories relating to typical development and psycholinguistics, and because of this have high construct validity (Waring & Knight, 2013). It has been suggested that every child with a speech sound disorder can be classified according to Dodd's system (Waring & Knight, 2013). In addition, the suggestions of intervention approaches for each category make it clinically useful (Dodd et al., 2005; Dodd, Hua, Crosbie, Holm, & Ozanne, 2002; Waring & Knight, 2013).

The subgroup classification has been found to be an appropriate classification system for languages apart from English (Dodd, 2005). For example, studies investigating monolingual German-speaking children (Fox & Dodd, 2001), monolingual Cantonese-speaking children (So & Dodd, 1994), and monolingual Turkish-speaking children (Topbas & Yavas, 2006) found that speech sound disorders could be classified into the four subgroups, and that the size of the groups are in similar proportions across all languages investigated. Because of this, this study will use Dodd's diagnostic subgrouping (2005) as a theoretical framework. In addition, these subgroups can also be used to describe the speech difficulties of bilingual children (Holm & Dodd, 1999b), making it an appropriate classification system for this study.

## 1.5 Intervention for speech sound disorders

The theoretical approach of Dodd's classification system is useful for an appropriate intervention approach to be identified, as it is based on an increasing evidence-base (Holm & Dodd, 1999b). Children with articulation disorders have difficulties primarily at the motoric level and have been shown to benefit from intervention that focuses on producing individual speech sounds (Dodd & Crosbie, 2005). This includes producing the sound in isolation, and then in utterances of increasing difficulty, including syllables, words, phrases, sentences and spontaneous speech (Holm, Stow, & Dodd, 2005).

Children with a phonological delay and consistent phonological disorder would benefit from intervention that considers error patterns and phonological contrasts (Dodd & Crosbie, 2005; Holm, Crosbie, & Dodd, 2005). This may include a minimal pairs, or cycles approach or a metaphonological approach such as Metaphon (Dodd & Crosbie, 2005). However, in comparison to this, children with inconsistent phonological disorders benefit from intervention

that focuses on whole words rather than individual sounds, including approaches such as core vocabulary (Dodd & Crosbie, 2005).

### 1.5.1 Minimal pairs

The minimal pairs approach is commonly used among SLPs, and has been used since the 1960s (Baker, 2010). The approach makes use of words that differ by one phoneme, where that difference is enough to result in a change in meaning (Barlow & Gierut, 2002). The approach aims to reorganize a child's phonological system, and thus differs from the approaches to speech sound disorders before the 1960s that focused on the motoric aspect of speech (Baker, 2010). The minimal pair approach contrasts a child's error phoneme with the accurate phoneme, and thus causes a communication breakdown in order to highlight the need for revision by the child (Baker, 2010). Traditionally, the minimal pair approach was used for children with moderate to severe speech sound disorders, or children with unintelligible speech (e.g. Blache, Parsons, & Humphreys, 1981; Weiner, 1981). However, more recently it has been suggested that minimal pairs is more suited for a child with a mild to moderate phonological delay or disorder (Baker, 2010). Minimal pairs is most appropriate for children who have consistent speech sound disorders or delays (Crosbie, Holm, & Dodd, 2005; Dodd & Bradford, 2000).

The minimal pair approach has been used successfully with multilingual children (e.g. Holm & Dodd, 2001; Ray, 2002). Ray (2002) provided a five year old English-Hindi-Gujarati trilingual child with intervention that incorporated a cognitive linguistic approach, including minimal pairs and noted improvement in all languages, while Holm and Dodd (2001) provided minimal pair intervention for a Cantonese-English bilingual child in English and noted improvement in English. See Table 4 for more information regarding these studies.

### 1.5.2 Metaphonological approach

A metaphonological approach to speech sound intervention states that focusing on phonological awareness will support change in a child's speech (Hesketh, 2010). It is an appropriate intervention for children who can understand the more abstract concepts associated with phonological awareness tasks (Hesketh, 2010). If the child does not have the

cognitive skills to apply the taught concepts to their speech, this approach will not be effective (Pascoe et al., 2006). It has been suggested that speech sound disorders in children may result in difficulties with phonological awareness and literacy at a later stage, although this is not necessarily the case for all children with speech sound disorders (Hesketh, 2010). Stackhouse, Wells, Pascoe and Rees (2002) suggest that a metaphonological approach to intervention is not simply including phonological awareness tasks in intervention, but rather making the child aware of the contrasts of the various sounds in their speech and how this influences the ability to communicate effectively. Although it may include minimal pairs, it moves beyond this and provides the child clear information regarding how the specific phonemes differ in targets and how to produce these targets (Stackhouse et al., 2002). It focuses on the attributes of the various phonemes and relies on the child's metalinguistic knowledge to change their speech (Dodd & Bradford, 2000). Considering the universality of phonological awareness skills to all languages, focusing on phonological awareness skills in one language with a bilingual child should generalize the phonological awareness skills to the untreated language, but the same may not be true with regards to specific speech errors unique to each language (Hesketh, 2010).

Research into the effect of adding phonological awareness activities into intervention for speech sound disorders suggest that it is effective in improving a child's phonological awareness skills, but is not necessarily more effective than other interventions targeting speech sound disorders, and as such should be used in addition to an approach focused on speech production (e.g. Denne, Langdown, Pring, & Roy, 2005; Hesketh, Dima, & Nelson, 2007; Rvachew, Nowak, & Cloutier, 2004). However, specific and structured metaphonological interventions such as Metaphon has shown evidence of more success at treating the production of speech sounds (e.g. Reid, Donaldson, Howell, Dean, & Grieve, 1996)

### 1.5.3 Cycles approach

The cycles approach was developed by Hodson and Paden (1983) for severe-to-profound speech sound disorders. It is based on seven underlying concepts:

1. Typically developing children do not acquire a single phoneme at a time, but rather acquire many phonemes gradually (Ingram, 1986; Prezas & Hodson, 2010).
2. Children typically develop speech by listening to the adult production of speech (Ingram, 1986).
3. Children will develop kinaesthetic and auditory sensations as they develop speech sounds and aiming for 100% accuracy will help to develop accurate kinaesthetic images (Hodson, 2006).
4. The context of a word can influence a child's ability to produce a sound (Kent, 1982) and targets should therefore be selected with care.
5. Children learn best when they are actively involved in the learning process, and should therefore be engaged and interested in activities during intervention (Prezas & Hodson, 2010).
6. Children will generalize newly learnt speech sounds to other targets (Hodson, 2006).
7. It is important to determine the level of breakdown in order to provide intervention at an appropriate level of difficulty that will result in successful learning (Prezas & Hodson, 2010).

The cycles approach includes not only the production of speech. It also includes a focus on auditory awareness, the perception of speech, language, and literacy (Prezas & Hodson, 2010). It requires carefully chosen targets that have been ordered according to typical phonological development (Prezas & Hodson, 2010). Each target is addressed for one to one and a half hours before the next target is addressed. Once all targets have been addressed, a cycle is complete. Previous research has found the cycles approach to be effective (e.g. Almost & Rosenbaum, 1998; Prezas & Hodson, 2010; Tyler, Edwards, & Saxman, 1987). It has been suggested that cycles is appropriate for a bilingual child, but the targets will need to be chosen carefully. It is important to be aware of the typical development of phonology in both languages and how the targets chosen for each cycle would correspond to these norms (Prezas & Hodson, 2010). Some preliminary research has investigated phonological processes shared by English and Spanish, and this will aid target selection for bilingual English-Spanish children

using this approach (Prezas, 2008). However, further research into the use of the cycles approach with bilingual children is required (Prezas & Hodson, 2010).

### 1.5.4 Core vocabulary

Core vocabulary intervention was developed for children who have inconsistent speech disorders (Dodd, Holm, Crosbie, & McIntosh, 2010). Velleman and Vihman (2002) suggest that children initially learn phonology at the whole word level. Following this, usually by around the age of two years, a child's phonological system is then reorganised to include error patterns that affect phoneme classes rather than specific words (Dodd et al., 2010). However, some children continue to use errors that do not follow patterns and result in inconsistent speech, highlighting the need to focus on whole words as opposed to phonological patterns. In addition, authors such as Storkel and Morrisette (2002) and Sosa and Stoel-Gammon (2012) suggest that phonological development and lexical development are linked, and intervention that focuses on whole words and vocabulary will aid phonological development. Core vocabulary aims for a child to produce 50 to 70 targeted words with either consistent, developmental errors or accurate production (Dodd et al., 2010). Sessions include establishing best production and practicing the target words in drill activities. The words that are targeted should be functionally powerful words that are used frequently by the child.

Core vocabulary has been used in case studies and shown to be effective for children with inconsistent speech disorders (e.g. Dodd & Bradford, 2000; Holm & Dodd, 1999b; McIntosh & Dodd, 2008). Dodd and Bradford (2000) considered three children (ages 3;4 years, 4;3 years and 3;7 years) with speech sound disorders, two of whom were diagnosed with inconsistent speech. Core vocabulary resulted in an increase in consistency for these two children, but did not result in positive gains for a third participant who presented with a consistent phonological disorder (Dodd & Bradford, 2000). McIntosh & Dodd (2008) investigated three children with inconsistent speech disorder (ages 3;8 years, 3;9 years and 4;2 years). All three children received core vocabulary intervention for 12 – 38 sessions, and although each child responded differently, they all made gains in terms of increasing the consistency of their speech (McIntosh & Dodd, 2008). Holm and Dodd (1999b) described one child (age 4;6 years) who was bilingual, and presented with an inconsistent speech disorder in both his home language, Punjabi, and

English. In this case, core vocabulary intervention was provided in English but consistency improved in both Punjabi and English (Holm & Dodd, 1999b). This suggests core vocabulary is an appropriate approach for bilingual children.

## 1.6 Intelligibility

One of the key goals when working with children with speech sound disorders is to increase their intelligibility (Dodd & Bradford, 2000; Lousada, Jesus, Hall, & Joffe, 2014). Intelligibility refers to how speech is understood by a listener (Pascoe et al., 2006). Intelligibility can be difficult to assess due to its subjective nature and can be influenced by many factors, including familiarity of the listener, the context of the speech and the number of repetitions provided (Lousada et al., 2014). There are two main ways to assess intelligibility: word identification tasks, where listeners are required to listen to words and identify what word was produced; or listener rating scales, where a listener is required to make a judgment about intelligibility of speech according to a scale (Pascoe et al., 2006). In many cases, the reliability and validity of such scales have not been established, and they should, therefore, be used with caution (Pascoe et al., 2006).

One rating scale that has been developed is the *Intelligibility in Context Scale* (*ICS*) (McLeod, Harrison, & McCormack, 2012a). This scale relies on report of the intelligibility of a child's speech by their communication partners. The tool aims to supplement a full assessment of the child's speech, and focuses on identifying how the child's difficulties affect their daily life (McLeod, Harrison, & McCormack, 2012b). The scale considers various communication contexts (e.g. with acquaintances, with extended family) to more effectively address the effect that environmental factors can have on the intelligibility of speech, as suggested by the International Classification of Functioning, Disability and Health (ICF) (McLeod et al., 2012b). Reliability and validity of this tool have been investigated. It is able to identify children with speech sound disorders, and internal reliability and criterion validity have been established (McLeod et al., 2012b).

The use of some form of intelligibility assessment as a clinical outcome measure is important, as although intervention may result in changes to other measures (e.g. percentage consonants

correct or percentage use of phonological processes), this does not always have an effect on functional intelligibility (Lousada et al., 2014). This suggests that the use of intelligibility rating scales, such as the *ICS* may be useful as a form of screening, as parental report has been found to be accurate in identifying speech sound disorders (McLeod et al., 2012b; Stertzbach, 2005). Prezas (2008) considered the intelligibility of Spanish-English bilingual children aged 4;0 to 5;10, with no history of speech or language intervention, and found the children had similar levels of intelligibility in both languages, and that the listener ratings of intelligibility were correlated with the number of speech sound errors used by the children. However, Kim, Ballard, and McCann (2016) investigated the use of the *ICS* as a screening tool specifically for bilingual children acquiring Korean and English, and although they found some correlation between specific questions on the *ICS* and the presence of speech sound disorders, using the *ICS* as a screening tool resulted in over 40% of the sample being referred for a full assessment. In comparison to the expected prevalence of speech sound disorders in children, this is a relatively high number of children to be referred for full assessment from a screening tool. The use of the *ICS* as a screening tool for bilingual speech warrants further investigation, but it can be used effectively to add to the speech assessment battery of a bilingual child with a speech sound disorder, and be used as an outcome measure.

## 1.7 Bilingualism and SLPs

### 1.7.1 Bilingual speech sound disorders

As multilingualism is the norm, rather than the exception, SLPs have to be prepared to provide appropriate and effective services for this population (De Lamo White & Jin, 2011; International Expert Panel on Multilingual Children's Speech, 2012; Jordaan, 2008; Kohnert, 2010). Kohnert (2010) highlights three issues that clinicians need to take into account when considering bilingual children regardless of whether they have acquired their languages simultaneously or sequentially: (1) children may present with an uneven distribution of skills in their two languages, meaning they perform better in one language for one aspect of the assessment (e.g. length of narratives), but achieve lower scores in an assessment investigating another aspect of language in their second language (e.g. receptive vocabulary), and their language skills may be distributed across both languages rather than duplicated from their stronger language to their

weaker language (Goldstein & McLeod, 2012); (2) some form of cross-linguistic interaction will take place, such as Spanish-English bilingual children using Spanish phonemes in English; and (3) due to the complex interaction between personal factors evident in all children (e.g. socioeconomic situation and general exposure to language at home) as well as factors specific to bilingual children (e.g. exposure to each language, age of acquisition of each language and opportunity to use each language), bilingual children present as a very heterogeneous group, making it difficult to compare a bilingual child's development to norms, even when those norms are based on a similar group of bilingual children.

It has been hypothesised that if a bilingual child presents with a speech sound disorder, the disorder will fall in the same category in both languages, suggesting that although the child has two phonological systems, a single underlying deficit affects both (Holm et al., 1999; Holm & Dodd, 1999c). This seems to align with *dual systems theory* which suggests a child's two phonological systems will interact in various ways as the child's phonology develops, resulting in cross linguistic transfer. For example, a child with an inconsistent disorder in Punjabi may also typically present with an inconsistent disorder in English. This has been documented across a range of language pairs by some authors, including Holm, Dodd and Ozanne (1997), Holm and Dodd (1999b, 1999c, 2001) and Ray (2002). Where a child presents with speech errors in only one language, this may be indicative of cross-linguistic transfer, rather than a speech sound disorder (McLeod et al., in press). For example, a child who speaks both English and French may not be able to produce the fricative /θ/ in English and substitutes it with the plosive /t/, as it is not present in French. If this use of the phonological process of stopping is only present in English, it is not necessarily caused by a speech sound disorder, but rather cross-linguistic transfer from French to English. This highlights the importance of an SLP being able to identify whether a bilingual child presents with a speech sound disorder, or difference (McLeod et al., in press). A child acquiring two or more languages may present with differences in their speech that are not true errors, but rather are caused by the typical acquisition of two languages or dialects (McLeod, 2012). This, too, must be differentiated from a child who presents with a true phonological disorder or delay (McLeod et al., in press). In order to do this,

knowledge of the typical development of bilingual children acquiring various language pairs is essential. For many language pairs this information is lacking.

Studies have considered some language pairs and investigated typical acquisition and common errors made by typically developing bilingual children in either one or both of their languages. There is also a small set of studies that consider bilingual children with speech sound disorders, or that focus on specific aspects of speech. Examples of these studies have been summarized in Table 3.

**Table 3: Examples of studies considering bilingual speech acquisition in children**

| | Language pair | Focus of study |
|---|---|---|
| **Dodd, Holm, & Wei (1997)** | Cantonese and English | Error patterns of two children acquiring Cantonese as a home language and English as a second language. |
| **Holm & Dodd (1999a)** | Cantonese and English | Longitudinal study of two children acquiring Cantonese as a home language and English as a second language. |
| **Holm & Dodd (1999c)** | Italian and English | Error patterns of two children acquiring English and Italian with phonological disorders. |
| **Goldstein & Washington (2001)** | Spanish and English | Phonological patterns in the speech of 12 children acquiring both languages. |
| **Salameh, Nettelbladt, & Norlin (2003)** | Swedish and Arabic | Comparison of 10 children acquiring both languages with specific language impairment (SLI) to those without SLI, as well as to monolingual norms. |
| **Goldstein, Fabiano, & Washington (2005)** | Spanish and English | Phonological skills of 15 children were assessed and compared. The children were all exposed to both languages, but categorized as predominantly English, predominantly Spanish or bilingual. |
| **Gildersleeve-Neumann et al. (2008)** | Spanish and English | Comparison of the speech of 33 children categorized as being monolingual English, English-Spanish predominantly exposed to Spanish and English-Spanish with relatively equal exposure to |

| | | |
|---|---|---|
| | | both languages. |
| **Grech & Dodd (2008)** | Maltese and English | Speech acquisition in both languages of 241 children. |
| **Gildersleeve-Neumann & Wright (2010)** | Russian and English | English speech acquisition of 14 Russian-English bilingual children compared to that of monolingual English children. |
| **Lin & Johnson (2010)** | Mandarin and English | Mandarin and English phonological patterns in the speech of 48 children aged 4 or 5 years. |
| **San (2010)** | Malaysian English and Mandarin | Described the Malaysian English phonological system of 264 children who spoke both languages. |
| **Twinky (2011)** | Cantonese and Putonghua | Investigated interaction between the two languages by comparing the speech of 20 successive bilingual children between the ages of 3 and 4 years with the speech of 20 monolingual Cantonese speakers and 20 monolingual Putonghua speakers. |
| **En, Brebner, & McCormack (2014)** | English and Mandarin | English phonology of 70 children aged 4;0 – 4;5 years old who spoke both languages in Singapore. |
| **Prezas et al. (2014)** | Spanish and English | Spanish and English phonological productions, considering differences between 56 girls and boys, 4 and 5 year olds, and productions of Spanish and English words. |
| **Kim (2015)** | Korean and English | Phonological development in 52 Korean-English bilingual children. |
| **Mayr, Howells, & Lewis (2015)** | Welsh and English | Investigated word-final clusters in 40 children acquiring Welsh and English. |

These are examples of the studies that consider bilingual development. Many of the studies reviewed include English as one of the languages, with the exception of Twinky (2011) who considered Cantonese and Putonghua, and Salameh et al. (2003) who considered Swedish and Arabic. In addition, most of these studies included fairly small numbers of children, ranging

from two to 70 participants, with the exception of Grech and Dodd (2008) and San (2010), who included over 200 children in their studies.

The studies focus on the assessment of the speech of bilingual children, and on analysing these results to gather important information regarding typical development of the language pairs. McLeod et al. (in press) highlight the importance of this information, as it can be used when assessing bilingual children who speak the same language pairs, and help to distinguish between a disorder and a difference due to typical bilingual acquisition. However, it is important to remember the uniqueness of each bilingual child's language profile (Kohnert, 2010). These studies do not directly address intervention or investigate intervention outcomes. There are limited studies investigating bilingual children who are developing Bantu languages such as isiXhosa.

There has been little research into the typical bilingual development of isiXhosa and English. Although there is some research into the monolingual development of isiXhosa (e.g. Gxilishe, 2004; Lewis & Roux, 1996; Maphalala et al., 2014; Mowrer & Burger, 1991; Tuomi et al., 2001) and preliminary research into the normal acquisition of South African English (Pascoe et al., 2015), there is much less information regarding bilingual speech acquisition in South Africa, and more specifically isiXhosa-English bilingual development. Pascoe et al. (2015) considered the acquisition of English phonology by three year olds in Cape Town. Their sample included a small number (n = 25) of isiXhosa-English bilingual speakers. Findings suggested that the isiXhosa bilingual children in their sample had the most complete consonant inventories when compared to monolingual English speakers, bilingual English-Afrikaans speakers and trilingual English-Afrikaans-isiXhosa speakers in the study. However, the isiXhosa-English children also had the lowest mean percentage vowels correct. The researchers questioned the validity of this score, suggesting it may have been caused by typical vowel substitutions used by isiXhosa-English bilingual speakers, given the complexity of the English vowel system in comparison to the five vowels of isiXhosa. The study also determined that the phonological processes of cluster reduction and stopping were more prevalent in the isiXhosa-English children than in the other groups, as well as the processes of backing and devoicing (Pascoe et al., 2015), often

considered non-developmental in monolingual English speech (Dodd et al., 2003). The prevalence of backing and devoicing amongst the bilingual speakers in this study suggests they may be typical in the development of English by isiXhosa-English bilingual children. None of the isiXhosa-English bilingual children were identified as having a speech difficulty, although it is important to note that the sample of isiXhosa-English children was small (Pascoe et al., 2015). Further research is required that considers a larger sample to describe typical isiXhosa-English development with more accuracy.

### 1.7.2 Intervention for speech sound disorders

Yavas and Goldstein (1998) highlighted the lack of research into the appropriate approach to intervention for bilingual children with speech sound disorders. Much of the research into bilingualism focuses on children without communication difficulties (Goldstein & Kohnert, 2005). This has been identified as an area where further research should be conducted, as it will allow for the development of theories regarding speech and language development and breakdown, as well as inform intervention (Goldstein & Kohnert, 2005).

In 2012, a position paper was developed to guide SLPs in the provision of services for multilingual children with speech sound disorders (International Expert Panel on Multilingual Children's Speech, 2012, www.csu.edu.au/research/multilingual-speech/position-paper). The Expert Panel that developed the paper acknowledged the lack of skills and resources amongst SLPs for providing effective intervention for multilingual children with speech sound disorders. The position paper highlights the importance of using assessment tools that are appropriate for the child's linguistic and cultural background, as well as using procedures that are based on evidence. Although it addresses the very important topic of being culturally relevant when working with bilingual children, the position paper does not outline specific guidelines regarding aspects of intervention such as choice of language or approach to therapy (International Expert Panel on Multilingual Children's Speech, 2012). However, it does recommend that assessment and intervention should be available in the languages identified by family members as being relevant for the child, suggesting assessment and intervention should be available in all of the children's languages if necessary. The expert panel have since developed a tutorial outlining a recommended process of assessment of a bilingual child, and

applying this to a hypothetical case (McLeod et al., in press). Although this provides preliminary suggestions of aspects that must be considered in goal selection, it does not provide specific outlines in determining goals or approaches to intervention (McLeod et al., in press). This lack of clear guidelines regarding intervention may be due to the heterogeneous nature of the multilingual population worldwide, which makes it challenging to provide guidelines that will be appropriate for all multilingual children with speech sound disorders.

It is important to consider the type of speech sound disorder and the appropriate approach to intervention before providing intervention to a multilingual child (Holm & Dodd, 1999b). Due to the lack of information, Yavas and Goldstein (1998) suggested using a similar approach to bilingual children with speech sound disorders as for monolingual children. This includes matching the approach to intervention with the type of speech sound disorder the child presents with. In addition, more specific guidelines were given regarding choosing targets. Initially, targets should be chosen that affect the intelligibility of the child's speech most, in both languages (Goldstein & Fabiano, 2007). This should be followed by targeting errors that may affect intelligibility in one language more than in the other language, and finally those error patterns that affect only one language (Yavas & Goldstein, 1998). For example, if a bilingual Spanish-English child presents with (1) weak syllable deletion which occurs equally in both languages, (2) final consonant deletion in both languages but noted more in English due to the structure of words in English, and (3) devoicing of consonants which is only present in English, the errors should be addressed in that order (Goldstein & Fabiano, 2007; Yavas & Goldstein, 1998). The Royal College of Speech and Language Therapists also recommend providing intervention in the language that is most appropriate for the goal being targeted, but in addition to this highlighted the importance of including the child's caregivers in the decision making process (RCSLT Specific Interest Group in Bilingualism, 2007). It is important to consider targets in all of the child's languages, as the recommendations developed by the International Association of Logopedics and Phoniatrics (2006) highlight that providing intervention in one language will not always result in generalisation to the other language.

Language of intervention is thus an important consideration. Although parents of bilingual children will often want their child to learn the language of the school and as a result will emphasise it over their home language, the development of the child's home language is important (Kohnert, Yim, Nett, Kan, & Duran, 2005) and can aid the acquisition of the second language (Ramos & Ardila, 2011). Intervention for language difficulties in the child's home language can aid progress (Verdon, McLeod, & Wong, 2015). However, in phonological intervention, the language of intervention has been debated, and there seem to be few guidelines regarding language of intervention (Goldstein & Gildersleeve-Neumann, 2015). Although some authors have recorded transfer to the untreated language following intervention (Holm & Dodd, 2001; Mamdouh, 2008; Ray, 2002), others have not reported generalization to the untreated language (Holm et al., 1997). Some studies have explored intervention in both languages, and this has shown positive results in terms of improvements in both languages (Gildersleeve-Neumann & Goldstein, 2015; Ramos & Mead, 2014).

Intervention studies are not only useful for clinical application, but by considering the surface level changes to a child's speech following intervention, hypotheses about the underlying structure of a multilingual child's phonological systems can be made. In order to investigate previous studies involving intervention for bilingual children with speech sound disorders, a literature search was conducted. Articles published between 1990 and the present were considered. Academic Search Premier, CINAHL, ERIC, Health Source, MEDLINE and PscyARTICLES on the EBSCOhost database was used, with the search phrase "(intervention OR therapy) AND phonology AND speech AND child* AND (bilingual* OR multilingual*)", resulting in 33 results. Google Scholar was also used, with the search phrase "intervention therapy phonology speech children bilingual multilingual", resulting in 3950 results. The titles of the articles, as well as the abstracts of those whose titles indicated they may be relevant, were reviewed in order to determine whether they investigated intervention for speech sound disorders in bilingual children. Those that investigated phonological awareness, those that assessed or described bilingual children's phonology but did not provide intervention, and those that provided guidelines or policies but no specific case studies or intervention studies were removed. In addition, the references used by these studies were consulted to identify any

further intervention studies. A total of seven articles were identified that presented an intervention study of bilingual or multilingual children with speech sound disorders. These have been summarized in Table 4. The studies presented vary in their approach to intervention as well as language of intervention.

Many of the studies classified the children's speech sound disorder according to Dodd's diagnostic subcategories, and included children presenting with articulation disorder and phonological delay (Holm et al., 1997; Holm & Dodd, 2001), and inconsistent disorder (Holm & Dodd, 1999b, 2001). Ray (2002) defined their participant's speech as containing phonological errors that impacted on the child's speech intelligibility, while Gildersleeve-Neumann and Goldstein (2015) describe their participants as presenting with a moderate speech sound disorder and with childhood apraxia of speech. Mamdouh (2008) described the participant as presenting with "delayed language affecting phonology" (p.38), and Ramos and Mead (2014) described the child in their study as having a severe speech sound disorder. Although the intervention studies seem to consider a range of articulation and phonological delays and disorders, the multiple classification systems makes it difficult to compare the results of children with similar disorders.

The studies investigated a variety of language pairs. The majority of the studies provided intervention only in English (Holm et al., 1997; Holm & Dodd, 1999b, 2001; Ray, 2002), while one provided intervention only in Arabic (Mamdouh, 2008). In all of these cases, intervention appeared to be provided in the language that was dominant within the community. In contrast, in two of the case studies intervention was provided in both of the children's languages, Spanish and English (Gildersleeve-Neumann & Goldstein, 2015) and Portuguese and English (Ramos & Mead, 2014). No intervention studies were found that include a language pair that is common amongst bilingual children in South Africa, or a Bantu language.

Intervention was also provided for varying durations. This ranged from 15 to 64 sessions, lasting 20 – 60 minutes per session, one to four times a week. Intervention was provided over a period of between eight weeks to seven months. This highlights another aspect of

heterogeneity between the studies, and points to the difficulty in drawing general conclusions from these specific intervention case studies.

In the majority of studies, intervention in one language resulted in generalisation to the untreated language, with the exception of the phonological intervention received by the Cantonese-English speaking child with both articulation and phonological errors reported by Holm et al. (1997) and Holm and Dodd (2001). The authors hypothesised that addressing the underlying deficit would result in generalisation, and supported this hypothesis by describing generalisation to the untreated language when treating the underlying deficit of an articulation disorder, but no generalisation when addressing the surface level contrasts that are typically targeted in intervention for phonological disorders. However, the phonological processes targeted during the phonological therapy included gliding, a process only noted to be present in his English speech, not his Cantonese speech, and cluster reduction. There are very few clusters that are used in Cantonese, and those that are present in the language were not targeted during the phonological intervention (Holm et al., 1997). Some authors suggest there are no consonant clusters present in Cantonese (e.g. Lin & Johnson, 2010), therefore no generalisation would be expected when targeting cluster reduction in English. Ray (2002) also provided intervention to a child presenting with a phonological delay, but in contrast to Holm et al. (1997) and Holm and Dodd (2001), when using a cognitive-linguistic approach in order to treat a phonological delay, cross-linguistic generalisation did occur. Mamdouh (2008) provided intervention for a child who presented with a speech sound disorder that was described as phonological in nature. Although not explained in detail, intervention appeared to include aspects of metaphonological approaches, auditory perception and drill-like activities and included a variety of target phonemes at different points during intervention, the majority of which were present in both Arabic and English. Intervention in one language resulted in changes in both of the child's languages, apart from when the target phonemes were only present in Arabic, which resulted in no change to his English speech. Comparing this to the results found by Holm et al. (1997), it could be suggested that if phonological intervention focuses on phonemes not present in both language, it will result in little or no generalisation.

In contrast to the studies providing intervention focused on specific phonological processes or error sounds, Holm and Dodd (1999b, 2001) provided core vocabulary intervention to a child who spoke English and Punjabi, an intervention that focuses on whole words rather than error patterns, and that aims to increase consistency. Results suggested that there was an increase in consistency in English, and a smaller but still evident increase in consistency in Punjabi.

In contrast to the studies providing intervention in one language only, Gildersleeve-Neumann and Goldstein (2015) and Ramos and Mead (2014) investigated the effect of providing intervention in both languages. The use of both the child's languages in intervention is more in line with the recommendations provided by various individuals and organisations (e.g. Gildersleeve-Neumann & Goldstein, 2012; Goldstein & Fabiano, 2007; International Expert Panel on Multilingual Children's Speech, 2012; RCSLT Specific Interest Group in Bilingualism, 2007; Yavas & Goldstein, 1998). Results indicated an increase in overall accuracy in both languages (Gildersleeve-Neumann & Goldstein, 2015; Ramos & Mead, 2014). The results recorded by Ramos and Mead (2014) are worth mentioning, as they compared the results of a period of intervention in one language (English), to those following a period of intervention in two languages (English and Portuguese). They concluded that for their participant, even though some improvement of specific phonological processes was noted in Portuguese when the processes were targeted in English, there was a much greater improvement when she received bilingual intervention (one hour of English and one hour of Portuguese per week). In addition, although providing English intervention improved her English speech production, bilingual intervention had a greater effect on improving her English production. However, they did note that some phonological processes (e.g. fronting of palatal fricatives) had to be specifically targeted in Portuguese, her weaker language, for the child to show indications of eliminating that specific processes from her Portuguese speech (Ramos & Mead, 2014).

Table 4: Summary of studies investigating the effect of intervention on the speech sound disorders of multilingual children

| Author/study | Languages | Participants | Language of therapy | Approach of therapy | Results |
|---|---|---|---|---|---|
| **Holm, Dodd & Ozanne (1997)** | Cantonese and English | 5;2 year old child | English only, 15 weeks of intervention | 7 weeks of articulation intervention (20 minutes, twice a week), 8 weeks of phonological therapy (45 minutes once a week, using phonological contrasts) | Cross-linguistic generalization occurred for articulation targets, but not phonological targets |
| **Holm & Dodd (1999b)** | Punjabi and English | 4;6 year old child, inconsistent speech sound disorder in both languages | English only<br>16 30 minute sessions over 8 weeks | Core vocabulary, including parent training | Increased consistency of productions of treated and untreated words in English. Smaller increase in consistency in Punjabi. |
| **Holm & Dodd (2001)** | 1.Cantonese and English | 5;2 year old child | English only, 15 weeks | 7 weeks of articulation intervention (20 minutes, twice a week), 8 weeks of phonological therapy (45 minutes once a week) | Cross-linguistic generalization occurred for articulation targets, but not phonological targets |
| | 2.Punjabi and English | 4;8 year old child, inconsistent disorder | English only, 16 30 minute sessions over 8 weeks | Core vocabulary | Cross linguistic generalization occurred. |

| | | | | | |
|---|---|---|---|---|---|
| **Ray (2002)** | Hindi, Gujarati, English | 5;0 year old child, similar developmental but not age appropriate phonological process in all three languages, with a small amount of inconsistency (10 – 30%). | English only, 40 sessions of 45 – 60 minutes over 20 week. | Cognitive linguistic approach: minimal contrast therapy, focusing on both perception and production of contrasts. Included parent training | Increase percentage consonants correct (PCC); increased intelligibility; decrease use of phonological processes. Generalisation to all languages. Residual errors in conversational speech. |
| **Mamdouh (2008)** | Arabic and English | 5;0 year old child, with "delayed language affecting phonology" (Mamdouh, 2008, p. 38) | Arabic only, 43 sessions, 30 minute sessions, twice a week over 7 months. | Intervention was structured in four steps, targeting different phonemes. Intervention included description of the characteristics of the phonemes, sensori-perceptual training, production of the sound in isolation, syllables, words, phrases sentences and spontaneous speech. | PCC improved in both Arabic and English after most steps, however his English PCC did not improve after the step that focused on phonemes specific to Arabic (/ ħ/ and /x/). The use of /v/ in English also improved, even though not present in Arabic or targeted in intervention. |
| **Ramos & Mead (2014)** | Portuguese and English | 6;5 year sequential bilingual child with a severe speech sound disorder. | Three intervention phases, each lasting two months:<br>1. English (focusing on backing and cluster reduction) and Portuguese (focusing on prevocalic devoicing and fronting of palatal fricatives) by two therapists. One hour sessions, twice a week by each therapist, resulting in | Auditory discrimination training; production in isolation, syllables, words, phrases; minimal pair activities included in drill play. | Although progress was noted throughout, the most progress was noted in the phase providing bilingual Portuguese-English intervention. Bidirectional transfer occurred when targeting phonemes with similar rules in both languages. |

| | | | | | |
|---|---|---|---|---|---|
| | | | 4 hours of intervention each week.<br>2. English and Portuguese provided by one therapist, targeting the above processes in both languages. One hour a week in English, one hour a week in Portuguese.<br>3. English only, targeting the above processes. One hour, twice a week. | | |
| **Gildersleeve-Neumann & Goldstein (2015)** | Spanish and English | 5;8 year old and 5;6 year old children, one with a moderate SSD, one diagnosed with Childhood Apraxia of Speech. | Spanish and English: Intervention provided two to three times a week, in Spanish at least 2 out of every 3 days. A total of 19 and 25 sessions were reported on. | Combined the following features: (a) meta- and perceptual awareness of session goals and how they linked to both languages; (b) developmentally appropriate activities to facilitate drill play; (c) articulatory and phonological components and cueing; (d) practicing targets in functional utterances. | Increases in accuracy of targets and overall accuracy in both languages. |

To the best of the author's knowledge, there are no studies considering intervention with isiXhosa-English bilingual children with speech sound disorders. This paucity of research regarding intervention for bilingual children with speech sound disorders in South Africa appears to be a reflection of the research being conducted internationally, considering the small number of intervention studies for bilingual children published between 1990 and 2016. It also highlights a gap in the knowledge of South African SLPs, who are striving to provide appropriate and effective intervention for bilingual children with speech sound disorders.

The present study aims to add to the evidence-base regarding intervention for bilingual children with speech sound disorders, focusing on the relatively unresearched language of isiXhosa together with English. The study strives to make both theoretical and clinical contributions to the field by adding to the body of knowledge regarding bilingual phonological acquisition and disorders, and supporting South African SLPs in their quest to offer ethical and evidence-based services to all the clients they serve. In the next chapter, the methodology that was used in this study is described, along with a rationale for the choices made. This is followed by three chapters, one for each child, in which their assessments and intervention are described. In the final chapter, the results are discussed in greater detail, and considered within the context of South Africa.

# Chapter 2: Methodology

This chapter will describe the aim and objectives of this study. In addition, it will outline the research design, giving rationales for decisions made. It will describe the recruitment process, as well as the procedure used in gathering and analysing data. Finally it will consider issues of reliability and validity, as well as ethical considerations.

## 2.1 Aim

To describe changes occurring in isiXhosa-English bilingual children's speech following intervention targeted at their speech sound difficulties.

## 2.2 Objectives

1. Describe each child's phonology, articulation and intelligibility prior to intervention.
2. Describe the individual intervention programme devised for each child.
3. Describe each child's phonology, articulation and intelligibility post intervention, and make comparison with the pre-intervention data.

## 2.3 Research design

This study followed an exploratory descriptive design in order to detail the changes that occurred in the children's speech. A single subject, pre- and post-test design was used: this allowed each participant to be described as an individual case and act as their own control (Graham, Karmarkar, & Ottenbacher, 2012; Vance & Clegg, 2012), and included assessing the children's speech before and after the intervention (Babbie & Mouton, 2006). This research design allowed for the changes in the individual children's speech to be analysed and described in detail (Dodd et al., 2005; Vance & Clegg, 2012). The study design was based on that detailed in other descriptive-linguistic intervention projects (e.g. Gildersleeve-Neumann & Goldstein, 2015; Holm & Dodd, 1999b; Ray, 2002).

## 2.4 Participant selection

The participants were three children who fulfilled the following inclusion and exclusion criteria:

a) The children were between the ages of 3 to 6 years.
b) The children were bilingual, with isiXhosa as a home language and English as an additional language.

c) The children presented with a speech sound difficulty as their primary difficulty. This study focused on children where speech difficulties affect their intelligibility, regardless of the aetiology. Therefore children with motor speech impairments such as dysarthria or apraxia, as well as those with cleft lip and/or palate were also eligible for inclusion. Children with other primary diagnoses (e.g. hearing loss, ADHD) that could affect their ability to participate in the intervention were excluded from the study. Other primary diagnoses were identified through teacher and parent report, as well as through questions on the case history form (see Appendix B).
d) The children had not received previous intervention for a communication disorder from an SLP or were not receiving intervention for a communication disorder from an SLP at the time of recruitment.

These broad criteria allowed for a range of children to participate, as this was an exploratory study through which hypotheses could be developed that could be investigated in future research.

## 2.5 Recruitment

The children were recruited through personal contacts at preschools in Cape Town. Undergraduate students who gathered data for their honours project were consulted in order to identify children that may have been appropriate for this study. The speech of the children from the honours project had been screened, but not assessed. A small group of children were found to have potential speech sound disorders. From this group, a smaller pool of children spoke isiXhosa and English. Participants were randomly selected from this small pool of children. When one of the selected children did not meet the inclusion criteria, or did not want to be part of the study, another child from the pool of isiXhosa-English speaking children was randomly selected.

Where potential speech difficulties were found during the honours project, caregivers were informed and provided with information counselling regarding intervention available for their child. The children were referred to qualified SLPs, and many of those referred were on waiting

lists for intervention. As such, offering them access to intervention would be of benefit to them, and their participation in the present study was not an additional burden.

One participant was identified through the honours project. The remaining isiXhosa-English bilingual children identified as having possible speech sound disorders in that project were found to be unsuitable for the current project. Further participants were identified through teacher referrals from preschools in Cape Town. The preschools were approached to obtain permission to contact the children's caregivers (see Appendix C). The caregivers were then contacted to obtain informed consent (see Appendix D). The researcher was responsible for sharing information with the caregivers both in written form and verbally. Information letters were sent home with the children from school or given to the caregivers at the school, and were available in the participants' language of choice. Once consent had been obtained, the children were invited to be part of the study. Assent was obtained from the children themselves (see Appendix E).

## 2.6 Sampling

This study made use of purposive sampling. Purposive sampling allows individuals from the specific population under consideration to be identified to meet the research aim, although they are not always representative of the entire population (Babbie & Mouton, 2006). A pool of potential participants was identified. Three participants were selected who were of interest to the researcher, and whose caregivers or legal guardians gave consent, and had themselves given assent. Although consent was given for a number of children, and assessment was started, in many cases the children were found to have typical speech development in both English and isiXhosa, thus excluding them from the study. This difficulty in identifying participants was unexpected and raises questions regarding the speech development of isiXhosa-English bilingual children in Cape Town. Three participants were selected. This number is in line with similar work in the area (e.g. Gildersleeve-Neumann & Goldstein, 2015; Holm & Dodd, 1999b, 2001; Ray, 2002), where small numbers of cases are used to describe the changes in participants' phonological systems in detail.

## 2.7 Materials

The participants were assessed using an assessment protocol outlined in Appendix F. Intervention was planned, and appropriate materials were developed for this. These included materials commonly used by SLPs, such as picture cards of target words, games and toys to be used as reinforcers. The materials required for therapy were identified during the process of the assessment and analysis of the assessment results.

Assessment and therapy were audio-recorded using an Olympus Digital Voice Recorder model number VN-3100PC.

To ensure fidelity of intervention, a fidelity checklist was developed, based on the rubric in Appendix G. This was tailor-made for each child, according to their intervention plan.

## 2.8 Study Personnel

Data collection was carried out by the researcher, an experienced speech and language therapist. The researcher's first language was English, but her language background includes Afrikaans, as well as basic isiXhosa language skills from previous high school level education, specific courses and experience. In addition, she had experience providing young isiXhosa speaking children with basic intervention in isiXhosa. The level of language required to provide adequate intervention to younger children, such as the participants of this study, is generally less than that required for older learners.

## 2.9 Procedure and Data Collection

Approval from the University of Cape Town's Faculty of Health Science Human Research Ethics committee was obtained (ethics number 448/2015, see Appendix H). Following this, principals of schools were contacted to get permission to approach the caregivers of children at their school, as well as to use their school as a venue for assessment and therapy (see Appendix C). Once permission had been granted from the principals, caregivers of potential participants were contacted. The consent form (see Appendix D) was explained to them, and they were provided with the opportunity to ask questions. Once consent had been granted, the children were approached in order to obtain assent (see Appendix E).

### 2.9.1 Pre-intervention

The children were assessed at the beginning of the research process. The assessment protocol in Appendix F was used. Caregivers were requested to fill out a case history form (see Appendix B). In addition, caregivers and teachers were asked to complete the *Intelligibility in Context Scale* (*ICS*) (McLeod et al., 2012a). An isiXhosa translation of this scale was available for caregivers who preferred to complete this form in isiXhosa (available from www.csu.edu.au/research/multilingual-speech/ics). Assessment of the child took place, whenever possible, at a quiet room at the child's school. This was a familiar environment for the child, allowing them to feel comfortable. The child was seated at a table or on the floor. Individual assessments were conducted over two to three sessions of about 30 – 60 minutes in length, with a total estimated time of two to three hours. Breaks were provided throughout each assessment session as needed by each child. The researcher consulted with the child's teacher to ensure the child did not miss important work or routines in class, including snack time, nap time or play time. The assessment was conducted by the researcher and was audio-recorded. Data was transcribed and scored online during the assessment; however the audio-recordings allowed for offline scoring of the assessments with speech output to ensure accuracy of transcriptions.

On initial meeting with the children for assessment, rapport was established using age appropriate books and toys. The children's English speech was assessed using the *Diagnostic Evaluation of Articulation and Phonology* (*DEAP*) (Dodd et al., 2002). The children's isiXhosa speech was assessed using the *Masincokoleni isiXhosa Speech Assessment* (Maphalala et al., 2012). Following this, the children's receptive language in English was assessed using the *Peabody Picture Vocabulary Test* (Fourth Edition) (*PPVT-4*) (Dunn & Dunn, 2007). Then the children's receptive language in isiXhosa was assessed using an isiXhosa translation of the *PPVT-4* that was developed by the Sombambisana initiative (Dawes, Biersteker, & Hendricks, 2012). As this was a translation, the results were analysed descriptively. This was due to the normative data being based on the English version of this test, and on children in the United States of America (Dunn & Dunn, 2007), and was therefore not representative of the children in this study. The children's receptive language in both languages was assessed using the same

assessment tool in order to allow their receptive vocabulary across both languages to be determined (O'Brien, 2015; Pearson, Fernandez, & Oller, 1993). This allowed an indication of their overall understanding of language (both English and isiXhosa) to be determined. The order of assessments was altered slightly depending on the child. If the child was shy on the initial meeting of the main researcher, the receptive language assessments were conducted first, as they do not require speech output and the child was often more willing to participate.

Caregivers were provided with feedback following the initial assessment. They were given a choice as to how they would like to receive the feedback: they were invited to a face-to-face meeting, or provided with telephonic feedback, and provided with a written report. In this feedback session, they were provided with information regarding the nature of their child's speech sound disorder, and the intervention plan proposed. If the researcher identified any area of concern other than those relating to the child's speech (e.g. fine motor, psychological or other developmental difficulties), the child was referred to the appropriate professional, such as occupational therapists, psychologists, social workers, and this was discussed with the caregivers during the feedback meeting.

### 2.9.2 Intervention

A tailor-made therapy plan was developed for each child based on the results of the initial assessment. Based on the nature of the child's difficulty and their language profile, decisions were taken regarding the intervention approach, language of instruction and the language of the targets and stimuli used during intervention. This was based on the available research evidence. Figure 2 indicates the decision making process for each of Dodd's (2005) subtypes of speech disorder, considering the most appropriate approach for each subtype.

The language of instruction, where possible, was English. As the children were bilingual they had an understanding of English. In addition, as a language mismatch is common between SLPs and clients in South Africa, this reflected the realities of providing intervention in South Africa. The language of the targets was based on each child's individual profile. IsiXhosa target words were gathered from isiXhosa flashcards, dictionaries and textbooks. Only words appropriate for

the child's age were selected. Figure 3 outlines how decisions were made regarding the selection of language for targets.

Due to the intervention being designed specifically for each child, many factors were taken into consideration in order to design an intervention programme that was appropriate for that child. The researcher provided therapy, wherever possible, in a quiet room at the child's school two to three times a week with 30 – 45 minute sessions, for 6 to 8 weeks (or 14 to 16 sessions). The child had the freedom to move around the room, as typical speech therapy activities often include a mixture of table activities and activities requiring movement throughout a room. The researcher consulted with the child's teacher to ensure intervention occurred at a time that was convenient for the child and the teacher, and that the child did not miss any important events or daily routines such as snack time or nap time. All assessment and intervention sessions were audio recorded to ensure accurate transcription of targets. The fidelity checklist based on the rubric in Appendix G was completed during each session, to ensure intervention followed the child's intervention plan.

Throughout the intervention process, the researcher remained in contact with the caregivers and teachers as necessary, in a manner that suited the caregivers/teachers (e.g. telephonically, through written messages).

### 2.9.3 Post-intervention

Following intervention, the children were re-assessed, using the assessment protocol detailed in Appendix F, omitting some assessments as indicated in the table. The case history questionnaire was omitted, as the information was not expected to change over the intervention period. In addition, the language assessments were omitted, as they should not be administered within 6 months of the first assessment. The re-assessment again took place at the children's schools, at a mutually convenient time as discussed with the child's teacher. This re-assessment provided information regarding the children's speech production which was described and compared to the pre-intervention assessment results. Following the re-assessment, caregivers were invited to a face-to-face meeting, or provided with telephonic

feedback and provided with a written report. The results of the re-assessment were explained. If the child required further intervention, this was discussed with their caregivers, and they were referred to an SLP. Caregivers and teachers will have access to the completed research report should they wish to read it.

## 2.10 Data analysis

The data collected during pre- and post-intervention assessments were descriptively analysed. For each language, the child's phonetic inventory was described. The percentage consonants correct was calculated according to the instructions in the *DEAP* (Dodd et al., 2002). Each child's speech was analysed for developmental and non-developmental phonological processes. In addition, the child's consistency was also noted as a percentage of total repeated items. Finally, the child's intelligibility in each language was discussed. This is based on analysis protocols used by similar intervention studies investigating intervention for multilingual children with speech sound disorders (e.g. Gildersleeve-Neumann & Goldstein, 2015; Holm & Dodd, 1999b; Ray, 2002).

The decision-making process and rationales for intervention was documented, and the intervention programme for each child was described. Following the post-intervention assessment, the results were compared and any changes described, for either language over time and in relation to each other.

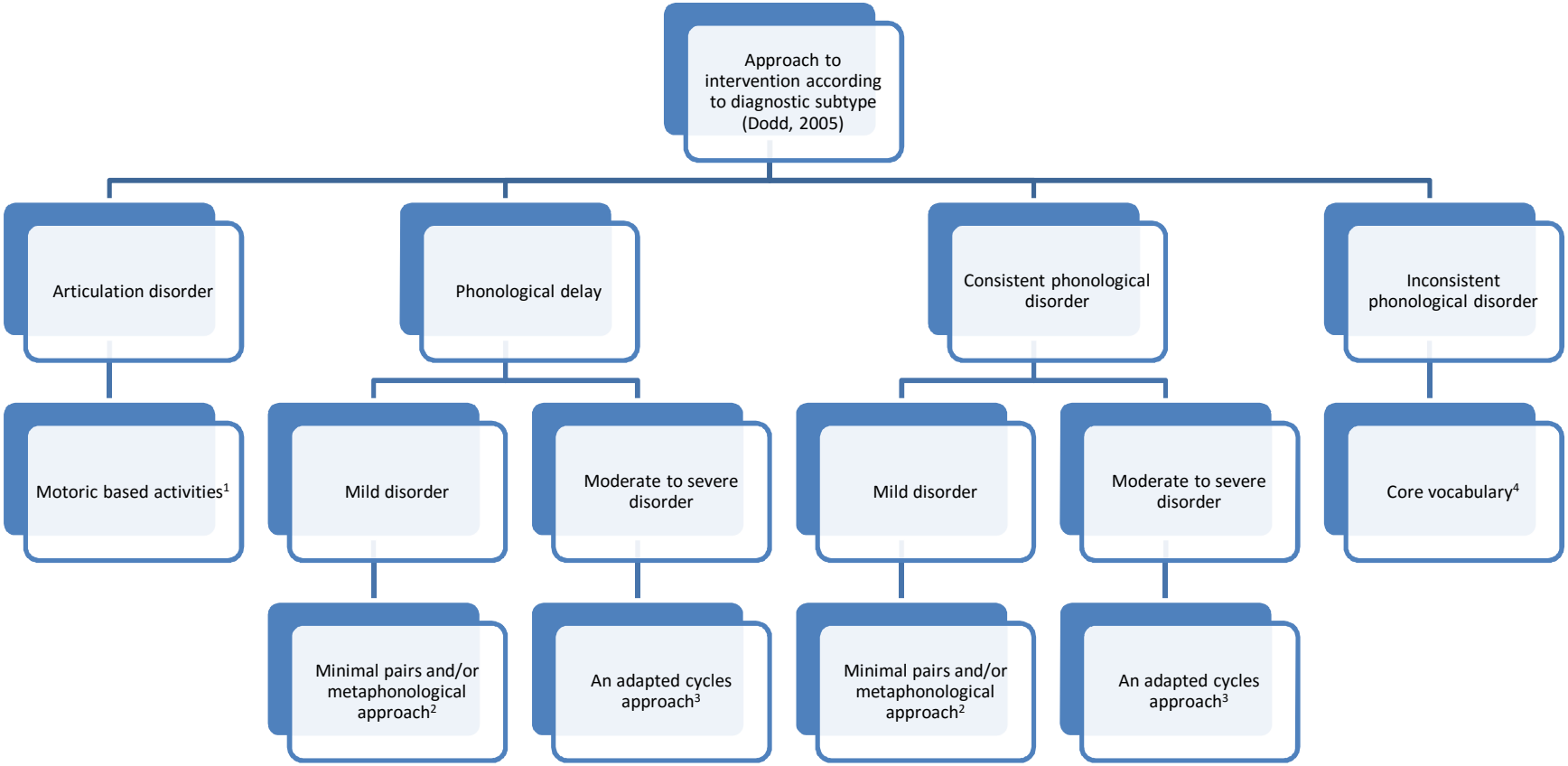



**Figure 2: Selection of therapy approach**

[1] Motoric based activities target the underlying deficit affecting the child's speech (Dodd & Crosbie, 2005). This is an effective approach for intervention for articulation disorders.

[2] According to Baker (2010), minimal pairs may be more suited for a child with a mild phonological disorder. A minimal pair approach highlights the communicative and functional use of the correct sounds in words, and aims to reorganize a child's phonological system to achieve this (Holm, Crosbie, et al., 2005). A metaphonological approach includes using a child's phonological awareness skills in order to aid the accurate production of speech sounds (Hesketh, 2010). It is not appropriate for children younger than 4 or 5 years of age, as they will not yet have developed the ability to reflect on the structure of the words they produce (Hesketh, 2010). In addition, it is not appropriate for children who struggle with auditory discrimination or have weak cognitive or linguistic skills (Hesketh, 2010).

[3] The cycles approach is more appropriate for children with highly unintelligible speech (Prezas & Hodson, 2010). As a cycle is typically 10 to 15 weeks, the approach was adapted slightly for use in this study. It included the main concepts of the approach, including basing intervention on gradual acquisition of phonemes, as seen in typical speech development; including auditory stimulation; choosing targets that will result in successful productions while adding more challenging targets gradually; actively involving the child in the intervention sessions; choosing targets to result in the most generalization; and choosing targets that will challenge the child but provide them with success (Prezas & Hodson, 2010).

[4]The core vocabulary approach is appropriate for inconsistent phonological disorder as it aims to establish consistent productions of words (Dodd, Holm, Crosbie, & McIntosh, 2010). In addition, it is appropriate for children above the ages of two years, and has been shown to be effective for bilingual children (Dodd et al., 2010; Holm & Dodd, 1999b).

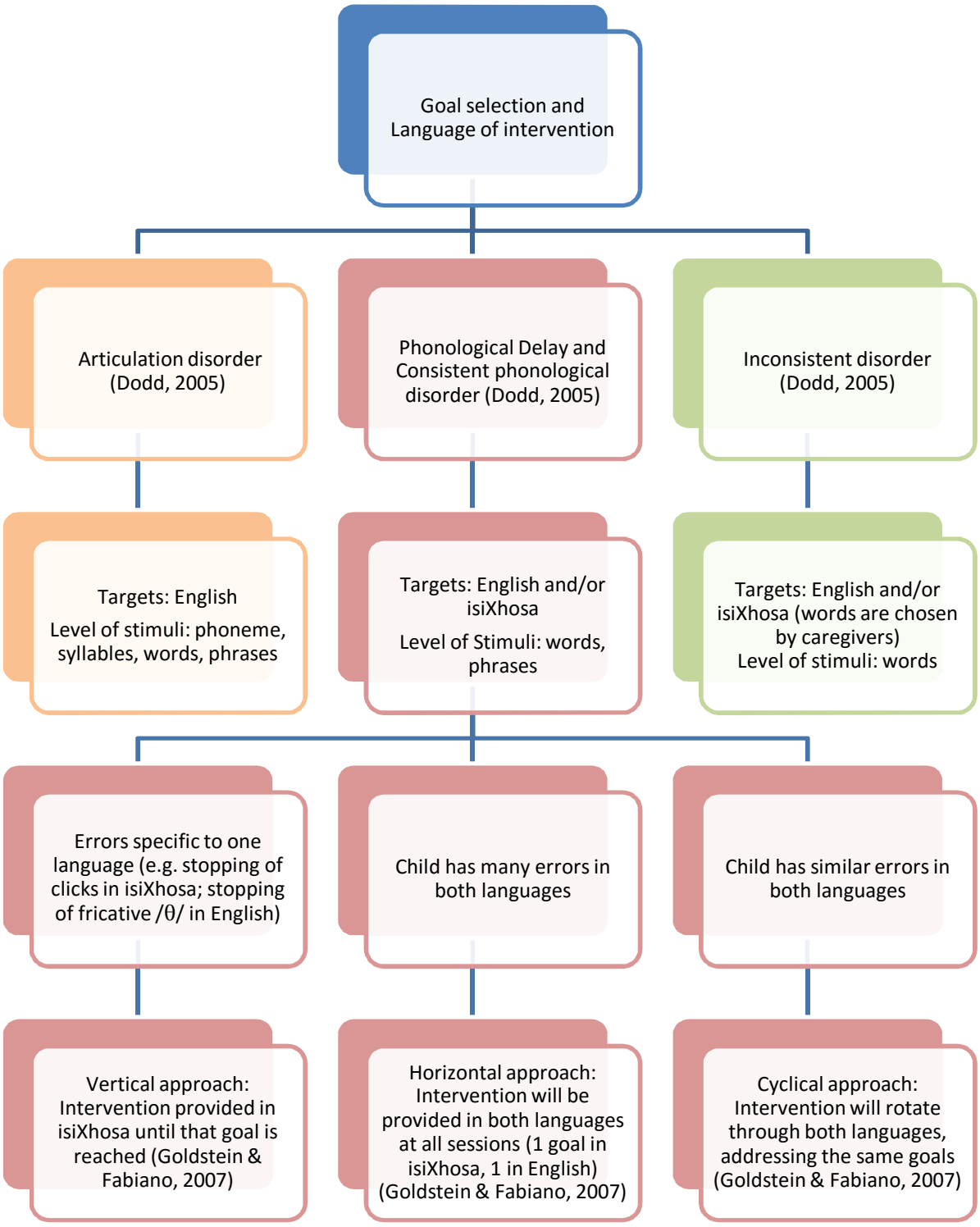



**Figure 3: Goal selection and language selection**

## 2.11 Reliability and validity

Reliability is concerned with the ability to replicate results when providing the same technique under the same conditions (Babbie & Mouton, 2006). By audio recording the assessment and intervention sessions, both intra- and inter-rater reliability were considered. Intra-rater reliability is the extent to which the researcher obtains the same findings on repeated observations (Irwin, Pannbacker, & Lass, 2008). The researcher transcribed 25% of the assessment data twice, in order to compare and establish intra-rater reliability. An agreement of 96.5% was recorded, which was considered an acceptable level

Inter-rater reliability is the extent that two individuals obtain the same findings from a single observation or sample (Irwin et al., 2008). This was ensured by a portion of the assessment data (10%) being transcribed by an experienced linguist. This was compared with the transcriptions by the researcher, to ensure accurate transcriptions of the speech productions of the children. An agreement of 89% was established, and this was considered an acceptable level. Many of the disagreements involved vowels, or the inclusion or exclusion of the initial/final vowels in isiXhosa. Although a level of agreement of 80% was considered acceptable for both intra- and inter-reliability, any discrepancies between the transcriptions were discussed in detail to ensure the most accurate transcription of data.

Validity refers to whether a measure is investigating the behaviour it intends to measure (Babbie & Mouton, 2006). The children's speech will be evaluated using assessment tools that are designed to identify speech sound disorders in English and isiXhosa. The intervention programmes for each child will be designed by selecting the appropriate approach according to Dodd and Crosbie (2005).

Many of the assessments used in this study are published studies with high reliability and validity. The *DEAP* (Dodd et al., 2002) is a standardized articulation and phonology assessment with high reliability and validity. It has been standardized in the United Kingdom, so results are interpreted with caution for the South African population. However, some preliminary data has been collected using the *DEAP* with three year old children acquiring English in Cape Town (Pascoe et al., 2015). This data set included a small sample of isiXhosa-English bilingual

children, providing some information regarding the development of English speech of bilingual children. The *Masincokoleni* isiXhosa Speech Assessment (Maphalala et al., 2012) has some preliminary validity work (Maphalala et al., 2014). Although it is still unpublished, it has been used in a few studies (e.g. Maphalala et al., 2014; Pascoe et al., 2016) and is the only isiXhosa speech assessment tool available. The *Peabody Picture Vocabulary* Test (Fourth Edition) (Dunn & Dunn, 2007) is a published English language assessment. It has high reliability and validity. However, as it has not been normed on a South African population, results will be interpreted with caution. Finally, the isiXhosa translation of the *Peabody Picture Vocabulary Test* (Fourth Edition) that was developed Dawes et al. (2012) was used informally as it is a translation of an English receptive language assessment.

## 2.12 Ethical considerations

When conducting research that involves interaction with people, it is important to consider the ethical issues that arise (Babbie & Mouton, 2006). This study was carried out in accordance with the principles of the Helsinki Declaration (World Medical Association, 2013).

### 2.12.1 Autonomy

It is important that participation in a research study be voluntary (Babbie & Mouton, 2006). In order to ensure this occurred, informed consent was obtained from the children's caregivers or legal guardians, as children fall into the vulnerable population and cannot give informed consent themselves (see Appendix D for a copy of the consent form that was given and explained to the caregivers). This consent form was available in both English and isiXhosa, and caregivers were given opportunity to request a copy in the language of their choice. The caregivers were informed that participation in the study is voluntary and that they were able to withdraw their child from the study at any point with no repercussions. The study was also explained to the children, and they were required to give verbal assent to participate (see Appendix E). All information gathered from the study was kept confidential (Babbie & Mouton, 2006), as any identifying information provided by the participants and their care-givers was not available to anyone other than the researcher, research assistant and supervisor. This information will be kept under lock and key and destroyed following publication of study results. In order to ensure anonymity, pseudonyms were used in all documentation and reports

to ensure participants cannot be identified by those other than the researchers doing the assessment and providing intervention. All audio recordings will be kept under lock and key and will be destroyed on completion of the study. No identifiable biographical information is included in the report.

### 2.12.2 Beneficence

Beneficence refers to the researcher's responsibility to maximize benefit to the participants (Wassenaar, 2006). In this study, the participants received intervention for their speech sound disorder, which had the potential to result in an improvement in their speech production. On completion of the study, families were provided with detailed information regarding their child's speech and language. Participants who required further intervention following the completion of the study were referred to a qualified SLP or to the supervised SLP student clinical programme running at the crèche. Any other necessary referrals identified throughout the study (e.g. Occupational Therapy, Psychology, Social Work) were made as the need arose. In addition to this benefit for the individual participants, this study may add to the knowledge base of intervention for speech sound disorders for bilingual children in South Africa, and as such has social value (Wassenaar, 2006), as this information may result in more appropriate intervention being offered to bilingual children in South Africa with speech sound disorders. Feedback will be provided to the teachers at the crèche, and the research findings will be disseminated through papers and talks.

### 2.12.3 Nonmaleficence

Nonmaleficence is the ethical principle that ensures no harm comes to the participants of the study (Wassenaar, 2006). This study did not present the participants with any risks. Assessment and intervention was provided at the participants' crèches, and they were given regular breaks throughout the assessment sessions. They were given encouragement throughout the process.

### 2.12.4 Justice

In order to uphold justice, the researcher must ensure that each participant is treated fairly and equitably (Wassenaar, 2006). This was upheld in this study, as each participant's intervention plan was specifically developed for their unique speech profile. All findings were reported to

the children's caregivers. In addition, the results of this study may benefit a wider population of bilingual children with speech sound disorders in South Africa.

### 2.12.5 Risks and benefits

It is important to ensure the participants are informed of all possible risks involved in a study (Babbie & Mouton, 2006). This study presented no risks to the participants. However, they may benefit from the provision of intervention as their speech production may improve.

In this chapter, the aim of this study was stated, and the research design of single subject, pre- and post-test was justified. The procedure of data collection and analysis was outlined, while keeping ethical considerations in mind. In the following three chapters, each child will be presented as an individual case, and their assessments and intervention results described and analysed. Following this, there is a final chapter that discusses the findings from the three children together.

# Chapter 3: Gcobisa

## 3.1 Background information

Gcobisa was a 4 year, 2 month old girl living and attending crèche in Cape Town. She was referred to the researcher by her teacher, who had concerns about her speech. Gcobisa's mother was contacted in writing, and gave consent for her child to take part in the research study (Appendix D). The only contact between the researcher and Gcobisa's mother after an initial telephone call was through letters sent home from school. Although Gcobisa's mother was willing to complete any forms sent to her, she gave minimal additional feedback about Gcobisa's progress and activities sent home.

Gcobisa's mother completed a case history information form, providing the following information. Gcobisa lives at home with her mother, grandmother, two cousins, and aunt. She speaks English and isiXhosa at both home and school. Gcobisa's mother reported that Gcobisa had been learning both languages from a young age, and hears both languages throughout the day. She also reported that although Gcobisa only speaks English and isiXhosa, she is also exposed to some Southern Sotho at home. When Gcobisa is not at school, she is usually with her mother. There is no history of any speech, language or hearing problems in the family, and Gcobisa's mother reported no concerns regarding her speech or language.

Gcobisa's teacher reported that she was concerned about her speech and that she seems "lazy to talk". The children at school usually understand what she is saying, but the teacher did not always find it easy to understand her. She reported that they encourage the use of English at the crèche, but Gcobisa would sometimes speak to her or to her friends in isiXhosa. The teacher would usually reply in English, in order to encourage the use of English.

Gcobisa's early developmental history appears normal. Gcobisa's mother reported she was born via C-section at full term, weighing 3.2kg. Gcobisa suffered from seizures at 10 months and experienced a severe burn at 1 year, 6 months. Her motor milestones appeared to be within the average range. However, her communication milestones appeared to be slightly late, as Gcobisa's mother reported that she used single words at 2 years, combined words at 3

years, named single objects at 2 years, and asked simple questions and engaged in conversation from 3 years, 6 months.

## 3.2 English speech assessment results

Gcobisa was shy at first. She was interested in the pictures, but in the first few sessions was often nervous to say anything without having an adult model. Gcobisa's English speech was assessed using the *Diagnostic Evaluation of Articulation and Phonology* (*DEAP*) (Dodd et al., 2002). This consists of five subtests that include a diagnostic screener, phonology assessment, articulation assessment, inconsistency assessment and an oro-motor assessment. The diagnostic screener was administered first. In this subtest, Gcobisa did not demonstrate her ability to use the phonemes /θ/, /l/ and /r/ in spite of having opportunity to do so, and she used a variety of phonological processes including affrication, gliding, cluster reduction, fronting, stopping and weak syllable deletion. Gcobisa produced five of the ten words differently on a repeated production, resulting in an inconsistency score of 50%. These results indicated that further testing was required, and the articulation, oro-motor, phonology and inconsistency assessments were administered. The *DEAP* subtests administered resulted in the following information being gathered.

### 3.2.1 Consonant and Vowel Inventories

Gcobisa had difficulty producing the fricatives /θ/ and /ð/, as well as the liquid /r/. She did not appear to be stimulable for these sounds during the assessment. It was noted, however, that at times she was able to produce the phoneme /r/ in isolated words in later subtests. As such, the phoneme /r/ is in her inventory. However, although she could not produce the liquid /l/ in words or syllables, she was stimulable for this sound in isolation. Gcobisa's phonetic inventory is summarized in Table 5.

**Table 5: Gcobisa's phonetic inventory in English (initial assessment)**

| INVENTORY | **Present** | **Not present** | **Comment** |
|---|---|---|---|
| **Stops** | p, b, t, d, k, g | | |
| **Fricatives** | f, v, s, z, ʃ, ʒ, h | θ, ð | Age appropriate (Dodd et al., 2002) |
| **Affricates** | tʃ, dʒ | | |

| | |
|---|---|
| **Nasals** | m, n, ŋ |
| **Liquids** | l, r |
| **Glides** | w, j |

Gcobisa was able to produce all front, central and back vowels elicited by the *DEAP*. In addition, she was able to produce diphthongs. Table 6 summarises the vowels and diphthongs produced by Gcobisa during the assessment.

Table 6: Vowels and diphthongs produced by Gcobisa in English

| | **Present** |
|---|---|
| **Front** | i (beet) |
| | ɪ (bit) |
| | ɛ (bet) |
| | a (bat) |
| **Central** | ə (sofa) |
| | ʌ (but) |
| | ɜ (bird) |
| **Back** | u (boot) |
| | ʊ (book) |
| | ɒ (pot) |
| | ɑ (palm) |
| | ɔ (bought) |
| **Diphthongs** | ɪə (ear) |
| | eɪ (play) |
| | ɔɪ (boy) |
| | ɑɪ (my) |
| | ɑʊ (house) |
| | oʊ (boat) |

### 3.2.2 Severity Indices (Percentage Consonants Correct (PCC), Percentage Vowels Correct (PVC), Percentage Phonemes Correct (PPC))

The *DEAP* provides norms for PCC based on the phonology assessment (see Table 7). Gcobisa achieved a PCC score of 75%. According to the *DEAP* norms (Dodd et al., 2002), this is equivalent to a standard score of 6 and a percentile of 9, suggesting her PCC is not at the level expected for her age. However, it is important to note that the *DEAP* was normed on monolingual English speakers from the United Kingdom (UK). Although some data is provided for bilingual children, these children spoke English and Punjabi, Mirpurri or Urdu and as such

cannot necessarily be applied to a child acquiring isiXhosa and English. However, a small set of data regarding the speech of three-year-old isiXhosa-English bilingual children has been collected in Cape Town (Pascoe et al., 2015). These data suggests three year old bilingual children have a mean PCC of 83.5%. Considering Gcobisa was 4;2 years, this suggests that even amongst her peers who are acquiring isiXhosa and English in Cape Town, her PCC is below the expected level.

Her vowel accuracy was greater than that for consonants, with an accuracy of 99%. This is average for her age (Dodd et al., 2002) according to the *DEAP* norms, as well as in comparison to the sample of isiXhosa-English bilingual children in Cape Town (Pascoe et al., 2015).

**Table 7: Gcobisa's PCC, PVC and PPC scores for the phonology assessment (initial assessment)**

| | **Percentage** | **Percentile rank compared to monolingual children in the UK (Dodd et al., 2002)** |
|---|---|---|
| **PCC** | 75 | 9 |
| **PVC** | 99 | 50 |
| **PPC** | 84 | 9 |

### 3.2.3 Phonological Processes

Gcobisa's phonological processes were identified during the phonology assessment. She made use of typical phonological processes, including gliding, cluster reduction, final consonant deletion, and stopping; as well as some unusual processes (see Table 8). According to the *DEAP* normative data, phonological processes that occur on five or more occasions are considered phonological processes or error patterns (Dodd et al., 2002). According to this criterion, Gcobisa made use of gliding and cluster reduction consistently. Although Gcobisa did make use of some unusual phonological processes, these were isolated instances. In addition, it has been suggested that children acquiring two languages may make use of atypical errors without having a speech disorder (Hambly et al., 2013).

Table 8: Gcobisa's use of phonological processes in the phonology assessment (initial assessment)

| Phonological process | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Gliding** | /l/ → /j/ | /ɛjəfɛn/ for *elephant*<br>/gjʌv/ for *glove* | Age appropriate (Dodd et al., 2002) |
| | /ɹ/ → /j/ | /jɐin/ for *rain*<br>/bjɪdʒ/ for *bridge* | |
| | /l/ → /w/ | /ɛwikɒptə/ for *helicopter* | |
| | /ɹ/ → /w/ | /ɒwindʒ/ for *orange*<br>/bwɛd/ for *bread* | |
| **Cluster reduction** | /nt/ →/n/ | /ɛjəfən/ for *elephant* | Not age appropriate, apart from triclusters (Dodd et al., 2002) |
| | /bɹ/ → /b/ | /zɛbə/ for *zebra* | |
| | /θɹ/ → /t/ | /ti/ for *three* | |
| | /fɹ/ → /f/ | /fɒg/ for *frog* | |
| | /sp/ → /p/ | /paɪdə/ for *spider* | |
| | /sk/ → /k/ | /kul/ for *school* | |
| | /spl/ → /pj/ | /pjaʃ/ for *splash* | |
| | /stɹ/ → /tɹ/ | /tɹɔbɛɹi/ for *strawberry* | |
| **Phonological processes that occurred less than five times during the phonology assessment** | | | |
| **Stopping** | /θ/ → /t/ | /tɑŋtʃu/ for *thank you*<br>/ti/ for *three* | Not age appropriate (Dodd et al., 2002) |
| | /ð/ → /d/ | /fɛdə/ for *feather*<br>/dis/ for *this* | |
| **Consonant deletion:**<br>**Initial**<br>**Medial**<br>**Final** | <br>/h/ → ø<br>/θ/ → ø<br>/θ/ →ø | <br>/ɛwikɒptə/ for *helicopter*<br>/tubʌʃ/ for *toothbrush*<br>/ti/ for *teeth* | Isolated occurrences |
| **Unusual process: fronting of nasals** | /n/ → /m/ | /mʌf/ for *knife*<br>/vam/ for *van* | Isolated occurrences |

| | | | |
|---|---|---|---|
| **Unusual process: Fronting of velar** | /kj/ → /tʃ/ | /tɑŋtʃu/ for *thank you* | Produced consistently in the word *thank you*, but not in other words containing the /kj/ cluster |

Gcobisa's use of the two main phonological processes were analysed in more detail.

#### *3.2.3.1 Gliding*

Gcobisa replaced both /ɹ/ and /l/ with either /j/ or /w/ on various occasions throughout the *DEAP* assessment (see Table 8 for examples). Her production of words containing /l/ was analysed in more detail (see Table 9). Over all the subtests of the *DEAP*, Gcobisa produced the phoneme /l/ inaccurately 36 times out of the 42 opportunities she had to produce the phoneme as a singleton or in a cluster in words. Her productions included /j/, /w/, /v/ and /p/, as well as omitting the phoneme, or the syllable containing the phoneme, from the word. In terms of the singleton /l/, she was able to produce it accurately in word final position. In word initial position, she consistently produced /j/. However, her variable errors were all produced in word medial position. On the majority of attempts she produced /j/ (nine out of 18 attempts) or /w/ (five out of eighteen attempts), with only two instances of substituting it with unexpected phonemes (/v/ and /p/), and two occasions of omitting the sound. Clusters containing /l/ were also investigated, and it was noted that Gcobisa reduced the /l/ from all l-clusters in medial position. However, in initial position, she produced /j/ on four occasions, and omitted the /l/ on three occasions.

As seen in Table 9, Gcobisa had a preference of substituting /j/ for /l/ (gliding), but on isolated occasions she omitted the /l/ or substituted it with other phonemes.

**Table 9: Analysis of phonological process of gliding of /l/ in English (initial assessment)**

| **/l/ in *DEAP*** | **Initial** | **Medial** | **Final** | **Total** |
|---|---|---|---|---|
| **/l/** | | | | |
| **Accurate productions** | 0/5<br>(0% accurate) | 0/18<br>(0% accurate) | 6/6<br>(100% accurate) | 6/29<br>(21% accurate) |

| | | | | |
|---|---|---|---|---|
| **Analysis of substitutions/omissions** | /j/: 5/5 | /j/:9/18;<br>/w/: 5/18;<br>Other: 2/18;<br>Omission: 2/18 | | |
| **/gl, spl, kl, sl/** | | | | |
| **Accurate productions** | 0/7<br>(0% accurate) | 0/3<br>(0% accurate) | | 0/10<br>(0% accurate) |
| **Analysis of substitutions/omissions** | /j/: 4/7;<br>Omission: 3/7 | Omission: 3/3 | | |
| **TOTAL accurate productions of /l/** | | | | 6/39<br>15% accurate |

Gcobisa's production of /ɹ/ was also analysed over all the subtests of the *DEAP* (see Table 10). Gcobisa produced the phoneme /ɹ/ as either /j/ or /w/ in initial position. In medial position, she had a slightly higher accuracy rate, and again she produced both /j/ and /w/ for the phoneme. She did not seem to have a preference for either of these glides. Her accurate production of /ɹ/ was in the word *strawberry* /tɹɒbɛɹi/. Similarly, in clusters, Gcobisa had more success producing clusters containing /ɹ/ in initial position. It has been suggested that it may be easier to produce /ɹ/ in clusters containing velar sounds, possibly as a result of the production being judged as more accurate due to the similar starting frequencies for velars and /ɹ/ (Kent, 1982). Gcobisa had more difficulty with clusters in the medial position. In contrast to producing /ɹ/ in isolation, when producing clusters, Gcobisa seemed to have a preference for producing /j/, or omitting the phoneme completely.

**Table 10: Analysis of Gcobisa's production of /ɹ/ in English (initial assessment)**

| **/ɹ/ in *DEAP*** | **Initial** | **Medial** | **Total** |
|---|---|---|---|
| **/ɹ/** | | | |
| **Accurate productions** | 0/5 (0% accurate) | 1/9 (11% accurate) | 1/14 (7% accurate) |
| **Analysis of substitutions/omissions:** | /j/: 2/5;<br>/w/: 3/5 | /j/: 3/9;<br>/w/: 5/9 | |

| | | | |
|---|---|---|---|
| **/bɹ, tɹ, kɹ, θɹ, kɹ, fɹ, stɹ, pɹ/** | | | |
| **Accurate productions** | 3/12 (33% accurate) | 1/11 (9% accurate) | 4/23 (17% accurate) |
| **Analysis of substitutions/omissions:** | /j/: 3/12;<br>/w/: 2/12;<br>Omission: 3/12 | /j/: 5/11;<br>/w/: 0/11;<br>Omission: 5/11 | |
| | | | |
| **TOTAL accurate productions of /ɹ/** | | | 5/37 (14% accurate) |

#### *3.2.3.2 Cluster reduction*

Gcobisa's use of cluster reduction was also analysed in more detail. Her use of cluster reduction for some of the common initial and medial clusters over all the *DEAP* subtests is summarized in Table 11, using the developmental sequence laid out by McLeod, van Doorn and Reed (2001) to organize the clusters. This table only considers instances where the cluster was reduced, and does not consider instances of cluster simplification. As noted in section 3.2.3.1 at times Gcobisa produced the two elements of the cluster, but simplified one of the elements (e.g. /bjɪdʒ/ for *bridge*). This can be described as cluster simplification, and it suggests that Gcobisa is in the process of acquiring the consonant clusters accurately (McLeod et al., 2001). She reduced approximately half of the clusters in the *DEAP* subtests. Gcobisa appeared to have more difficulty producing clusters containing /l/, often reducing the consonant cluster to produce a singleton. She had more success in producing the phoneme /ɹ/ within a cluster. Typically, children are able to produce final consonant clusters with more ease than clusters in other positions in words (McLeod et al., 2001). It was noted that Gcobisa was inconsistent in her production of final clusters, producing approximately 33% accurately. However, only a small sample of words containing final consonant clusters was elicited, and this may have affected her ability to demonstrate this skill.

Table 11: Gcobisa's use of cluster reduction in initial and medial position (initial assessment)

| | Productions with all elements present in initial position | Productions with all elements present in medial position | Total productions with all elements present |
|---|---|---|---|
| /tw/, /kw/ | 1/1 | | 1/1 |
| /sp/, /st/, /sk/ | 0/4 | 0/1 | 0/5 |
| /sm/, /sn/ | 2/2 | | 2/2 |
| /sw/ | 1/1 | | 1/1 |
| /sl/ | 1/3 | | 1/3 |
| /pl/, /bl/, /kl/, /gl/, /fl/ | 2/3 | 0/3 | 2/6 |
| /pɹ/, /bɹ/, /tɹ/, /dɹ/, /kɹ/, /gɹ/, /fɹ/ | 8/10 | 6/11 | 14/21 |
| /θɹ/ | 0/1 | | 0/1 |
| /skw/ | 0/1 | | 0/1 |
| /spl/ | 0/1 | | 0/1 |
| /spɹ/, /stɹ/, /skɹ/ | 0/1 | | 0/1 |
| **TOTAL** | 15/28 (54%) | 6/15 (40%) | 21/43 (49%) |

### 3.2.4 Connected Speech

Although the connected speech picture description task in the *DEAP* phonology assessment was attempted, Gcobisa was unable to produce her own spontaneous sentences or phrases to describe the pictures. This may have been as a result of Gcobisa finding it difficult to formulate sentences with the words depicted in the pictures, or due to being unfamiliar with the researcher. She only produced individual words, or imitated words produced by the researcher. The researcher was unable to determine whether the same phonological processes noted in her single word production were used in spontaneous connected speech.

### 3.2.5 Oro-Motor Assessment

Gcobisa's oro-motor skills were assessed using the oro-motor subtest. Gcobisa had no difficulty with these tasks. Her scores are summarized in Table 12.

Table 12: Gcobisa's Oro-motor assessment results (initial assessment)

| | Raw score | Standard score | Percentile |
|---|---|---|---|
| **Diadochokinetic** | 8/9 | 12 | 75 |
| **Isolated movement** | 12/12 | 11 | 63 |
| **Sequenced movement** | 18/18 | 13 | 84 |

### 3.2.6 Stimulability and Articulation

As discussed in 3.2.1, Gcobisa had difficulty producing the fricatives /θ/ and /ð/, as well as the liquid /ɹ/. During the articulation subtest, her stimulability for these sounds was established. Gcobisa was not stimulable for /θ/, /ð/ and /ɹ/ during the articulation subtest. However, it was noted that Gcobisa made use of the phoneme /ɹ/ in consonant clusters in the other subtests, although she had difficulty imitating this phoneme in isolation. Although she could not produce the liquid /l/ in words or syllables, she was stimulable for this sound in isolation.

### 3.2.7 Consistency

As Gcobisa's inconsistency score in the diagnostic screener was 50%, the full inconsistency assessment was conducted in order to investigate her consistency. In the inconsistency subtest, Gcobisa produced seven of the 25 words inconsistently, resulting in an inconsistency score of 28%. This is an age appropriate inconsistency score. The words that Gcobisa produced inconsistently often included the liquids /l/ and /ɹ/ (see Table 13). She either omitted the sounds, or substituted them with a glide sound (/j/ or /w/), or another sound (e.g. /p/ in her third trial of *helicopter*). Additional sounds that she omitted or substituted inconsistently were /θ/ and /v/.

Table 13: Gcobisa's inconsistent productions in English (initial assessment)

| Target | Trial 1 | Trial 2 | Trial 3 |
|---|---|---|---|
| ***Rain*** | weɪn | jeɪn | weɪn |
| ***Vacuum cleaner*** | vakumkinə | zakukinə | vakumkinə |
| ***Teeth*** | tiʃ | ti | ti |
| ***Elephant*** | ɛwəfənt | ɛəfɛnt | ɛjəfənt |
| ***Slide*** | saɪd | saɪd | sjaɪd |
| ***Umbrella*** | ʌmbɛjʌ | ʌmbrɛjʌ | ʌmbjɛjʌ |
| ***Helicopter*** | ɛwikɒptə | ɛwikɒptə | ɛpeɪkɒptə |

### 3.2.8 Summary

From the *DEAP* assessment, a profile of Gcobisa's speech can be determined. Gcobisa's phonetic inventory is age appropriate. Although the fricatives /θ/ and /ð/ are missing from her inventory, this is age appropriate in comparison to monolingual norms (Dodd et al., 2002). All other English sounds were present in her phonetic inventory. In addition, Gcobisa showed evidence of being able to produce all vowels and diphthongs appropriately.

Gcobisa used many developmental phonological processes and few non-developmental processes, but most of them were isolated occurrences, suggesting that she is in the process of eliminating many of them. This made her speech seem unintelligible and occasionally inconsistent, and she had a PCC of 75% as a result of her errors. However, the results of the inconsistency assessment suggest it is appropriate for her age. Gcobisa has two consistent phonological processes: gliding and cluster reduction. The process of gliding is still age appropriate as it should be eliminated by the age of 5;11 years according to monolingual English norms (Dodd et al., 2002). The process of cluster reduction was of more concern, as a monolingual child acquiring English should be able to produce clusters containing two consonants by the age of 3;11 years (Dodd et al., 2002). Her difficulty producing triclusters is still age appropriate.

### 3.2.9 Diagnostic Category

Gcobisa's speech was analysed in order to establish a diagnosis using Dodd's diagnostic categories (Dodd et al., 2005). Although her difficulties producing the fricatives /θ/ and /ð/ may be due to articulation difficulties, this is still age appropriate and as such, not a concern at present. However, her ability to produce the liquid /l/ in isolation, even though she was unable to produce it in words, suggests that her difficulty producing this sound is due to a phonological error rather than an articulation error. She is able to produce the sound, but 'chooses' not to. In addition, she had no difficulties with the oro-motor assessment. Gcobisa's speech difficulties fall into the phonological delay category: her main phonological processes are developmental, but she should no longer be using cluster reduction for clusters containing two consonants,

meaning she is delayed in developing this skill. She had difficulty producing clusters in all word positions, but had most difficulty with those containing the phonemes /l/ or /s/.

## 3.3 IsiXhosa speech assessment results

Gcobisa's isiXhosa speech was assessed using the *Masincokoleni* Assessment (Maphalala et al., 2012) which consists of 52 single words elicited by pictures. Gcobisa required prompting for many of the pictures, and as a result many of the words were repetitions of the therapist's production rather than spontaneous productions.

### 3.3.1 Consonant and Vowel Inventories

From the speech sample gathered during the assessment, Gcobisa's phonetic inventory for isiXhosa can be described, based on the consonant and vowel inventory described by Maphalala et al. (2014). Table 14 summarises her phonetic inventory of isiXhosa sounds.

**Table 14: Gcobisa's inventory of isiXhosa phonemes (initial assessment)**

| INVENTORY | Present | Not present | Comment |
|---|---|---|---|
| **Plosive** | p', $p^h$, b, t', $t^h$, d, c', ɟ, k', $k^h$, g | $c^h$ | Age appropriate. |
| **Implosive** | | ɓ* | |
| **Nasals** | m, n, ŋ, ɲ | | |
| **Fricatives** | f, v, s, z, ʃ, h, x, ɣ | | |
| **Lateral** | ɬ, l | ɮ | Age appropriate, /l/ only used accurately on one occasion. |
| **Trill** | | r | Not age appropriate – should have acquired /r/. |
| | | | |
| **Affricates** | tʃ', dʒ, dz, ts' | kx', tɬ, $ts^h$, $tʃ^h$ | Should be acquiring /kx'/. |
| **Glides** | w, j | | |
| **Clicks** | ǀ, ǁ, !, ŋǀ, ŋǁ, ŋ!, !g, ǁg, $ǀ^h$, $ǁ^h$, $!^h$ | ǀg | Age appropriate. |

* Due to Gcobisa's difficulty producing many of the words independently, much of her speech was an imitation of the researcher's productions. This resulted in Gcobisa's productions being limited by the researcher's productions. The researcher was not always able to produce all isiXhosa phonemes, so that Gcobisa did not always produce the phonemes accurately. However, at times she "corrected" the researcher's production of sounds, producing accurate productions in spite of the inaccurate model. Following the discussion of Gcobisa's inventory, a broader transcription was used. In addition, the use of the plosive /b/ for the implosive /ɓ/ was not considered incorrect.

Although *Masincokoleni* has not yet been standardized, preliminary data collected from 24 children suggests that by the age of 4 years, all phonemes should be acquired, apart from some fricatives, affricates and some clicks (Maphalala et al., 2014). In addition, Tuomi, Gxhilishe, and Matomela (2001) found that most of the isiXhosa consonants were present in the speech of the children in their research by the age of 3 years. Later developing consonants include fricatives and liquids (Tuomi et al., 2001). Mowrer and Burger (1991) reported the later developing sounds in their study to be /ŋ/, /r/, /tʃ/, /cʰ/ and /ɟ/. As seen in Table 15, the age of the children acquiring the phonemes in each of the studies (Maphalala et al., 2014; Mowrer & Burger, 1991; Tuomi et al., 2001) was compared to Gcobisa's age. Although there was some variation in ages stated in the studies, the data suggests that Gcobisa should be in the process of developing the phonemes /r/ and /kx/ at her age, but it is age appropriate to not have acquired the phonemes /cʰ/, /ɮ/, /tɬ/, /tsʰ/ and /tʃʰ/. Gcobisa was able to use most of the isiXhosa clicks. However, she used the incorrect click in the place of /ǀg/. This suggests she is in the process of acquiring the click, as it has been suggested that children may substitute an incorrect click before using the click accurately in words (Gxilishe, 2004).

**Table 15: Summary of age of acquisition of Gcobisa's missing phonemes in other studies**

| | **Mowrer & Burger, 1991** | **Tuomi et al., 2001** | **Maphalala et al., 2014** | **Gcobisa's age** | **Comment** |
|---|---|---|---|---|---|
| **Age of children in study** | Ages 2;6 – 6;0 | Ages 1;0 – 3;0 years | Ages 3;0 – 6;0 years | 4;2 | |
| cʰ | 6 and over | After 3 years | After 6;0 | 4;2 | Age appropriate |
| ɮ | Not specified | After 3 years | 3;0 – 3;6 | 4;2 | Not age appropriate |
| kx | 2;6 – 3;6 | After 3 years | 4;1 – 5;0 | 4;2 | Should be in the process of acquiring sound |
| tɬ | Not specified | After 3 years | 5;1 – 6;0 | 4;2 | Age appropriate |
| r | 3;6 – 4;6 | Children who were 3;0 years used this sound with 60 - 70% | 4;1 – 5;0 | 4;2 | Should be in the process of acquiring this sound. |

| | | | | | |
|---|---|---|---|---|---|
| | | accuracy. | | | |
| tsʰ | 2;6 – 3;0 | Not specified | Some children aged 3;7 to 4;0 used this phoneme, otherwise 5;1 – 6;0. | 4;2 | Age appropriate |
| tʃʰ | Not specified | Children who were 3;0 used this sound with 0 - 10% accuracy. | Some children aged 3;7 to 4;0 used this phoneme, otherwise 5;1 – 6;0. | 4;2 | Age appropriate |

Gcobisa made use of all five of the isiXhosa vowels. Table 16 summarises the vowels present in Gcobisa's inventory.

**Table 16: Vowels present in Gcobisa's inventory**

| | Present | Example |
|---|---|---|
| **Front** | i, ɛ | ***i**papa* [porridge], *amay**e**za* [medicine] |
| **Central** | ʌ | *lp**a**p**a*** [porridge] |
| **Back** | u, ɔ | ***u**mgca* [line], *isiXh**o**sa* |

### 3.3.2 Severity Indices (PCC, PVC and PPC)

Gcobisa's PCC was calculated. In isiXhosa, there are noun classes that are indicated by a prefix, and the prefix of the verb must agree with the noun class (Demuth, 2000; Katamba, 2006). At times, Gcobisa would omit the prefix even though it was present on the record form for the *Masincokoleni*. For example, for the picture targeting the phoneme /f/, she produced *funda* [read] while the record form included the prefix *uya-*, to produce *uyafunda* [he/she is reading]. In these instances, the consonants in the omitted prefix were not counted as errors, as Gcobisa did not attempt to produce the prefix, and she produced the target phoneme. Gcobisa had a PCC of 77%. This is very similar to her PCC in English. However, it is lower than expected for isiXhosa, as the small sample of normative data gathered for this assessment tool (Maphalala et al., 2012) suggests that for a child of her age, PCC should be in the region of 95%.

Gcobisa's PVC was 96%. This is slightly below what Maphalala et al. (2014) suggested for Gcobisa's age group: 99%. Gcobisa's PPC was calculated, and she achieved a score of 88%. Although this is slightly higher, it is still similar to her PPC in English. This suggests that the severity of her speech sound disorder is similar in both English and isiXhosa.

### 3.3.3 Phonology

Gcobisa's phonological processes were analysed. Although she made use of many phonological processes in isiXhosa, like in English, most of them were isolated instances. Table 17 provides a summary of her phonological processes, as well as some examples of the isolated phonological processes she used. The most prevalent phonological process was gliding of both /r/ and /l/. In isiXhosa, the process of gliding is suggested to be eliminated much earlier than in English, by 4 years according to Maphalala et al. (2012). Gcobisa should have eliminated this phonological process. She also made use of the process of backing of the palatal plosives. In English this is considered to be an unusual/idiosyncratic process that may be indicative of a phonological disorder. A research study investigated the speech of a small sample of children acquiring English in the Western Cape, and included a sample of isiXhosa/English bilingual children. The results suggested that backing is more common in children acquiring both isiXhosa and English than in monolingual English children (Pascoe et al., 2015). This suggests the phonological process of backing may be typical of children acquiring isiXhosa and English. In addition, Gcobisa only made use of this phonological process on these two occasions, and it is age appropriate for her to not have developed the target phonemes yet (Maphalala et al., 2014; Mowrer & Burger, 1991; Tuomi et al., 2001). Other isolated phonological processes were used for phonemes that Gcobisa has not yet acquired.

**Table 17: Gcobisa's main phonological processes and examples of isolated phonological processes in isiXhosa (initial assessment)**

| PHONOLOGICAL PROCESSES | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Gliding – 4;0** | /r/ → /w/<br>/l/ → /j/ | ɔwɛndʒ for *iorenji* [orange]<br>ibɔjʌ for *ibhola* [ball]<br>ijʌndʌ for *ilanga* [sun]<br>ujɛjɛ for *ulele* [sleep] | Not age appropriate (Maphalala et al., 2014) |

| | | | |
|---|---|---|---|
| | | kjʌjʌ for *uyatyhala* [push]<br>ŋk\|ɛŋk\|ɛʃɛjʌ for *nkcenkcenshela* [watering]<br>sɛjɛ for *isele* [frog] | |
| **Backing of palatal plosive** | /ɟ/ → /g/ | igʌsi for *idyasi* [coat] | Stimulable for *idyasi* |
| **Backing of palatal plosive** | /c$^{h}$/ → /kj/ | kjʌjʌ for *uyatyhala* [push] | Has not yet acquired /c$^{h}$/. |
| **Examples of isolated phonological processes made by Gcobisa during the assessment.** | | | |
| **Fronting of fricative** | /x/ → /ʃ/ | u!giʃʌ for *ugqirha* [doctor] | Stimulable for *ugqirha* |
| **Fronting of glide** | /j/ → /w/ | uwʌtsibʌ for *uyatsiba* [jump] | |
| **Fronting of plosive** | /g/ → /d/ | ijʌndʌ for *ilanga* [sun] | Stimulable for /g/ in *ilanga* |
| | | | |
| **Stopping of affricate** | /kx/ → /k/ | jʌkʌzulʌ for *uyakrazula* [tear] | Has not yet acquired /kx/ |
| **Stopping of affricate** | /ts$^{h}$/ → /t/ | isitʌbʌ for *isithsaba* [crown] | Has not yet acquired /ts$^{h}$/ |
| **Stopping of fricative** | /ɣ/ → /k/ | ʌkɔmbʌ for *uyagromba* [dig] | Stimulable for /ɣ/ in *uyagromba* |

#### *3.3.3.1 Gliding*

Gcobisa's use of gliding was analysed in more detail (see Table 18). She was more consistent in her substitution for /l/ in isiXhosa than she was in English, as she only substituted it with the phoneme /j/. On two occasions, she substituted /l/ with other sounds (/n/ and /k/). On one occasion, this may have been due to a confusion of the isiXhosa and English word for the picture presented, as for the target word *imali* [money] she produced *imani* /imʌni/, a word very similar to the English word *money*.

Only one example of her attempt to produce the phoneme /r/ was elicited, as only one word in *Masincokoleni* contains this sound. The trill /r/ is not common in isiXhosa, and is often only present in loan words such as the *Masincokoleni* target word *iorenji* [orange] and other loan words such as *irayisi* [rice] (Maphalala et al., 2014).

Table 18: Analysis of Gcobisa's use of the phonological process of gliding in isiXhosa (initial assessment)

| | Initial (of root word) | Medial | Total |
|---|---|---|---|
| **/l/** | | | |
| **Accurate productions** | 0/2 (0%) | 2/9 (22%) | 2/11 (18%) |
| **Analysis of substitutions/omissions** | /j/: 2/2 | /j/: 5/9 | |
| | | Other: 2/9 | |
| | | | |
| **/ɾ/** | | | |
| **Accurate productions** | | 1/1 (0%) | 0/1 (0%) |
| **Analysis of substitutions/omissions** | | /w/: 1/1 | |

### 3.3.4 Connected Speech

As in English, it was difficult to obtain a sample of connected speech in isiXhosa. This was partly due to Gcobisa's shyness, but the researcher's isiXhosa skills may have also been a limiting factor, as it was more difficult to ask appropriate questions to elicit isiXhosa speech, rather than English speech. Gcobisa's use of phonological processes in spontaneous speech could not be compared to her use of processes in single words.

### 3.3.5 Stimulability and Articulation

The phonemes /ɾ/, /kx/, /cʰ/, /ɮ/, /tɬ/, /tsʰ/ and /tʃʰ/ were not present in Gcobisa's speech inventory. During the initial speech assessment she also had difficulty producing the phonemes /ɟ/, /x/ and /ɣ/. Her stimulability for these sounds in words was assessed. She was able to produce /ɟ/ and /ɣ/ in words, and although she struggled to produce /x/ in a word, she was able to produce it accurately in isolation.

### 3.3.6 Consistency

*Masincokoleni* does not include a specific subtest to determine whether a child's speech is inconsistent or not. However, over the course of the assessment, Gcobisa produced 22 of the 52 words twice. Of those 22 words, only eight were produced inconsistently. These words are analysed in more detail in Table 19. On some occasions, her inconsistency resulted from inconsistent use of the correct/incorrect prefix for the word. In addition, some of her

inconsistencies contrasted the accurate production with a production containing a phonological process. Of the eight words produced inconsistently, only three were inconsistent errors. Although no data is available regarding inconsistency in isiXhosa speaking children, comparing this to English data, her inconsistency is age appropriate.

**Table 19: Gcobisa's inconsistent productions of target words in isiXhosa (initial assessment)**

| Target | First production | Second production | Comment |
|---|---|---|---|
| ***Ihagu* [pig]** | ihʌti | ihʌgu | Inconsistency with accurate production. |
| ***isiXhosa* [Xhosa]** | ǁʰɔsʌ | izinǁʰɔsʌ | Inconsistent use of prefix. |
| ***Uyahleka* [laugh]** | ujʌɬɛkʌ | iɬɛkʌ | Incorrect use of prefix. |
| ***Uyatsiba* [jump]** | uwʌtsibʌ | ujʌtsibʌ | Inconsistency with accurate production. |
| ***Uyatyhala* [push]** | kjʌjʌ | ikjʌjʌ | Inconsistent use of prefix. |
| ***Uyakrazula* [tear]** | jʌkʌzujʌ | jʌkjʌzʌjʌ | |
| ***Ucango* [door]** | iŋjʌŋgɔ | n\|ʌŋgɔ | |
| ***Ingqiniba* [elbow]** | iŋ!ibʌ | i!ibʌbʌ | |

### 3.3.7 Summary

Gcobisa's phonetic inventory is age appropriate, although she should be in the process of acquiring the phonemes /r/ and /kx/. She was able to produce all isiXhosa vowels accurately, with very few errors. Her PCC and PPC, however, is low in comparison to the scores described by Maphalala et al. (2014), although it is similar to her English PCC and PPC scores. She made use of some phonological processes consistently, as well as some on isolated occurrences. This made her speech seem inconsistent, but comparing her productions of the same word, her consistency is appropriate for her age.

According to the information gathered in the study by Maphalala et al. (2014), the process of gliding was found to have been eliminated in the speech of the children by the age of 3 years, 6 months. Considering this, Gcobisa's use of the phonological process of gliding could be considered delayed.

### 3.3.8 Diagnostic Category

Considering Gcobisa's consistent use of the developmental phonological process of gliding, and her ability to produce /l/ in isolation, she falls into the diagnostic category of phonological delay (Dodd et al., 2005). This corresponds with the findings in English.

## 3.4 Intelligibility

Gcobisa's intelligibility was assessed using the *Intelligibility in Context Scale* (McLeod et al., 2012a). This was sent home to Gcobisa's mother to complete. No instructions were given in terms of which language to consider, because we hoped to obtain an overall impression of her speech intelligibility. A form was also completed with Gcobisa's teacher, although some questions were omitted to make it relevant for her teacher. Her teacher reported on Gcobisa's English speech, as this is the language spoken at crèche. The results are described in Table 20.

**Table 20: *Intelligibility in Context* (McLeod et al., 2012a) results from Gcobisa's mother and teacher (initial assessment)**

| | Mother | Teacher |
|---|---|---|
| **1. Do you understand your child?** | 4 - Usually | 3 – Sometimes |
| **2. Do immediate members of your family understand your child?** | 4 - Usually | - |
| **3. Do extended members of your family understand your child?** | 3 - Sometimes | - |
| **4. Do your child's friends understand your child?** | 4 - Usually | 3 – Sometimes |
| **5. Do acquaintances understand your child?** | 3 - Sometimes | 3 – Sometimes |
| **6. Do your child's teachers (teacher assistants) understand your child?** | 4 - Usually | 3 – Sometimes |
| **7. Do strangers understand your child?** | 3 - Sometimes | - |
| **TOTAL** | 25/35 | 12/20 |
| **AVERAGE** | 3.5 | 3 |

Gcobisa's intelligibility ratings have an average of 3 and 3.5, suggesting that on average she is intelligible "sometimes". From Gcobisa's mother's responses, it is clear that those who are close to her are able to understand her more easily than those who are not familiar with her speech (e.g. extended family or acquaintances and strangers). Her mother's response that she, immediate family, friends and teacher usually understand Gcobisa fits with her report of

Gcobisa having no difficulties with her speech. Gcobisa's teacher's responses reflect her concerns regarding Gcobisa's speech development. On initial interactions with Gcobisa, the researcher's judgment of Gcobisa's intelligibility was similar to Gcobisa's teacher, as she was often difficult to understand and was required to repeat herself before she was understood.

## 3.5 Receptive vocabulary assessment results

### 3.5.1 English Receptive Vocabulary

Gcobisa's receptive vocabulary was assessed using the *Peabody Picture Vocabulary Test* (Fourth Edition). This assessment has not been standardized on a South African population, and as such all results should be considered with caution. However, the picture stimuli used were from the isiXhosa translation, where some adaptations were made to make them more culturally appropriate for children in South Africa (Dawes et al., 2012).

Gcobisa achieved a raw score of 25, with a standard score of 65. This suggests her receptive vocabulary in English is below what is expected for her age. However, this result should be considered with caution for two reasons. Firstly, the assessment has not been standardized on a South African population. Secondly, Gcobisa is bilingual. It is not always possible to differentiate between poor performance on an assessment due to typical bilingual development as opposed to delayed or disordered language development (Kohnert, 2008).

### 3.5.2 IsiXhosa Receptive Vocabulary

Gcobisa's receptive vocabulary was assessed using an isiXhosa translation of the *Peabody Picture Vocabulary Test* (Fourth Edition) that was developed by the Sombambisana initiative (Dawes et al., 2012). There is no normative data for this translation, and results can only be discussed qualitatively. Gcobisa achieved a raw score of 22. Interestingly, this is less than the raw score of 25 achieved in the English assessment. Although Gcobisa struggled to understand some words in both English and isiXhosa, there were more words that she understood in English but not in isiXhosa compared to words she understood in isiXhosa but not English. For example, she understood the items "cup", "drum", "toe", "whistle" and "lamp" when provided with the English words, but did not understand when provided with the isiXhosa words.

Conversely, she could understand the item "throw" in isiXhosa, but not in English. This suggests her understanding of English may be stronger than her understanding of isiXhosa, and may reflect the fact that she spends a larger portion of the day at crèche where she is surrounded by English.

The two language assessments raised concerns regarding Gcobisa's understanding of language. However, from informal interaction with Gcobisa, her language was considered appropriate for the intervention required for her mild phonological delay.

## 3.6 Summary of assessment results

Gcobisa's assessment results are summarized in Table 21, and show that she has near complete inventories in both English and isiXhosa. The missing sounds were age appropriate, and considering her age, she should soon be developing the /r/ and /kx/ in isiXhosa. She had very similar PCC, PVC and PPC scores across both languages. She used the phonological process of gliding in both English and isiXhosa. Cluster reduction (present in English) and gliding in isiXhosa should have been eliminated by her age. Her speech was more inconsistent in English than in isiXhosa, but in both languages her percentage of inconsistency was appropriate for her age. She had age appropriate oro-motor skills. This led to a diagnosis of a phonological delay. Her receptive vocabulary scores were similar in both languages.

**Table 21: Summary of Gcobisa's assessment results (initial assessment)**

| | English | isiXhosa |
|---|---|---|
| **Speech Inventory (missing sounds)** | /θ/, /ð/ | /r/, /kx/, /$c^h$/, /ɮ/, /tɬ/, /$ts^h$/ and /$tʃ^h$/ |
| **PCC** | 75% | 77% |
| **PVC** | 98% | 96% |
| **PPC** | 83% | 88% |
| **Phonological processes** | Gliding, cluster reduction | Gliding, backing of palatal plosive |
| **Consistency** | 28% | 14% |
| **Oro-motor skills** | Age appropriate | |
| | | |
| **Language (receptive)** | RS 25 | RS 22 |

## 3.7 Intervention Plan

### 3.7.1 Overview

An intervention plan was developed according to the decision making process outlined in section 2.9.2. This is summarized in Figure 4, and described in more detail in the following sections. Figure 4 shows the relevant section from Figure 2 described in section 2.9.2, highlighting the decisions made regarding Gcobisa's intervention approach.

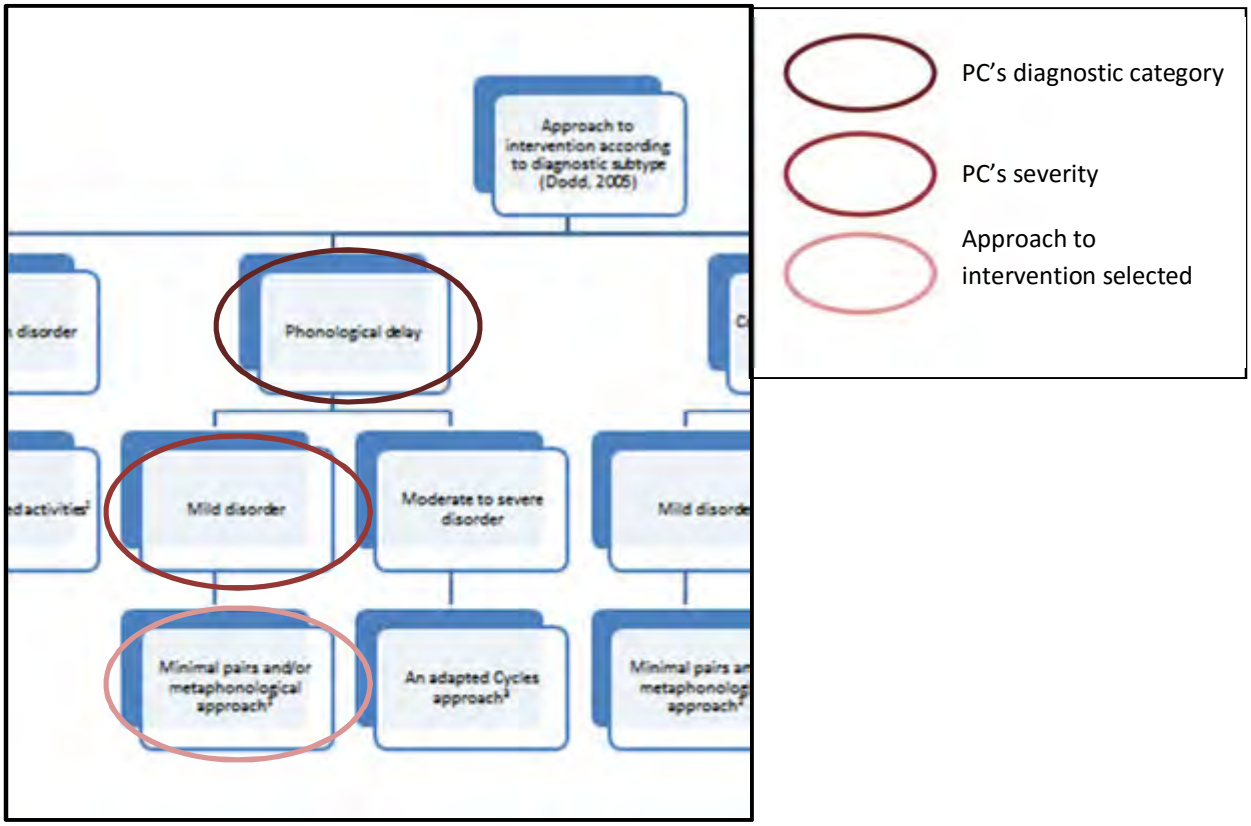



Figure 4: Decision making process for approach to intervention

Figure 5 highlights the decision making progress for the goal selection and language of intervention. This is explained in more detail in section 3.7.5 and 3.7.6.

### 3.7.2 Approach

Gcobisa had a mild phonological delay in both English and isiXhosa. The minimal pairs approach was selected as an appropriate approach for this type of speech difficulty (Baker, 2010).

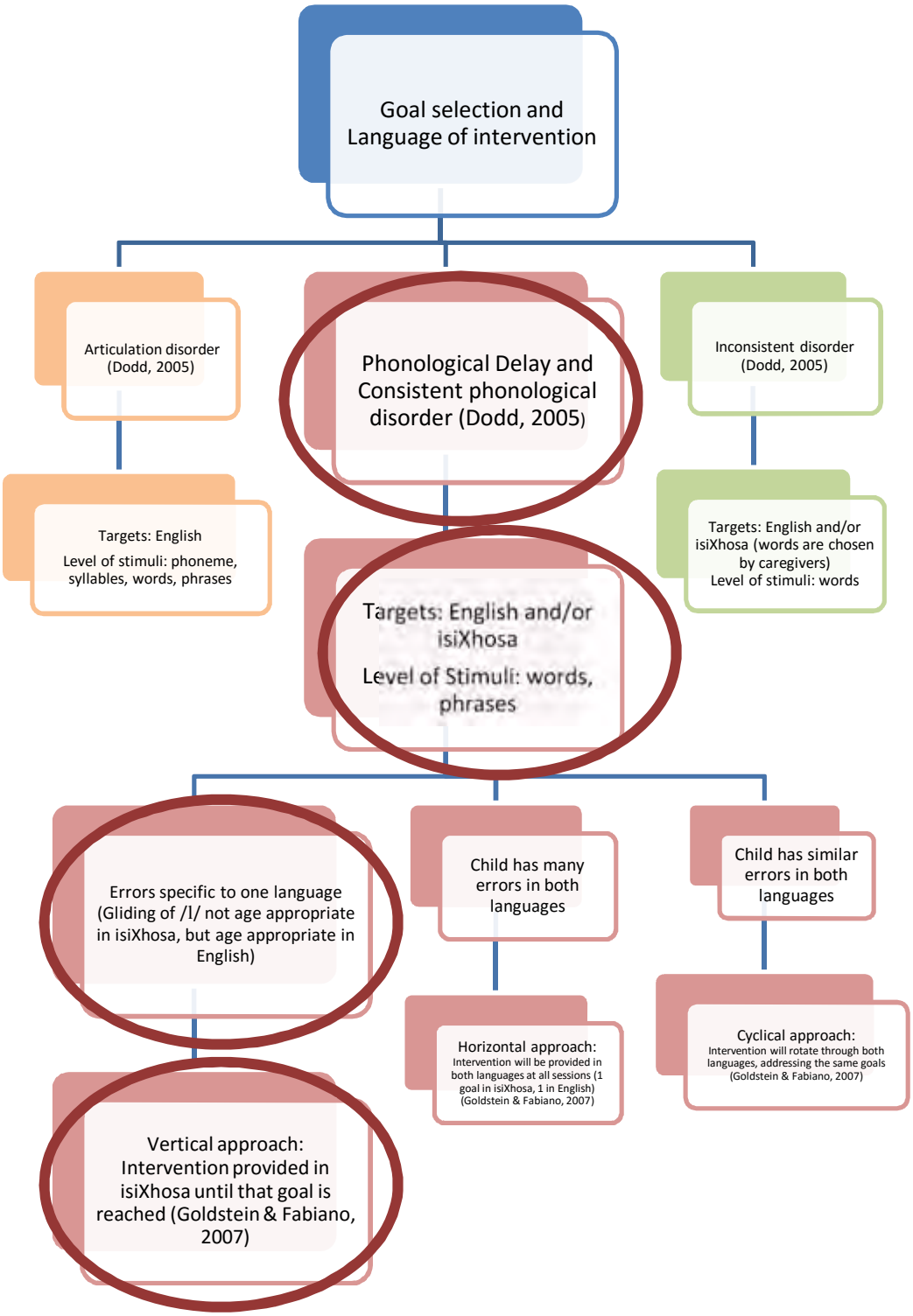



Figure 5: Process of decision making of language of intervention

### 3.7.3 Rationale

Gcobisa presented with only a few phonological processes (cluster reduction and gliding in English, and gliding and backing of palatal plosives in isiXhosa), so minimal pairs is an

appropriate approach for intervention as it focuses on one error pattern at a time (Baker, 2010; Williams, 2000). The minimal pairs approach is often used for children between the ages of 3 and 6 years (Baker, 2010).

### 3.7.4 Theoretical Framework

As described in section 1.5.1, minimal pairs is an appropriate intervention for a mild phonological delay, as it aims to change a phonological system by contrasting minimal pairs in order to eliminate phonological processes from a child's speech (Baker, 2010). It is appropriate for children with a mild phonological delay or disorder as it focuses on one phonological process at a time (Baker, 2010), making it an appropriate approach for Gcobisa. In addition, it has been shown to be effective for bilingual children with speech sound disorders (e.g. Holm & Dodd, 2001; Ray, 2002).

### 3.7.5 Aim for Intervention

Gcobisa's main phonological processes in English were gliding and cluster reduction, and in isiXhosa was gliding. The processes that were not age appropriate were cluster reduction in English, and gliding in isiXhosa. The bilingual approach suggested by Goldstein and Fabiano (2007) suggests that one should initially determine goals that would be of benefit to both languages. The elimination of the process of gliding in isiXhosa was selected as the main target, as it was the most consistent error, as well as being common across both languages, but only immature in isiXhosa. Although Gcobisa used cluster reduction in English, she did not use this error consistently, at times producing clusters accurately. As such, it was suggested that she may be in the process of eliminating this error from her speech and not require further intervention in order to address this. In addition, there are few clusters in isiXhosa (Maphalala et al., 2014), therefore working on cluster reduction would not benefit both languages. The phoneme /l/ was selected as the target phoneme, as it is much more common in isiXhosa than the trill /r/, and the liquid /ɹ/ is not present. The phoneme/r/ is often only used in borrowed words (e.g. *i-orenji* [orange] and *irayisi* [rice]), while the phoneme /l/ is much more frequently used in isiXhosa words (Maphalala et al., 2014; Niesler et al., 2005). In addition, Gcobisa was stimulable for the production of /l/. This confirms that Gcobisa's difficulty producing this

phoneme is phonological in nature, and Rvachew and Nowak (2001) found that addressing phonemes a child has productive knowledge about can result in greater gains and generalization.

From this, it was decided that the goal for Gcobisa was:

Gcobisa will be able to produce /l/ accurately

- in initial position, e.g. in verbs that, when produced as a command, start with consonants such as *luma* [bite];
- and medial position, e.g. after the prefix of nouns, such as *ilanga* [sun] in words and in phrases in isiXhosa.

### 3.7.6 Language

The language of instruction throughout all intervention sessions was English. Gcobisa was bilingual, and showed evidence of understanding English to the same degree or more than isiXhosa. In addition, as a language mismatch is common between SLPs and clients in South Africa, this reflects the realities of most SLPs currently providing intervention in South Africa.

However, the language of the intervention stimuli was considered further. Intervention aimed to cause change in both languages. Although the process of gliding was present in both English and isiXhosa, gliding was still considered to be an age appropriate process for Gcobisa in English. As such, all targets chosen were in isiXhosa, as the process of gliding is not age appropriate for Gcobisa in isiXhosa. However, as suggested by Ray (2002), providing phonological intervention in one language may result in generalization to the untreated language.

### 3.7.7 Hypothesis/Research Questions

Gcobisa had a phonological delay and intervention was designed to focus on her phonological system. Holm, Dodd, and Ozanne (1997) found, in a single case study, that phonological intervention did not generalize to the untreated language. They suggested this was as a result of the child having two separate phonological systems for his two languages: English and Cantonese (Holm et al., 1997). Evidence of this was that the child made use of different

phonological errors in his two languages (for example, the use of backing in Cantonese, but not in English).

However, Ray (2002) found that cognitive linguistic intervention that included phonological contrasts and that was provided in one language resulted in generalization to the other languages of a trilingual child. Ray suggested that the child's common errors across his languages were evidence that he presented with a common phonological system for all of his languages, resulting in the generalization of intervention results.

In contrast to both Ray (2002) and Holm et al. (1997), Gildersleeve-Neumann and Goldstein (2015) provided intervention in both English and Spanish, the two languages being acquired by their participants. This resulted in change in the speech of both languages. Authors have widely accepted that a bilingual child will have two phonological systems (e.g. Burrows & Goldstein, 2010; Fabiano-Smith & Goldstein, 2010b; Goldstein & Gildersleeve-Neumann, 2015; Grech & Dodd, 2008; Hambly et al., 2013; Kim, 2015; Prezas et al., 2014; Salameh et al., 2003; Tamburelli et al., 2015; Twinky, 2011; Vihman, 2015), but that these two systems will interact to varying degrees. Considering this, it was hypothesized that focusing on the phonological process of gliding of /l/ with isiXhosa targets could have one of the following results:

1) No generalization into English, suggesting Gcobisa had two separate phonological systems, with little interaction between them.
2) Generalization into English words, suggesting Gcobisa's two phonological systems interact.

### 3.7.8 Short Term Aims

Short term aims were developed using a minimal pairs approach, with minimal pairs being selected in isiXhosa while the bulk of the instruction was provided in English. Baker (2010) outlined a perception-production minimal pair intervention. The intervention plan for Gcobisa was developed and was loosely based on perception-production minimal pair intervention. Four short term aims were compiled:

1. **Familiarize Gcobisa with the minimal pair pictures and words.**

The target words and cognate pairs were introduced to Gcobisa. The following targets were used:

*ilanga* [sun] – *iyanga*

*molo* [hello]- *moyo*

*ilokhwe* [dress] - *iyokhwe*

*luma* [bite] - *yuma*

*ilifu* [cloud] - *iyifu*

Target words were identified using isiXhosa phrase books and textbooks. Simple words were chosen, which were suitable for her age and language level. The target sound is in initial position in the verb *luma*, after the prefix (initial position of the root word) in the nouns *ilanga* and *ilokhwe*, part of the prefix in the noun *ilifu*, and in medial position in the word *molo*.

Baker (2010) suggests the use of meaningful minimal pairs. However, identifying meaningful minimal pairs in isiXhosa was not always possible, as the words that have meaningful minimal pairs were often not suitable for a child's level of understanding. As a result, minimal pairs including one real word and one non-word were used. This real word – non-word pairing was also used by Pascoe et al. (2016) when using minimal pairs to determine the auditory discrimination skills of isiXhosa-speaking children. As the minimal pairs chosen were not meaningful, or able to be represented by a picture, they were represented by pictures of imaginary animals in order to indicate to Gcobisa the break down in meaning when she used /j/ for /l/.

2. **Perception training**

Gcobisa was required to identify the correct picture when either of the minimal pair words was named. As the minimal pairs included non-words represented by pictures of imaginary

creatures, pointing to any of the imaginary creatures was considered correct when Gcobisa was asked to identify a word with /j/.

3. **Imitation of target words**

Gcobisa was required to imitate each of the five target words presented in section one, and was provided with articulatory instruction if necessary, e.g. “put your tongue up, behind your teeth”.

4. **Production of minimal pairs**

Gcobisa was then required to request a target word, and meaning-based feedback was provided to highlight the breakdown in communication as described by Baker (2010).

### 3.7.9 Generalisation Activities

Following the steps outlined above, the words were used in carrier phrases, and additional words with the target sound were introduced. Words were targeted in isolation and in carrier phrases, and drill play activities were used in order to elicit the phrases. Some examples of activities included fishing activities to elicit the phrase *Ndibamba* __ [I catch __], or a shopping activity to elicit the phrase *Ndifuna* __ [I want __].

## 3.8 Outcomes

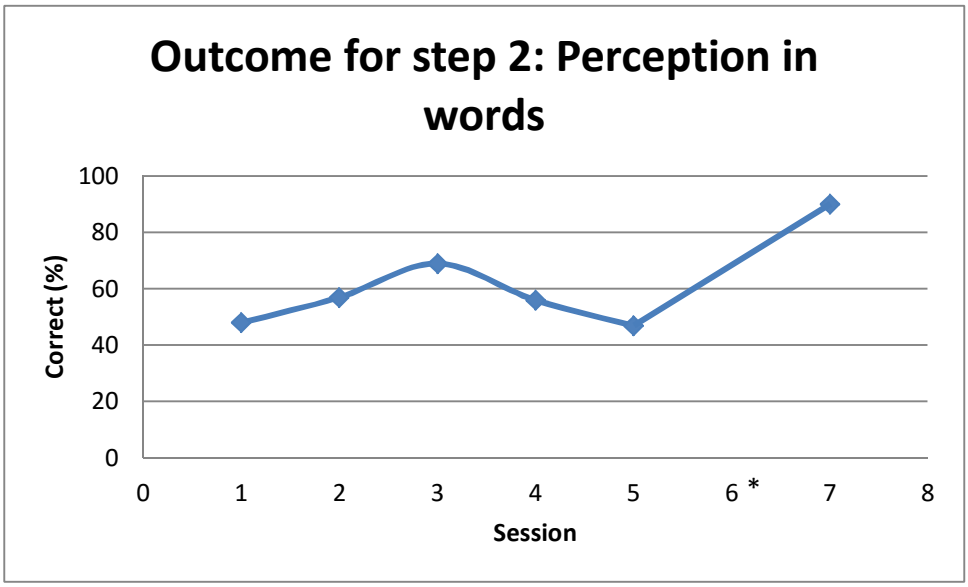
Gcobisa attended 16 sessions of intervention over 8 weeks. She was seen twice a week in an empty room at her crèche. Whenever possible, sessions lasted 30 minutes, although on one or two occasions, crèche activities resulted in a slightly shorter session. She received approximately eight hours of intervention. The fidelity rubric was completed at each session, and 100% fidelity recorded. Gcobisa was initially shy, but soon began participating more in sessions and produced more verbal output. There was a stage during intervention between sessions seven and ten where she became very frustrated, and at times refused to participate, or told the researcher that she “can’t say that”. However, as her production of /l/ improved, she became more enthusiastic and enjoyed taking part in the activities.

**Step 1: Familiarisation of targets and pictures: Outcome**

Gcobisa was initially confused about which language was required of her. However, after explaining the pictures were to be named in isiXhosa, and modelling this, she understood which language to use when referring to the pictures. Gcobisa preferred the pictures of the imaginary creatures.

**Step 2: Perception training: Outcome**

Gcobisa struggled with this activity. It was initially attempted with all minimal pairs. However, it was clearly overwhelming for Gcobisa, and the task was simplified to only using one minimal pair at a time (see Figure 7). In addition, it was noted that Gcobisa preferred the pictures of the imaginary creatures, and would choose them over the other pictures regardless of the word named. Gcobisa's success has been summarized in Figure 6.




*No perception activity was included in session 6 as Gcobisa was exhibiting high levels of frustration with the task.

Figure 6: Graph showing Gcobisa's progress for step 2

In the first session, Gcobisa had an overall accuracy of 48%, indicating her responses were based mainly on chance. In subsequent sessions, this task was attempted at a phoneme level and a syllable level before attempted at word level. For example, she was required to identify whether a phoneme produced by the researcher was a /j/ (the "yay" sound) or a /l/ (the "singing – la la" sound), and then required to make the judgment regarding syllables such as /jʌ/ or /lɛ/. By session 3, Gcobisa was able to discriminate between the phonemes in words

with an accuracy of 70%. At times, her success seemed to be affected by her concentration, and on occasion she attempted to imitate the words with her inaccurate motor programme, which made it more difficult for her to hear which word she was meant to be identifying. For example, when the researcher produced the word *ilanga* [sun], Gcobisa imitated it as *iyanga*, and then chose the incorrect picture. After including this task in six sessions, Gcobisa had achieved an accuracy of 90% indicating that she had achieved the goal for this aim.

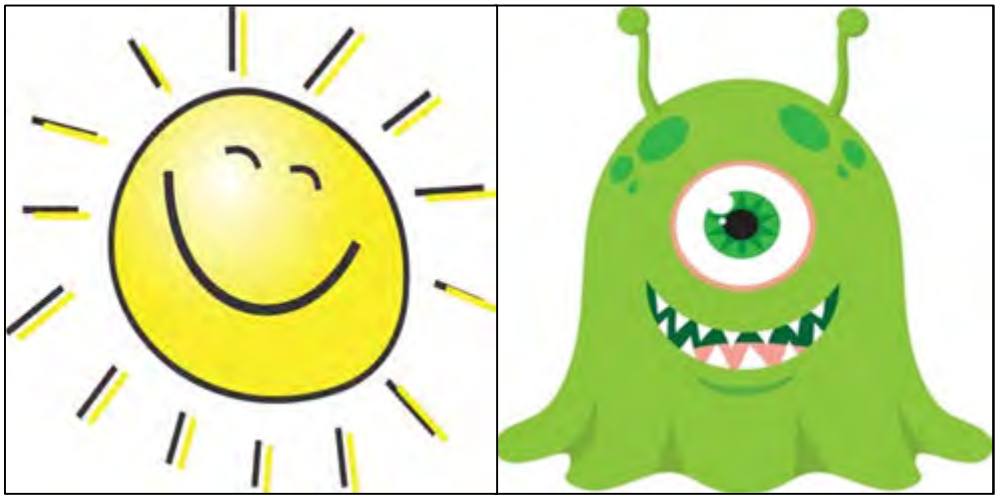
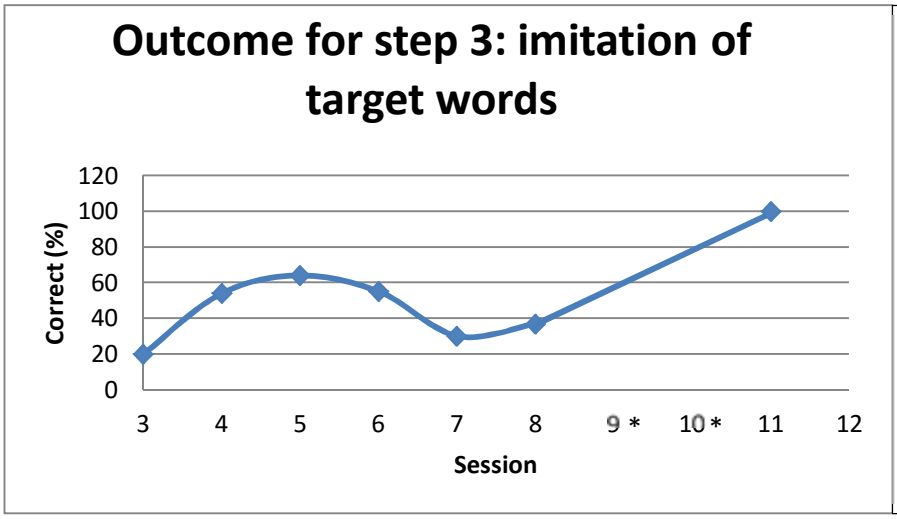


Figure 7: Example of one minimal pair used in perception training (*ilanga - iyanga*)

**Step 3: Repetition of target words: Outcome**

Initially, Gcobisa struggled with this task. Her progress is summarized in Figure 8




* No repetition activity was completed in sessions 9 and 10 as Gcobisa was starting to become frustrated with the similar tasks each session. In session 9, the concept of minimal pairs and communication breakdown was introduced, and in session 10, auditory

Figure 8: Graph showing Gcobisa's progress for step 3

When the activity was first attempted, she produced the words accurately on 20% of attempts. The imitation activity was then attempted with the phoneme in isolation and in syllables, and Gcobisa was successful in imitating the sound. This was a step that resulted in great frustration for Gcobisa, as she was starting to get more familiar with the researcher, and began refusing to participate when the task became difficult. She was also easily distracted during difficult tasks, and would produce a word quickly, without thinking about her production. She had most success with the word *molo* [hello], possibly due to it being a high frequency word that would be used in daily communication. She had most difficulty with the word *ilifu* [cloud]. This was the only word where the target sound was both preceded and followed by the vowel /i/. The articulatory posture required for this vowel sound may have made it more difficult to transition easily to the /l/. This may also be a less familiar word, as the word is often used in its plural form (*amafu* [clouds]). Over the following sessions, her accuracy improved and she was able to imitate words with an accuracy of above 90% by session 11. Gcobisa found it easier when the researcher imitated the articulatory movements of the word with her, but did not produce sound.

**Step 4: Production of minimal pairs: Outcome**

As considerable time had been spent working on imitation of the words with /l/, this step was achieved more quickly. It was introduced in session 9, and in this session Gcobisa became very frustrated when a breakdown in communication occurred. By session 12, she was using the words accurately to request pictures or toys. See Figure 9 representing Gcobisa's progress in producing single words.

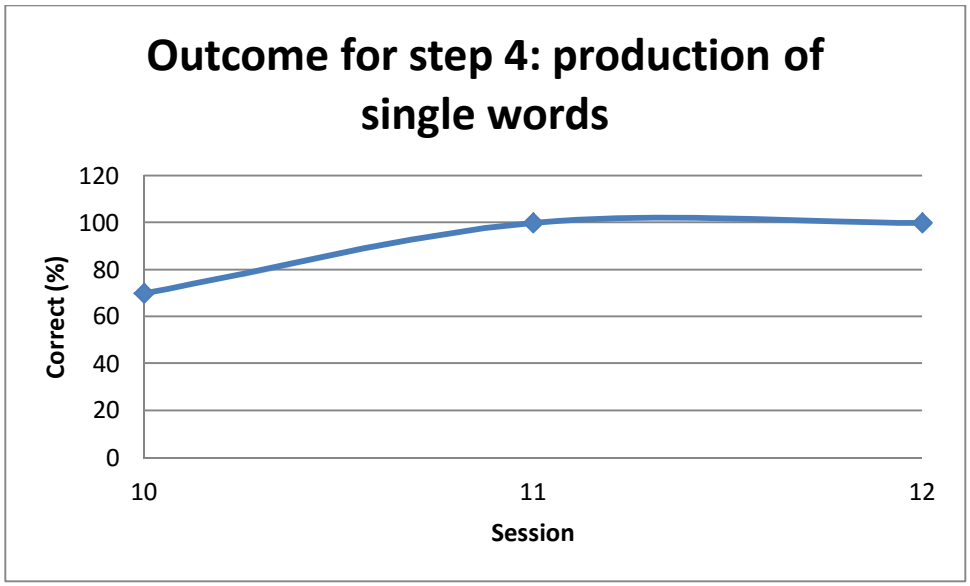



Figure 9: Graph showing Gcobisa's production of single words

As is evident by Figure 9, Gcobisa achieved success in this task more rapidly. Within three sessions, she was able to produce single words with 100% accuracy.

**Generalisation activities**

Gcobisa's success in the generalization activities described in 3.7.9 is shown in Figure 10.

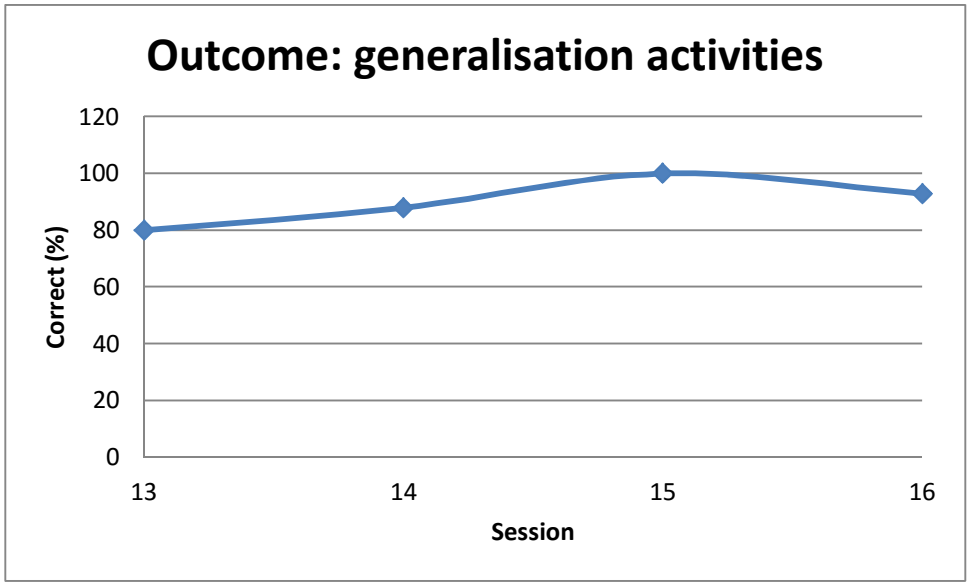



Figure 10: Graph showing Gcobisa's accuracy in short phrases

By the end of session 16, Gcobisa was using words with /l/ accurately in short sentences with an accuracy of above 90%, achieving an accuracy of 100% in the previous session. This suggests that although great progress was made, her elimination of gliding of /l/ was not completely eliminated and at times required her concentration to ensure she produced the phoneme accurately.

### 3.9 Home Programme

Over the course of intervention, pictures and activities were sent home with Gcobisa for her parents to complete at home. As intervention was provided at Gcobisa's crèche, the researcher did not have many opportunities to communicate directly with Gcobisa's parents, but sent letters and tasks home through the crèche message book. Although Gcobisa's parents completed any forms sent home, they did not report whether they were able to complete any activities at home.

## 3.10 English Speech Reassessment Results

Following intervention, a reassessment was completed. Gcobisa was 4 years, 6 months at the time of reassessment. The results were as follows:

### 3.10.1 Consonant and Vowel Inventories

When analysing Gcobisa's production of words, the only phonemes that were not present in Gcobisa's inventory were /θ/ and /ð/ (Table 22). This is similar to the results found in the initial assessment, where the same sounds were identified as missing from her inventory. However, on further investigation it was found that she was stimulable for these sounds in isolation, suggesting they are present in her inventory.

Table 22: Gcobisa's English speech inventory on initial and reassessment

| | INITIAL ASSESSMENT (4;2 years) | | REASSESSMENT (4;6 years) | |
|---|---|---|---|---|
| INVENTORY | Present | Not present | Present | Not present |
| **Stops** | p, b, t, d, k, g | | p, b, t, d, k, g | |
| **Fricatives** | f, v, s, z, ʃ, ʒ, h | θ, ð | f, v, s, z, ʃ, ʒ, h, θ, ð | |
| **Affricates** | tʃ, dʒ | | tʃ, dʒ | |
| **Nasals** | m, n, ŋ | | m, n, ŋ | |
| **Liquids** | l, ɹ | | l, ɹ | |

| | | | |
|---|---|---|---|
| **Glides** | w, j | | w, j |

Again, Gcobisa showed evidence of being able to produce all English vowels and diphthongs used in the *DEAP*, as described in Table 6 above.

### 3.10.2 Severity Indices (PCC, PVC, PPC)

Again, Gcobisa's PCC, PVC and PPC were calculated for the phonology subtest. Although she made improvements in her raw score (e.g. PCC of 75% in the phonology assessment in the initial assessment, and a PCC of 79% in the phonology assessment in the reassessment, see s still an area of concern.

Table 23), her percentile for the phonology assessment decreased from 9$^{th}$ percentile to 2$^{nd}$ percentile. This was due to the time between the assessments resulting in Gcobisa being in the next age group in the *DEAP* norms. Considering the data for three-year old isiXhosa-English bilingual children in the Cape Town area, Gcobisa's PCC is closer to the mean PCC of 83.5% (Pascoe et al., 2015). However, considering she is 4 years, 6 months, her PCC was still an area of concern.

**Table 23: Summary of Gcobisa's PCC, PVC and PPC from the phonology assessment in initial and reassessment.**

| | **INITIAL ASSESSMENT (4;2 years)** | | **REASSESSMENT (4;6 years)** | |
|---|---|---|---|---|
| | | Percentile rank (Dodd et al., 2002) | | Percentile rank (Dodd et al., 2002) |
| **PCC** | 75 | 9 | 79 | 2 |
| **PVC** | 99 | 50 | 99 | 37 |
| **PPC** | 84 | 9 | 86 | 5 |

### 3.10.3 Phonological Processes

In the reassessment, Gcobisa still made use of the two developmental phonological processes: gliding and cluster reduction. This is similar to the processes noted in the initial assessment. However, all the instances of gliding noted in the reassessment were with the phoneme /ɹ/. It was noted that on some occasions Gcobisa produced /l/ for /ɹ/, suggesting some over generalization of the phoneme /l/ (see Table 24). Gcobisa also made use of isolated

developmental phonological processes and non-developmental processes summarized in Table 24.

**Table 24: Gcobisa's use of phonological processes in the phonology subtest (reassessment)**

| Phonological process | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Gliding** | /ɹ/ → /w/ | /ɒwɪndʒ/ for *orange*<br>/kwab/ for *crab*<br>/twi/ for *three*<br>/fwɒg/ for *frog*<br>/zɛbwə/ for *zebra* | Age appropriate (Dodd et al., 2002) |
| **Cluster reduction** | /stɹ/ → /tɹ/<br>/spl/ → /pl/<br>/skw/ → /kw/<br><br>/sp/ → /p/<br>/sk/ → /k/<br><br>/pr/ → /p/<br>/bɹ/ → /b/<br><br>/pt/ → /t/ | /trɔbələ/ for *strawberry*<br>/plaʃ/ for *splash*<br>/kwɛə/ for *square*<br><br>/paidə/ for *spider*<br>/kul/ for *school*<br>/bɪkɪts/ for *biscuits*<br><br>/pam/ for *pram*<br>/tufbʌʃ/ for *toothbrush*<br><br>/hɛlikɒtə/ for *helicopter* | Not age appropriate, apart from triclusters (Dodd et al., 2002) |
| **Phonological processes that occurred less than five times during the phonology assessment** | | | |
| **Unusual process: Fronting of velar** | /j/ → /tʃ/ | /θɑŋktʃu/ for *thank you* | Produced consistently in the word *thank you*, but not in other words containing the /kj/ cluster |
| **Stopping** | /θ/ → /t/<br><br>/ð/ → /d/ | /ti/ for *three*<br><br>/dis/ for *this* | Not age appropriate (Dodd et al., 2002)<br><br>Used the fricatives /θ/ and /ð/ inconsistently on reassessment, with only 2 instances of stopping in the phonology subtest compared to the 4 instances on initial assessment. |
| **Assimilation** | /j/ → /l/ | /lɛloʊ/ for *yellow* | Isolated occurrence. |

| | | | |
|---|---|---|---|
| **Possible over-generalisation of target phoneme** | /ɹ/ → /l/ | /tɹɔbələ/ for *strawberry*<br>/labɪt/ for *rabbit* | |
| **Other errors** | /θ/ → /s/<br>/θ/ → /f/ | /tis/ for *teeth*<br>/tufbʌʃ/ for *toothbrush* | Isolated occurrences. |
| | /ɹ/ → /h/ | /dʒəhɒf/ for *giraffe* | Isolated occurrence. |

#### *3.10.3.1 Gliding*

Gcobisa's production of the liquids /l/ and /ɹ/ was analysed further across all of the subtests of the *DEAP* in order to investigate her use of the phonological process of gliding for these phonemes. Table 25 summarises Gcobisa's production of /l/. Results suggest that Gcobisa no longer makes use of gliding in the initial position for /l/ as a singleton. In addition her use of /l/ as a singleton in medial positions is more accurate, as she is producing this accurately on 84% of attempts as opposed to on no attempts in the initial assessment. When considering the phoneme /l/ in a cluster in initial position, she often made use of the earlier developmental process of cluster reduction, rather than gliding the phoneme within the cluster. Gcobisa still found it more difficult to produce /l/ as part of a cluster in medial position and made use of the phonological process of cluster reduction for all attempts of /l/ clusters in medial positions.

**Table 25: Analysis of Gcobisa's use of /l/ in initial assessment and reassessment**

| | **INITIAL ASSESSMENT (4;2 years)** | | | | **REASSESSMENT (4;6 years)** | | | |
|---|---|---|---|---|---|---|---|---|
| **/l/** | Initial | Medial | Final | Total | Initial | Medial | Final | Total |
| **/l/** | | | | | | | | |
| **Accurate productions** | 0/5 (0% accurate) | 0/18 (0% accurate) | 6/6 (100% accurate) | 6/29 (21% accurate) | 5/5 (100% accurate) | 16/19 (84% accurate) | 6/6 (100% accurate) | 27/30 (90% accurate) |
| **Analysis of substitutions/omissions** | /j/: 5/5 | /j/:9/18;<br>/w/: 5/18;<br>Other: 2/18;<br>Omission: 2/18 | | | | /j/: 1/19;<br>/w/: 1/19;<br>Omission: 1/19 | | |

| /gl, spl, kl, sl/ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Accurate productions** | 0/7 (0% accurate) | 0/3 (0% accurate) | | 0/10 (0% accurate) | 4/7 (57% accurate) | 0/3 (0% accurate) | | 4/10 (40% accurate) |
| **Analysis of substitutions/omissions** | /j/: 4/7; Omission: 3/7 | Omission: 3/3 | | | Omission: 3/7 | Omission: 3/3 | | |

When analyzing Gcobisa's use of /ɹ/ as a singleton and in clusters, Gcobisa produced the phoneme accurately at a slightly higher rate than the initial assessment (see Table 26). In addition, it was noted on reassessment that Gcobisa only made use of the glide /w/ when using the phonological process of gliding, and did not use both /j/ and /w/. However, on reassessment, Gcobisa made use of more unexpected substitutions for the phoneme /ɹ/, such as /h/ or /l/. Gcobisa omitted the phoneme /ɹ/ on fewer occasions during the reassessment, as she used cluster reduction on only 17% of attempts on reassessment, compared to 35% of attempts on initial assessment. This will be discussed in more detail in section 3.10.3.2.

**Table 26: Analysis of Gcobisa's use of /r/ in initial assessment and reassessment**

| | **INITIAL ASSESSMENT (4;2 years)** | | | **REASSESSMENT (4;6 years)** | | |
|---|---|---|---|---|---|---|
| | Initial | Medial | Total | Initial | Medial | Total |
| **/ɹ/** | | | | | | |
| **Accurate productions** | 0/5 (0% accurate) | 1/9 (11% accurate) | 1/14 (7% accurate) | 1/5 (20% accurate) | 3/9 (33% accurate) | 4/14 (29% accurate) |
| **Analysis of substitutions/omissions:** | /j/: 2/5; /w/: 3/5 | /j/: 3/9; /w/: 5/9 | | /l/: 1/5; /w/: 3/5 | /h/: 1/9; /l/: 4/9; /w/: 1/9 | |
| | | | | | | |
| **/bɹ, tɹ, kɹ, θɹ, kɹ, fɹ, stɹ, pɹ/** | | | | | | |
| **Accurate productions** | 3/12 (33% accurate) | 1/11 (9% accurate) | 4/23 (17% accurate) | 7/12 (58% accurate) | 4/11 (36% accurate) | 11/23 (48% accurate) |

| | | | | |
|---|---|---|---|---|
| **Analysis of substitutions/omissions:** | /j/: 3/12; /w/: 2/12; Omission: 3/12 | /j/: 5/11; /w/: 0/11; Omission: 5/11 | /w/: 3/12; Omission: 2/12 | /w/: 3/11; Omission: 2/11; /l/: 2/11 |

#### *3.10.3.2 Cluster reduction*

Gcobisa's production of clusters was then analysed in order to investigate her use of cluster reduction. Table 27 summarises Gcobisa's accurate use of clusters, only considering instances where Gcobisa reduced a cluster as inaccurate, not when she used cluster simplification. As can be seen in Table 27, Gcobisa's cluster reduction on reassessment was similar to the initial assessment, although she made some improvements, particularly with producing r-clusters in medial position.

**Table 27: Gcobisa's accurate production of clusters in initial and reassessment**

| | **Initial assessment (4;2 years)** | | | **Reassessment (4;6 years)** | | |
|---|---|---|---|---|---|---|
| | Productions with all elements present in initial position | Productions with all elements present in medial position | Total productions with all elements present | Productions with all elements present in initial position | Productions with all elements present in medial position | Total productions with all elements present |
| **/tw/, /kw/** | 1/1 | | 1/1 | 1/1 | | 1/1 |
| **/sp/, /st/, /sk/** | 0/4 | 0/1 | 0/5 | 0/4 | 0/1 | 0/5 |
| **/sm/, /sn/** | 2/2 | | 2/2 | 2/2 | | 2/2 |
| **/sw/** | 1/1 | | 1/1 | 1/1 | | 1/1 |
| **/sl/** | 1/3 | | 1/3 | 0/3 | | 0/3 |
| **/pl/, /bl/, /kl/, /gl/, /fl/** | 2/3 | 0/3 | 2/6 | 3/3 | 0/3 | 3/6 |
| **/pɹ/, /bɹ/, /tɹ/, /dɹ/, /kɹ/, /gɹ/, /fɹ/** | 8/10 | 6/11 | 14/21 | 8/10 | 9/11 | 17/21 |
| **/θr/** | 0/1 | | 0/1 | 1/1 | | 1/1 |
| **/skw/** | 0/1 | | 0/1 | 0/1 | | 0/1 |
| **/spl/** | 0/1 | | 0/1 | 0/1 | | 0/1 |
| **/spɹ/,** | 0/1 | | 0/1 | 0/1 | | 0/1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| /stɹ/, /skɹ/ | | | | | | |
| **TOTAL** | 15/28 (54%) | 6/15 (40%) | 21/43 (49%) | 16/28 (57%) | 9/15 (60%) | 25/43 (63%) |

### 3.10.4 Connected Speech

The connected speech assessment was attempted. However, again Gcobisa did not produce phrases or sentences when requested, so no spontaneous speech sample was collected for the *DEAP* phonology assessment.

### 3.10.5 Oro-Motor Assessment

As Gcobisa had no difficulties in the initial assessment, this aspect was not reassessed.

### 3.10.6 Stimulability and Articulation

When the articulation assessment was conducted, results indicated that the only sounds Gcobisa had difficulty with were /θ/ and /ð/, although she was stimulable for these sounds in isolation. It was also noted that she produced /l/ for /j/ in the word *yellow* in both the phonology and articulation assessment. Although this could be a case of consonant harmony or assimilation, in the articulation assessment she produced /j/ correctly in a syllable, but as /l/ in isolation. Again, this may suggest some overgeneralization of the phoneme /l/. However, over the course of the assessment, Gcobisa showed evidence that she was able to produce all phonemes.

### 3.10.7 Consistency

Although Gcobisa's inconsistency score on the screener was 20%, the inconsistency assessment was completed in order to compare Gcobisa's consistency from the initial assessment. During the inconsistency subtest, Gcobisa produced only two words with inconsistent errors (see Table 28), giving her an inconsistency of 8%. Both of these inconsistent errors included liquid sounds /ɹ/ and /l/. There were other examples of words Gcobisa produced correctly in one trial, but with a phonological process in another (e.g. *bridge* was produced as /bidʒ/ on the first trial, and /bɹidʒ/ on the two subsequent trials). These were not included in the inconsistency score.

Table 28: Gcobisa's inconsistent productions on reassessment

| Target | Trial 1 | Trial 2 | Trial 3 |
|---|---|---|---|
| ***zebra*** | zɛbə | zɛbwə | zɛbwə |
| ***elephant*** | ɛjəfənt | ɛləfənt | ɛfənt |

### 3.10.8 Summary

From the *DEAP* reassessment, a profile of Gcobisa's speech can be determined. Gcobisa's phonetic inventory is age appropriate, and the fricatives /θ/ and /ð/ that were missing from her inventory on the initial assessment were present at the reassessment. In addition, Gcobisa showed evidence of being able to produce all vowels and diphthongs appropriately.

Gcobisa still used many developmental phonological processes and a few non-developmental processes, but most of them were isolated occurrences (see Table 24), suggesting that she is in the process of eliminating many of these phonological processes. In the phonology subtest, Gcobisa had a PCC of 79%, which had improved in comparison to the initial assessment PCC of 75%. Her inaccurate productions in the phonology assessment are summarized in Table 29, which shows that Gcobisa's use of gliding has reduced from 13 to five instances, and her overall inaccuracies from 34 to 24 instances. As evident in the table, Gcobisa still made use of the two consistent phonological processes: gliding and cluster reduction. However, over the assessment she only glided the liquid /l/ on two occasions, producing it accurately on other occasions. She still makes use of the phonological process of gliding for the liquid /ɹ/. The process of gliding is still age appropriate as it should be eliminated by the age of 5;11 (Dodd et al., 2002). Again, she made use of the phonological process of cluster reduction. Although it was noted she made less use of cluster reduction for clusters containing /ɹ/ in medial position over the entire assessment, her use of cluster reduction was similar across assessments. Her difficulties producing the triclusters is still age appropriate, but her use of cluster reduction continues to be of concern as considering monolingual English norms, she should have eliminated this phonological process by the age of 3 years, 11 months (Dodd et al., 2002). Her speech was more consistent, with an inconsistency of only 8% in comparison to 24% in the initial assessment.

Table 29: Summary of Gcobisa's English speech results over initial assessment and reassessment

| | INITIAL ASSESSMENT (4;2 years) | REASSESSMENT (4;6 years) |
|---|---|---|
| **Inventory** | Incomplete but age appropriate (missing θ, ð, ɹ) | Complete |
| **PCC in phonology assessment** | 75% | 79% |
| **Number of times error patterns used in phonology assessment (5 or more instances):** | | |
| Gliding | 13 | 5 |
| Cluster reduction | 10 | 9 |
| Total number of errors in phonology assessment (including isolated processes) | 34 | 24 |
| **Inconsistency in screener** | 50% | 20% |
| **Inconsistency assessment** | 24% | 8% |
| | | |

### 3.10.9 Diagnostic Category

As Gcobisa still makes use of the immature process of cluster reduction, she still presents with a mild phonological delay.

## 3.11 Xhosa Speech Reassessment Results

### 3.11.1 Consonant and Vowel Inventories

On reassessment, Gcobisa showed evidence of using the sounds /ɮ/, /kx/, /tɬ/, /tʃʰ/ and /ǀg/, that were missing from her inventory in the initial assessment (see Table 30). She still had difficulty producing the sounds /cʰ/, /r/ and /tsʰ/. It is age appropriate for /cʰ/ and /tsʰ/ to be missing from her inventory (Maphalala et al., 2014; Mowrer & Burger, 1991; Tuomi et al., 2001). However, she should be in the process of acquiring the phoneme /r/. Again, Gcobisa showed evidence of using all isiXhosa vowels accurately.

Table 30: Gcobisa's isiXhosa inventory at initial assessment and reassessment

| | INITIAL ASSESSMENT | | REASSESSMENT | |
|---|---|---|---|---|
| INVENTORY | Present | Not present | Present | Not present |
| **Plosive** | pʼ, pʰ, b, tʼ, tʰ, d, cʼ, ɟ, kʼ, kʰ, g | cʰ | pʼ, pʰ, b, tʼ, tʰ, d, cʼ, ɟ, kʼ, kʰ, g | cʰ |

| | | | | |
|---|---|---|---|---|
| **Implosive** | | ɓ* | | ɓ* |
| **Nasals** | m, n, ŋ, ɲ | | m, n, ŋ, ɲ | |
| **Fricatives** | f, v, s, z, ʃ, h, x, ɣ | | f, v, s, z, ʃ, h, x, ɣ | |
| **Lateral** | ɬ, l | ɮ | ɬ, l, ɮ | |
| **Trill** | | r | | r |
| | | | | |
| **Affricates** | tʃ', dʒ, dz, ts' | kx', tɬ, $ts^h$, $tʃ^h$ | tʃ', dʒ, dz, ts', kx', tɬ, $tʃ^h$ | $ts^h$ |
| **Glides** | w, j | | w, j | |
| **Clicks** | ǀ, ǁ, !, ŋǀ, ŋǁ, ŋ!, !g, ǁg, $ǀ^h$, $ǁ^h$, $!^h$ | ǀg | ǀ, ǁ, !, ŋǀ, ŋǁ, ŋ!,ǀg, !g, ǁg, $ǀ^h$, $ǁ^h$, $!^h$ | |

* Again, as discussed in section 3.3.1, following the discussion of Gcobisa's inventory, a broader transcription was used and producing the plosive /b/ for the implosive /ɓ/ was not considered incorrect.

### 3.11.2 Severity Indices (PCC, PVC, PPC)

Gcobisa's PCC was calculated. Again, consonants in prefixes that Gcobisa omitted were not counted as errors, as she did not attempt to produce the prefix. On reassessment, Gcobisa's PCC was 94%. This indicates an improvement from her initial assessment, where her PCC was 77% (see Table 31). According to the data collected by Maphalala et al. (2014), this is an appropriate PCC score.

Gcobisa's PVC was calculated, and she had a PVC of 99%, which is similar to the data collected by Maphalala et al. (2014). Gcobisa's PPC was 97%.

**Table 31: Gcobisa's PCC, PVC and PPC in isiXhosa on initial assessment and reassessment.**

| | INITIAL ASSESSMENT (4;2 years) | REASSESSMENT (4;6 years) |
|---|---|---|
| **PCC** | 77 | 94 |
| **PVC** | 96 | 99 |
| **PPC** | 88 | 97 |

### 3.11.3 Phonological Processes

Over the reassessment, Gcobisa produced only eleven words inaccurately. These are described in Table 32. These errors were isolated occurrences, with one example for each error with the exception of backing of palatal plosives and nasalisation. Gcobisa again produced a nasal (/n/) for a liquid (/l/) in the word *imali* [money]. However, this may have been as a result of

confusion between the English word "money" and the isiXhosa word *imali*. She also produced /n/ for /j/ in the word *bayathetha* [talking]. Gcobisa also fronted the glide /j/, producing the liquid /l/ in *amayeza* [medicine]. This may have been over generalization the targeted sound of /l/ to words with the glide /j/. However, this was the only instance of this in the isiXhosa reassessment.

**Table 32: Gcobisa's phonological processes in isiXhosa reassessment**

| Phonological process | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Gliding** | /r/→ /w/ | /ɔwɛndʒi/ for *orenji* [orange] | |
| **Stopping of affricate** | /ts$^{h}$/ → /t/ | /isitʌbʌ/ for *isithsaba* [crown] | |
| **Nasalisation** | /l/ → /n/<br>/j/ → /n/ | /imʌni/ for *imali* [money]<br>/bʌnʌt$^{h}$ɛt$^{h}$ʌ/ for *bayathetha* [talking] | May be confusion between the isiXhosa word *imali* and the English word "money". |
| **Fronting** | /j/ → /l/ | /ʌmʌlɛzʌ/ for *amayeza* [medicine] | Only used on this word. Possible overgeneralization of the target sound /l/. |
| **Consonant harmony** | /j/ → /\|/ | /u\|ʌ\|$^{h}$ɛbʌ/ for *uyacheba* [cutting] | |
| **Backing of palatal plosive** | /ɟ/ → /g/<br>/kj/ → /c$^{h}$/<br>/d/ → /g/ | /igʌsi/ for *idyasi* [coat]<br>/ujʌkjʌlʌ/ for *uyatyhala* [push]<br>/i!ʌngʌ/ for *iqanda* [egg] | |
| | /ɣ/ → /ɬ/ | /ujʌɬɔmbʌ/ for *uyagromba* [digging] | |
| **Syllable Deletion** | | /iŋ!$^{h}$ibʌ/ for *ingqiniba* [elbow] | |

The only example of gliding in the reassessment was gliding of the trill /r/. Gcobisa did not use the phonological process of gliding /l/.

### 3.11.4 Connected Speech

Again, a connected speech sample was not obtained. Although Gcobisa produced some isiXhosa words, she preferred to speak English when interacting with the researcher. As such, it

was difficult to elicit spontaneous isiXhosa speech to determine whether her errors in her single words were also present in connected speech.

### 3.11.5 Consistency

Although there is no inconsistency assessment in *Masincokoleni*, over the course of the assessment, Gcobisa produced 12 words more than once. Of these 12 words, she produced two inconsistently. These are described in Table 33. On both occasions, she produced an incorrect production of the word, but her second attempt produced an accurate production of the word. This suggests her speech is consistent in isiXhosa.

**Table 33: Gcobisa's inconsistent productions on reassessment in isiXhosa.**

| Target | First attempt | Second attempt |
|---|---|---|
| ***Iqanda*** **[egg]** | i!ʌngʌ | i!ʌndʌ |
| ***Bayathetha*** **[talking]** | bʌnʌtʰɛtʰʌ | bʌjʌtʰɛtʰʌ |

### 3.11.6 Summary

Gcobisa's reassessment results are summarised in Table 34. Gcobisa's inventory has increased, with only /cʰ/, /tsʰ/ and /r/ missing from her inventory. This is age appropriate, although she should be acquiring /r/ soon (Maphalala et al., 2014). Her PPC, PVC and PPC all increased and were considered age appropriate in comparison to the small sample of data collected for *Masincokoleni* (Maphalala et al., 2014). Although she did still make use of some phonological processes, the majority of these were isolated occurrences, and on many occasions she was able to produce the accurate production of the word on the second attempt. Gcobisa's speech was more consistent, with only two instances of inconsistent productions of words, and both of these contrasting an inaccurate production with an accurate production of the word.

**Table 34: Summary of Gcobisa's isiXhosa initial and reassessment results**

| | INITIAL ASSESSMENT (4;2 years) | REASSESSMENT (4;6 years) |
|---|---|---|
| **Inventory** | Incomplete and not age appropriate (phonemes that Gcobisa should have acquired: /ɮ/, /ǀg/, /r/) | Incomplete and not age appropriate (phoneme that Gcobisa should have acquired: /r/). |
| **PCC in phonology assessment** | 77% | 94% |
| **Number of times error patterns** | | |

| used in assessment: | | |
|---|---|---|
| Gliding | 9 | 1 |
| Backing of palatal plosives | 2 | 2 |

### 3.11.7 Diagnostic Category

Gcobisa only made use of gliding the trill /r/. Although this process should be eliminated by her age, the phoneme /r/ is not common in isiXhosa. Again, she also made use of the process of backing of the palatal plosives. Although this is usually considered a non-developmental process, Pascoe et al. (2015) suggest that this may be a typical process for isiXhosa-English bilingual children in Cape Town. In addition, she only made use of this process on these two occasions and was stimulable for the error sounds. Gcobisa's use of gliding of /r/ suggests that she still has a mild phonological delay.

## 3.12 Summary/Overall Profile of Reassessment Results

Gcobisa's reassessment results showed clear improvements in both her English and isiXhosa speech. This is summarized in Table 35. Her inventories have increased, with only three phonemes missing from her isiXhosa speech. She has made improvements in her PCC, PVC and PPC, particularly with regards to her isiXhosa speech where her PCC has improved from 86% to 97%. Although she still makes use of the same phonological processes (gliding, cluster reduction and backing of palatal plosives), she no longer makes use of gliding for the phoneme /l/, which was the target of intervention. She also has more consistent speech, particularly in isiXhosa.

Table 35: Summary of Gcobisa's English and isiXhosa speech assessment and reassessment results

| | Initial Assessment (4;2 years) | | Reassessment (4;6 years) | |
|---|---|---|---|---|
| | English | isiXhosa | English | isiXhosa |
| **Speech Inventory (missing sounds)** | /θ/, /ð/ | /r/, /kx/, /cʰ/, /ɮ/, /tɬ/, /tsʰ/ and /tʃʰ/ | All sounds present | /cʰ/, /r/, /tsʰ/ |
| **PCC** | 75% | 77% | 79% | 94% |
| **PVC** | 98% | 96% | 99% | 99% |

| | | | | |
|---|---|---|---|---|
| **PPC** | 83% | 88% | 86% | 97% |
| **Phonological processes** | Gliding of /l/ and /r/, cluster reduction | Gliding of /l/ and /r/, backing of palatal plosive | Gliding of /r/, cluster reduction | Gliding of /r/, backing of palatal plosive |
| **Inconsistency** | 28% | 14% | 8% | 0% |
| **Oro-motor skills** | Age appropriate | | Not retested | |
| | | | | |
| **Language (receptive)** | RS 25 | RS 22 | Not retested | |

## 3.13 Intelligibility Reassessment

Gcobisa's intelligibility was again assessed using the *ICS* (McLeod et al., 2012a), and again both Gcobisa's mother and teacher were asked to complete the form. The results are compared with the initial assessment in Table 36.

**Table 36: Summary of *Intelligibility in Context* (McLeod et al., 2012a) responses for Gcobisa at initial assessment and reassessment**

| | Mother Initial assessment | Mother reassessment | Teacher Initial assessment | Teacher reassessment |
|---|---|---|---|---|
| **1. Do you understand your child?** | 4 - usually | 4 – usually | 3 - sometimes | 5 – always |
| **2. Do immediate members of your family understand your child?** | 4 - usually | 3 – sometimes | - | - |
| **3. Do extended members of your family understand your child?** | 3 - sometimes | 3 – sometimes | - | - |
| **4. Do your child's friends understand your child?** | 4 - usually | 3 – sometimes | 3 - sometimes | 5 – always |
| **5. Do acquaintances understand your child?** | 3 - sometimes | 3 – sometimes | 3 - sometimes | 4 – usually |
| **6. Do your child's teachers (teacher assistants) understand your child?** | 4 - usually | 4 – usually | 3 - sometimes | 4 – usually |
| **7. Do strangers understand your child?** | 3 - sometimes | 3 - sometimes | - | |
| **TOTAL** | 25/35 | 23/35 | 12/20 | 18/20 |
| **AVERAGE** | 3.5 | 3.2 | 3 | 4.5 |

As seen in Table 36, Gcobisa's teacher was able to hear a difference in Gcobisa's speech. This reflects the improvements noted in the reassessment. However, Gcobisa's mother rated her speech to be similar to before the intervention, reflecting her mother's ability to understand her child's speech before intervention was provided.

# Chapter 4: Lulama

## 4.1 Background information

Lulama was a four year old girl, living and attending crèche in Cape Town. She was referred to the researcher through an undergraduate research study that investigated three year old children's speech development in Cape Town (Pascoe et al., 2015). She had been identified as presenting with a possible speech sound disorder in English, and referred for further assessment. Although they had been referred to the local speech therapy clinic, at the time of the current study, Lulama's family had not investigated the matter further. Lulama's parents were contacted by telephone and a consent form was sent home from crèche (Appendix D). Her parents gave consent for Lulama to take part in the research study.

Lulama's parents completed a case history form, providing the following information. Lulama lives at home with both her parents and grandmother. She speaks isiXhosa, and "a little English". She speaks isiXhosa at home, and her parents predominantly speak to her in that language. They estimated that Lulama was exposed to and used isiXhosa for about 50 hours a week at home. Lulama started learning English when she attended crèche. Her parents estimated she was exposed to about 40 hours of English a week, and used it for about 30 hours a week. When Lulama is not at school, she is usually with her parents, or occasionally would spend time with her grandmother or other friends.

Lulama's parents reported that they had concerns regarding Lulama's speech development. They noticed that even in isiXhosa she had difficulty producing some words. They first noticed Lulama's difficulty producing sounds when she was around two years old, and monitored her speech at home as they could see it was changing slowly. They reported that Lulama became frustrated at times, and agitated when she was not understood by those around her. Lulama's parents reported that her father had a "lisp", but no other family history of speech, language or hearing problems were reported.

Lulama's teacher reported that she had concerns regarding her speech development. She reported that she did not always understand what Lulama was trying to say, but that the other children at school had more success understanding her.

Lulama's mother reported that she had difficulties with high blood pressure during pregnancy, and Lulama was born at eight months via C-section, weighing 2,5kg. Lulama suffered from asthma, and had ear infections when she was three years old. Apart from typical childhood colds and fevers, no other medical concerns were reported. Lulama's motor milestones appeared to be within the normal range, but her speech and language milestones were slightly delayed. It was reported that she used single words at two years, named objects at three years and used simple questions at three years.

## 4.2 English speech assessment results

Lulama was initially very shy. She said very little and used a soft voice to express herself. Lulama's English speech was assessed using the *DEAP* (Dodd et al., 2002). The diagnostic screener was administered, and Lulama did not use the phonemes /ɹ/, /θ/, /v/, /dʒ/ and /tʃ/. In addition, she made use of a range of developmental and non-developmental phonological processes including cluster reduction, fronting, stopping, deaffrication, devoicing and lateralisation. From this it was established that further assessment was necessary, and the phonology, articulation, inconsistency and oro-motor assessments were completed.

### 4.2.1 Consonant and Vowel Inventories

As can be seen in Table 37, Lulama showed evidence of being able to use all English phonemes in her speech, although she did not always use these phonemes accurately in words. This suggests her English speech inventory is age appropriate. However, her ability to produce these phonemes was not always consistent. For example, Lulama produced /dʒ/ in the word *giraffe*, but struggled to produce the same phoneme in *jam* or in isolation. In addition, she showed evidence of using the phoneme /ɹ/ in some clusters and in the word *giraffe*, but her production of this phoneme in isolation was not accurate.

Table 37: Lulama's English inventory (initial assessment)

| INVENTORY | Present | Not present |
|---|---|---|
| **Stops** | p, b, t, d, k, g | |
| **Fricatives** | f, v, s, z, ʃ, ʒ, h, θ, ð | |
| **Affricates** | tʃ, dʒ | |
| **Nasals** | m, n, ŋ | |
| **Liquids** | l, ɹ | |
| **Glides** | w, j | |

Lulama was able to produce the vowels and diphthongs listed in Table 38. However, at times she substituted vowels. For example, she produced /aləfant/ for *elephant*.

Table 38: Lulama's English vowel inventory

| | Present |
|---|---|
| **Front** | i (beet) |
| | ɪ (bit) |
| | ɛ (bet) |
| | a (bat) |
| **Central** | ə (sofa) |
| | ʌ (but) |
| | ɜ (bird) |
| **Back** | u (boot) |
| | ʊ (book) |
| | ɒ (pot) |
| | ɑ (palm) |
| | ɔ (bought) |
| **Diphthongs** | ɪə (ear) |
| | eɪ (play) |
| | ɔɪ (boy) |
| | ɑɪ (my) |
| | ɑʊ (house) |
| | oʊ (boat) |

### 4.2.2 Severity Indices (PCC, PVC and PPC)

As can be seen in Table 39, Lulama achieved a PCC of 85%. This is appropriate for her age when compared to the norms provided for the *DEAP* (Dodd et al., 2002). When considering the small sample of isiXhosa-English bilingual 3 year olds assessed in Cape Town, who had a mean PCC of

83.5% (Pascoe et al., 2015), even amongst her peers Lulama's PCC appears within the average range. Lulama achieved a PVC of 96%, which is below the expected level for her age according to the monolingual norms (Dodd et al., 2002). However, it should be noted that her inaccurate vowels may be as a result of accent or dialect rather than errors, and as such could be considered correct (En et al., 2014). She had a PPC of 87%.

Table 39: Lulama's PCC, PVC and PPC scores (initial assessment)

| | **Percentage** | **Percentile rank compared to monolingual children in the UK** (Dodd et al., 2002) |
|---|---|---|
| **PCC** | 85 | 37 |
| **PVC** | 96 | 9 |
| **PPC** | 87 | 25 |

### 4.2.3 Phonological Processes

Lulama made use of a variety of developmental and non-development phonological processes. Considerable inconsistency was noted in her production of words, as she seemed to be able to use a phoneme in one context, but not in another. For example, she was able to produce /dʒ/ accurately in the word *giraffe*, but struggled to produce the phoneme accurately in isolation. According to the *DEAP*, errors that occur on five or more occasions in the phonology assessment are considered error patterns (or phonological processes) (Dodd et al., 2002). Following this criterion, Lulama only presented with cluster reduction. She reduced some s-clusters (see Table 40), although was able to produce some s-clusters accurately in words such as *swing* and *strawberry*. However, her use of a variety of other developmental and non-developmental phonological processes resulted in her making use of 21 instances of phonological processes over the 50 word test. These have been summarized in Table 40.

Table 40: Lulama's phonological processes (initial assessment)

| **Phonological process** | **Realisation** | **Example** | **Comment/age appropriacy** |
|---|---|---|---|
| **Cluster reduction** | /sp/ → /p/ | /paɪdəs/ for *spider* | Age appropriate (Dodd et al., 2002) |
| | /sn/ → /n/ | /nɛk/ for *snake* | |
| | /sk/ → /k/ | /kul/ for *school* | |

| | | | |
|---|---|---|---|
| | | /bɪkɪt/ for *biscuit* | |
| | /spl/ → /pl/ | /plas/ for *splash* | |
| | /skw/ → /k/ | /kɛ/ for *square* | |
| **ISOLATED DEVELOPMENTAL PHONOLOGICAL PROCESSES (used in less than 5 instances)** | | | |
| **Stopping** | /tʃ/ → /t/ | /wɔt/ for *watch* | Not age appropriate (Dodd et al., 2002) |
| | /v/ → /b/ | /glʌbs/ for *gloves* | |
| | /ð/ → /d/ | /dis/ for *this* | |
| **Final devoicing** | /dʒ/ → /tʃ/ | /ɔɹintʃ/ for *orange* | Not age appropriate (Dodd et al., 2002) |
| | /g/ → /k/ | /piŋk/ for *pig* | |
| **ISOLATED NON-DEVELOPMENTAL PHONOLOGICAL PROCESSES** | | | |
| **Substitutions for /θ/** | /θ/ → /s/ | /tusbɹʌʃ/ for *toothbrush* | Lulama was able to produce the phoneme /θ/ in isolation, and in the final position in the word *teeth* but had difficulty producing the sound in a syllable. |
| | /θ/ → /f/ | /fli/ for *three* | |
| **Lateralisation** | /w/ →/l/ | /klin/ for *queen*<br>/lɛb/ for *web* | Lulama was able to produce /w/ in all other words. She showed evidence of producing /ɹ/ accurately but this was not consistent. See section 4.2.3.1 for further analysis. |
| | /ɹ/ → /l/ | /blɛd/ for *bread*<br>/ʌmblɛlə/ for *umbrella*<br>/plam/ for *pram* | |
| **Initial consonant deletion** | /j/ → /h/ | /hɛloʊ/ for *yellow* | |
| | /θ/ → /h/ | /haŋkju/ for *thank you* | |
| **Intrusive consonant** | Insertion of /ŋ/ | /piŋk/ for *pig* | |

Lulama substituted the phoneme /θ/ with a variety of different phonemes. There did not seem to be a pattern in which phoneme she used to substitute /θ/. She was able to use the phoneme /θ/ accurately in the word *teeth* and in isolation, suggesting it is within her phonetic inventory.

Lulama also made use of lateralization, where she produced /l/ for /ɹ/ and /w/. However, this, again, was not consistent. Although not consistent, it did have an impact on Lulama's intelligibility, and was the most frequently used non-developmental phonological processes.

Although Lulama appeared to produce the fricative /ʃ/ in the phonology assessment (as such, it is not listed in Table 40), it was noted that at times it was slightly distorted, and she had difficulty producing the phoneme accurately in other subtests or in isolation, often fronting it to the fricative /s/. For example, in the inconsistency subtest she produced the word *shark* as /sɑk/ on all three occasions. In addition, her production of the affricate /tʃ/ was inconsistent. This was explored in more detail (see section 4.2.3.3).

#### *4.2.3.1 Lateralisation*

Lulama's production of the phonemes /ɹ/ and /w/ across all subtests of the *DEAP* was considered. As can be seen in Table 41, Lulama produced /l/ for /ɹ/ on the majority of attempts. When Lulama produced /ɹ/ (on 29% of attempts), it was not always easy to establish whether she had produced an accurate /ɹ/, but it was judged adequate for conversational speech in that it did not affect the intelligibility of the words. However, on the majority of occasions she produced /l/.

**Table 41: Analysis of Lulama's production of /ɹ/ in English (initial assessment)**

| **/ɹ/ in *DEAP*** | **Initial** | **Medial** | **Total** |
|---|---|---|---|
| **/ɹ/** | | | |
| **Accurate productions** | 1/5<br>(20% accurate) | 3/10<br>(0% accurate) | 4/15<br>(27% accurate) |
| **Analysis of substitutions/omissions** | /l/: 4/5 | /l/: 7/10 | |
| | | | |
| **/bɹ, tɹ, kɹ, fɹ, pɹ, stɹ/** | | | |
| **Accurate productions** | 5/12<br>(42% accurate) | 2/11<br>(18% accurate) | 7/23<br>(30% accurate) |
| | | | |
| **Analysis of substitutions/omissions** | /l/: 7/12 | /l/: 9/11 | |
| | | | |

| | |
|---|---|
| **TOTAL accurate productions of /ɹ/** | 11/38<br>29% accurate |

In comparison, Lulama's production of /w/ was much more consistent (see Table 42). The only occasions she lateralized the phoneme were in the words *web* and *queen*. The phonological process of lateralization is non-developmental, indicating Lulama may have disordered speech development.

Table 42: Analysis of Lulama's production of /w/ (initial assessment)

| **/w/ in *DEAP*** | **Initial** | **Total** |
|---|---|---|
| **/w/** | | |
| **Accurate productions** | 7/8<br>(86% accurate) | 7/8<br>(86% accurate) |
| **Analysis of substitutions/omissions** | /l/: 1/8 | |
| | | |
| **/sw, skw, kw/** | | |
| **Accurate productions** | 1/3<br>(33% accurate) | 1/3<br>(33% accurate) |
| | | |
| **Analysis of substitutions/omissions** | /l/: 1/3<br>Omission: 1/3 | |
| | | |
| **TOTAL accurate productions of /w/** | | 8/11<br>73% accurate |

#### *4.2.3.2 Cluster reduction*

Lulama's use of cluster reduction was also investigated further. It was noted in the phonology assessment that she reduced most, but not all, clusters with/s/. This was investigated in other subtests of the *DEAP*, and a similar pattern was noted. Lulama reduced all s-clusters, with the exception of the word *swing* and one attempt of the word *slide* in the inconsistency assessment. However, when a stimulability assessment was completed, and she was requested to produce *swing*, she reduced the cluster. This variability in Lulama's speech seemed to occur frequently throughout the assessment. According to Dodd et al. (2002), cluster reduction is usually eliminated from the speech of typically developing monolingual English speaking children by the age of 3;11 years. Using these norms, it could be suggested that Lulama's

difficulty with the production of s-clusters is an indication of delayed phonology. However, McLeod et al. (2001) summarise some of the research into cluster development, and suggest that s-clusters are often only acquired between the ages of four years and seven years. They highlight the individual variability often noted between children. Considering this, as well as the fact that Lulama is bilingual and speaks isiXhosa, a language containing few clusters (Maphalala et al., 2014), Lulama's use of cluster reduction may be considered age appropriate.

#### *4.2.3.3 Production of /ʃ/ and /tʃ/*

Lulama's production of /ʃ/ and /tʃ/ over all of the subtests of the *DEAP* was explored in more detail (see Table 43). It was noted that although both /ʃ/ and /tʃ/ were in her phonetic inventory, Lulama often fronted the phonemes to produce either /s/ or /ts/. In two instances, she stopped the affricate /tʃ/ to produce /t/ (e.g. /tɛə/ for *chair*). Considering monolingual norms, the phonological process of fronting should be eliminated by the age of 3 years, 11 months (Dodd et al., 2002), suggesting Lulama should not be using this phonological process. The phonological process of stopping should be eliminated by 3;5 years (Dodd et al., 2002), again suggesting Lulama is delayed in eliminating this process in comparison to monolingual children.

**Table 43: Analysis of Lulama's use of /ʃ/ and /tʃ/ (initial assessment)**

| | Initial | Medial | Final | Total |
|---|---|---|---|---|
| **Accurate production of /ʃ/** | 2/5 | 1/3 | 3/6 | 6/14 (43% accurate) |
| **Analysis of substitution:** | /s/: 3/5 | /s/: 2/3 | /s/: 3/6 | |
| | | | | |
| **Accurate production of /tʃ/** | 0/4 | 1/1 | 1/8 | 2/13 (15% accurate) |
| **Analysis of substitution:** | /s/: 3/4<br>/t/: 1/4 | | /ts/: 6/8<br>/t/: 1/8 | |

### 4.2.4 Connected Speech

Lulama was very shy during the initial assessment. In addition, she struggled to remember the names of some of the pictures, often requiring prompts or a model to produce the accurate name. As such, although the picture description task in the *DEAP* phonology assessment was

attempted, it was difficult for her to produce spontaneous utterances to describe the pictures. Lulama again produced single words in order to describe the pictures, and as a result her connected speech could not be compared to her single word naming skills. Her connected speech in conversation was often unintelligible to the researcher, making an analysis of her connected speech difficult.

### 4.2.5 Oro-Motor Assessment

Lulama's oro-motor skills were assessed using the oro-motor assessment from the *DEAP*. As can be seen in Table 44, her oro-motor skills were appropriate and no concerns were identified.

**Table 44: Lulama's oro-motor assessment results (initial assessment)**

| | Raw score | Standard score | Percentile |
|---|---|---|---|
| **Diadochokinetic** | 8/9 | 12 | 75 |
| **Isolated movement** | 11/12 | 10 | 50 |
| **Sequenced movement** | 16/18 | 12 | 75 |

### 4.2.6 Stimulability and Articulation

As discussed in section 4.2.1, Lulama had a complete phonetic inventory in English. However, during the articulation subtest, it was noted that she struggled to produce some phonemes in words, so her stimulability for the phonemes in syllables and in isolation was established. During the articulation subtest, Lulama was stimulable for /θ/ and /ð/ in isolation, but not in syllables. However, she showed evidence of being able to use these phonemes in earlier subtests, in the words *teeth* and *feather*. Lulama was not stimulable for the affricates /tʃ/ or /dʒ/ in either words, syllables or in isolation in the articulation subtest. However, she had produced these sounds in earlier subtests in the words *sausage* and *kitchen*. Lulama was not stimulable for the phoneme /ɹ/ in syllables, but produced an approximation of /ɹ/ in isolation, as well as producing acceptable productions of the phoneme in earlier subtests in words such as *rabbit* and *train*. Lulama's variability in producing these phonemes made it difficult to determine an accurate profile of her speech abilities.

### 4.2.7 Consistency

Although Lulama only produced one word inconsistently in the diagnostic screener, it was decided that the inconsistency subtest would be completed due to Lulama's apparent varying ability to produce some phonemes and to gather further information regarding her use of phonological processes. Of the 25 words elicited, Lulama produced seven inconsistently. As can be seen in Table 45, she had particular difficulty with the words *vacuum cleaner* and *kangaroo*. This may be because these words could have been less familiar to her. Her inconsistency score of 28% is appropriate for her age, suggesting her speech is not inconsistent.

**Table 45: Lulama's inconsistent productions in English (initial assessment)**

| Target | First production | Second production | Third production |
|---|---|---|---|
| **zebra** | sɛblə | zɛmblə | sɛblə |
| **jump** | dʌm | dʌm | dʌmpiŋ |
| **vacuum cleaner** | kɔklikinə | vakjuklinə | hikjuklinə |
| **slide** | lai | lait | slaid |
| **kangaroo** | katəgəɹu | kaməlʊk | kaməlʊ |
| **witch** | wɒts | wɒts | wɪts |
| **helicopter** | ɛləkɒptə | ɛləkɒptə | hɛlakɒptə |

### 4.2.8 Summary

Lulama had a complete phonetic inventory, although her ability to produce the phonemes seemed inconsistent in that there were occasions where she struggled to produce some phonemes, even in isolation. She made use of a variety of developmental and non-developmental phonological processes, including cluster reduction, fronting and lateralization. She also used many isolated phonological processes, which resulted in her speech often being perceived as unintelligible. Although she produced some words inconsistently in the inconsistency assessment, her score of 28% suggests her speech is consistent.

### 4.2.9 Diagnostic Category

Lulama's speech was analysed to establish a diagnosis using Dodd's diagnostic categories (Dodd et al., 2005). Due to her use of many isolated phonological processes, and, what appeared to be varying abilities to produce sounds, it was difficult to clearly place Lulama in a diagnostic

category. She made use of the developmental phonological process of cluster reduction, although it may be age appropriate for her to still be acquiring these clusters. She also made use of a range of non-developmental phonological processes like lateralization and unusual substitutions for /θ/. In addition, the inconsistency assessment determined her speech was consistent. It was concluded that Lulama had a consistent phonological disorder.

## 4.3 IsiXhosa speech assessment results

Lulama's isiXhosa speech was assessed using *Masincokoleni* (Maphalala et al., 2012). Like Gcobisa, she had difficulty producing many of the words without prompting or an adult model. However, she was more successful than Gcobisa in producing some of the more common words independently.

### 4.3.1 Consonant and Vowel Inventories

Lulama's isiXhosa phonetic inventory was not complete. Table 46 summarises the phonemes present. However, she did not always use these phonemes accurately, and at times required prompting in order to produce them accurately. Lulama should be in the process of acquiring the affricates /kxʼ/ and /dz/, as previous research has recorded them being acquired between the ages of 2;6 and 5;0. The only phoneme that is not age appropriate to be missing from Lulama's inventory is /ɣ/. It is age appropriate for the phonemes /$c^h$/, /ɟ/ and /$ts^h$/ to be missing from her inventory. The age of acquisition for the phonemes was determined by comparing the acquisition ages provided by Maphalala, Pascoe, and Smouse (2014), Mowrer and Burger (1991), and Tuomi, Gxilishe and Matomela (2001) (Table 47).

**Table 46: Lulama's isiXhosa consonant inventory (initial assessment)**

| INVENTORY | Present | Not present | Comment |
|---|---|---|---|
| **Plosive** | pʼ, $p^h$, b, tʼ, $t^h$, d, kʼ, $k^h$, g, cʼ | $c^h$, ɟ | Age appropriate. |
| **Implosive** | ɓ | | |
| **Nasals** | m, n, ŋ, ɲ | | |
| **Fricatives** | f, v, s, z, ʃ, h, x | ɣ | Not age appropriate |
| **Lateral** | ɬ, l, ɮ | | |
| **Trill** | r | | |
| | | | |

| | | | |
|---|---|---|---|
| **Affricates** | tʃ', tʃʰ, dʒ, ts', tɬ | dz, kx', tsʰ | Should be acquiring /kx'/. |
| **Glides** | w, j | | |
| **Clicks** | ŋ\|, ŋ‖, ŋ!, \|g, !g | \|, ‖, !,‖g, \|ʰ, ‖ʰ, !ʰ | Not age appropriate |

Lulama had some difficulty producing clicks. Interestingly, she seemed to be able to produce the nasalized clicks (/ŋ|/, /ŋ‖/, /ŋ!/) and some of the voiced clicks (/|g/, /!g/), but had more difficulty with the basic (/|/, /‖/, /!/) and aspirated clicks (/|ʰ/, /‖ʰ/, /!ʰ/). This seems contrary to Gxilishe's (2004) suggestion that the basic clicks are acquired first, before the age of two, and the voiced and nasalized clicks are acquired later. Mowrer and Burger (1991) found all the basic clicks were acquired by the age of four, and Maphalala et al. (2014) found all basic clicks present in the speech of their youngest group of participants (3;0 – 3;6). Lulama's ability to produce the later developing voiced clicks but difficulty producing the basic clicks in unexpected, and suggests her speech sound acquisition may be atypical.

**Table 47: Summary of age of acquisition of Lulama's missing phonemes based on data from other studies**

| | **Mowrer & Burger, 1991** | **Tuomi et al., 2001** | **Maphalala et al., 2014** | **Lulama's age** | **Comment** |
|---|---|---|---|---|---|
| **Age of children in study** | Ages 2;6 – 6;0 | Ages 1;0 – 3;0 years | Ages 3;0 – 6;0 years | 4;0 | |
| **cʰ** | 6 and over | After 3 years | After 6;0 | 4;0 | Age appropriate |
| **ɟ** | 6 and over | Not specified | 5;1 – 6;0 | 4;0 | Age appropriate |
| **ɣ** | 2;6 – 3;0 | After 3 years | 3;7 – 4;0 | 4;0 | Not age appropriate |
| **dz** | 3;6 – 4;0 | After 3 years | 3;7 – 4;0 | 4;0 | Should be in the process of acquiring this sound |
| **kx** | 2;6 – 3;6 | After 3 years | 4;1 – 5;0 | 4;0 | Should be in the process of acquiring sound |
| **tsʰ** | 2;6 – 3;0 | Not specified | Some children aged 3;7 to 4;0 used this phoneme, otherwise 5;1 – 6;0. | 4;0 | Age appropriate |

Lulama was able to use all five of the isiXhosa vowels accurately, as summarized in Table 48.

Table 48: Lulama's isiXhosa vowels

| | Present | Example |
|---|---|---|
| **Front** | i, ɛ | ***i**papa* [porridge], *amay**e**za* [medicine] |
| **Central** | ʌ | *lp**a**p**a*** [porridge] |
| **Back** | u, ɔ | ***u**mgca* [line], *isiXh**o**sa* |

### 4.3.2 Severity Indices (PCC, PVC and PPC)

Lulama achieved a PCC of 80%. Again, as with Gcobisa, if Lulama deleted a prefix the consonants in that prefix were not considered incorrect. Considering the small set of data collected by Maphalala et al. (2014), this is below the mean PCC of children aged 3;7–4;0 years of 97.75%, suggesting Lulama's isiXhosa PCC is below the level expected for her age.

Lulama's percentage vowels correct was established. In isiXhosa it is acceptable to use vowel elision in the prefix of words (Maphalala et al., 2014), and as such, any errors caused by vowel elision in the prefix were not included as errors in the PVC (for example, Lulama produced *qanda* [egg] for *iqanda* [egg]). In addition, Lulama often deleted the final vowel of a word (e.g. /ikʌt/ for *ikati* [cat]). This error does not affect the meaning of words and is used by some adults and so these, too, were not included in the count of error sounds. She achieved a PVC of 99%, similar to the small set of data collected with *Masincokoleni* (Maphalala et al., 2014). Considering her PCC and PVC, Lulama had a PPC of 90%.

### 4.3.3 Phonology

As in English, many of Lulama's phonological processes were isolated instances, with the exception of simplification of clicks (see Table 49). This is a typical step in the acquisition of clicks (Gxilishe, 2004; Lewis & Roux, 1996). Lulama produced isolated examples of phonological process documented in other isiXhosa studies (Maphalala et al., 2014): deaffrication, stopping, fronting, gliding, devoicing, denasalisation and palatal substitution. Other processes that are considered non-developmental in English were also used on a few occasions: backing, lateralization and substitution of clicks with other phonemes (this process was not noted by Lewis and Roux (1996) and was therefore considered to be non-developmental). However,

Pascoe et al. (2015) suggested that in their sample, backing was more common in children acquiring both isiXhosa and English than in monolingual English children. This suggests that the phonological process of backing may be typical in the speech of children acquiring both isiXhosa and English.

Table 49: Lulama's phonological processes in isiXhosa (initial assessment)

| PHONOLOGICAL PROCESSES | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Developmental Processes** | | | |
| **Velar simplification** (Lewis & Roux, 1996) | /ǁ/ → /k/ | /kɔlɔ/ for *ixolo* [peel] | Although this is a developmental error, Lulama should be using these basic clicks in words and as such this is not age appropriate. |
| | /ǁʰ/ → /k/ | /kɔsʌ/ for *isiXhosa* [the language] | |
| | /!/ → /k/ | /kʌndʌ/ for *iqanda* [egg] | |
| | /!ʰ/ → /k/ | /ujʌkub/ for *uyaqhuba* [drive] | |
| **Alveolar simplification** (Lewis & Roux, 1996) | /ǀʰ/ → /t/ | /ujʌtɛb/ for *uyacheba* [cutting] | Not age appropriate |
| | /ǀ/ → /t/ | /itʌŋgɔ/ for *ucango* [door] | |
| | /ǁʰ/ → /d/ | /bʌjʌdɔlʌ/ for *bayangxola* [noise] | |
| **Developmental processes used in isolated words** | | | |
| **Deaffrication** | /dʒ/ → /ts/ | /ɔrɛntsi/ for *iorenji* [orange] | Used by 50% of children aged 3;7 – 4;0 years in Maphalala et al. (2014) |
| | /tʃ/ → /ts/ | /wɔts/ for *iwotshi* [watch] | |
| | /dz/ → /z/ | /izɛzɛ/ for *idzedze* [flea] | |
| | /kx/ → /k/ | /ukʌzulʌ/ for *uyakrazula* [tear] | |
| **Stopping** | /kx/ → /k/ | /ukʌzulʌ/ for *uyakrazula* [tear] | Both sounds not present in inventory |
| | /tsʰ/ → /t/ | /isitʌbʌ/ for *isithsaba* [crown] | |
| **Fronting** | /c/ → /t/ | /kut/ for *ukutya* [food] | Not recorded in Maphalala et al. (2014). /ɟ/ not present in Lulama's inventory. |
| | /ɟ/ → /d/ | /idʌsi/ for *idyasi* [jacket] | |

| | | | |
|---|---|---|---|
| **Gliding** | /l/ → /j/ | /ŋk\|ɛŋk\|ɛʃɛjʌ/ for *nkcenkcenshela* [watering] | Only instance of gliding |
| **Devoicing** | /ɮ/ → /ɬ/ | /iɬɛbɛ/ for *indlebe* [ear] | Only instance of devoicing |
| **Denasalisation** | /n/ → ø | /itlɔk/ for *intloko* [head]<br>/iɬɛbɛ/ for *indlebe* [ear] | Used by 50% of children in the 3;7 – 4;0 age group in Maphalala et al. (2014) |
| **Palatal substitution** (Lewis & Roux, 1996) | /!g/ → /\|g/ | /u\|giɬʌ/ for *ugqirha* [doctor] | |
| **Non-developmental processes used in isolated instances** | | | |
| **Backing** | /cʰ/ → /k/<br><br>/ɓ/ → /d/ | /ujʌkʌlʌ/ for *uyatyhala* [push]<br><br>/in!inidʌ/ for *ingqiniba* [elbow] | /cʰ/ not present in Lulama's inventory. Only used in this word. |
| **Lateralisation** | /x/ → /ɬ/ | /u!giɬʌ/ for *ugqirha* [doctor] | Only instance of lateralization. |
| **Unusual substitutions for clicks** | /‖g/ → /nd/<br><br>/!g/ →/gl/ | /ʌmʌndʌ/ for *amagxa* [shoulder]<br><br>ugliɬʌ for *ugqirha* [doctor] | |

### 4.3.4 Connected Speech

Again, it was difficult to obtain a connected speech sample. This was partly due to the researcher's limited knowledge of isiXhosa and because Lulama was shy, making it difficult to elicit full sentences. She also associated the researcher predominantly with English, as this was the primary language used to communicate with Lulama. This resulted in the majority of her communication with the researcher being in English.

### 4.3.5 Stimulability and Articulation

During the *Masincokoleni* assessment, there were a variety of phonemes that Lulama did not demonstrate the ability to use in words. Her stimulability for these phonemes was assessed, and she was found to be stimulable for /cʼ/, /x/ and /ɮ/. This suggests that these phonemes are present in her phonetic inventory in isiXhosa (Table 46). However, her ability to use these phonemes accurately in words was not always consistent, as she used the phonemes inconsistently over the assessment sessions.

### 4.3.6 Consistency

Although *Masincokoleni* does not include an inconsistency subtest, over the course of the assessment Lulama produced 15 words twice. Of these 15 words, only five were produced inconsistently and these have been summarized in Table 50. Most of these inconsistencies contrast an accurate production with an inaccurate production. The only two instances of inconsistent errors are in the words *ugqirha* [doctor] and *ingqiniba* [elbow], giving an inconsistency of 13%. Lulama's speech was therefore considered to be consistent.

**Table 50: Lulama's inconsistent productions in the isiXhosa assessment (initial assessment)**

| Target | First production | Second production |
|---|---|---|
| ***iorenji*** | iɔrɛndʒi | ɔrɛntsi |
| ***ugqirha*** | u!giɬʌ | u\|giɬʌ |
| ***uyapheka*** | xʌp$^{h}$ɛk | jʌp$^{h}$ɛk |
| ***nkcenkceshela*** | ŋk\|ɛŋk\|ɛʃɛjʌ | ŋk\|ɛŋk\|ɛʃɛlʌ |
| ***ingqiniba*** | iŋ!inidʌ | iŋ!ininʌ |

### 4.3.7 Summary

Lulama's isiXhosa phonetic inventory is not yet complete. Although it is age appropriate for her to still be acquiring /c$^{h}$/, /ɟ/and /ts$^{h}$/, she should be in the process of acquiring the affricates /kx'/ and /dz/ as previous studies have suggested they are usually acquired around Lulama's age, and she should have already acquired /ɣ/. In terms of clicks, she should have acquired the basic forms of the clicks (/|/, /‖/, and /!/) and yet did not show evidence of using these clicks in the assessment. However, she was able to use other forms of these clicks (/ŋ|/, /ŋ‖/, /ŋ!/, /|g/ and /!g/). Considering her inventory, it is suggested that her phonological development is delayed. She presented with two consistent phonological processes, velar simplification and alveolar simplification. Both of these processes concern clicks. She made use of a variety of other developmental and non-developmental phonological processes. She was stimulable for some of her error sounds (/c'/, /x/ and /ɮ/) and her speech was consistent.

### 4.3.8 Diagnostic Category

Considering Lulama's inconsistent and often isolated use of phonological processes, it was difficult to place her speech clearly in one of Dodd's diagnostic categories. Given that the bulk of her phonological processes are developmental, this may indicate a phonological delay. However, her difficulties producing some phonemes, particularly the basic clicks, while she can produce some later developing clicks suggest her speech development may be deviating from the typical developmental trajectory. It has been hypothesized that although the surface errors of a child's speech sound disorder may vary across two languages, they will have the same underlying deficit (Holm et al., 1999). Considering her diagnosis of a consistent phonological disorder in English, and the presence of some non-developmental phonological processes in isiXhosa, it was concluded that Lulama would fall in the diagnostic category of consistent phonological disorder. However, it is important to consider that it has been suggested that it is typical for bilingual children to make use of non-developmental phonological processes (Holm et al., 1999; Holm & Dodd, 1999a; Lin & Johnson, 2010). This makes it difficult to ascertain whether Lulama's errors are typical for a bilingual child acquiring isiXhosa and English, or whether they are indicative of a speech sound disorder. However, regardless of the cause of these difficulties, from a functional perspective (as described in sections 4.1 and 4.4) there are concerns regarding Lulama's speech from her parents and teachers, and her speech seems make it difficult for her to participate in activities effectively.

## 4.4 Intelligibility

Lulama's intelligibility was assessed using the *ICS* (McLeod et al., 2012a), sent home to her parents to complete. They were free to consider both of her languages. A form was also completed with Lulama's teacher, although some questions were omitted to make it relevant for her teacher. Her teacher reported on Lulama's English speech, as this is the language spoken at crèche. The results are described in Table 51, and indicate that while Lulama's parents usually understand her, even immediate family members only understand her sometimes and strangers rarely understand her. This was confirmed in the initial assessment sessions, as the researcher found her difficult to understand when she was producing short

sentences or phrases. Her teacher also reported that both her, her teaching assistant and the children in the class only understand Lulama some of the time.

Table 51: Lulama's *Intelligibility in Context* (McLeod et al., 2012a) results (initial assessment)

| | Mother | Teacher |
|---|---|---|
| **1. Do you understand your child?** | 4 - Usually | 3 – Sometimes |
| **2. Do immediate members of your family understand your child?** | 3 - Sometimes | - |
| **3. Do extended members of your family understand your child?** | 3 - Sometimes | - |
| **4. Do your child's friends understand your child?** | 4 - Usually | 3 – Sometimes |
| **5. Do acquaintances understand your child?** | 3 - Sometimes | 3 – Sometimes |
| **6. Do your child's teachers (teacher assistants) understand your child?** | 3 - Sometimes | 3 – Sometimes |
| **7. Do strangers understand your child?** | 2 - rarely | - |
| **TOTAL** | 22/35 | 12/20 |
| **AVERAGE** | 3 | 3 |

## 4.5 Receptive vocabulary assessment results

### 4.5.1 English Receptive Vocabulary

Lulama's receptive vocabulary was assessed using the *PPVT-4*. This assessment has not been standardized on a South African population, and results should be considered with caution. Picture stimuli used were from the isiXhosa translation, where some adaptations were made to make them more culturally appropriate for children in South Africa (Dawes et al., 2012).

Lulama achieved a raw score of 15, with a standard score of 56 and a percentile of 0.2. This suggests her understanding of English vocabulary is significantly below the expected level for her age. However, again it is important to consider the same factors used when interpreting Gcobisa's language scores: firstly, the assessment has not been standardized on a South African population; and secondly, Lulama is bilingual and it is not always possible to differentiate between poor performance on an assessment due to typical bilingual development as opposed to delayed or disordered language development (Kohnert, 2008).

### 4.5.2 IsiXhosa Receptive Vocabulary

Lulama's isiXhosa receptive vocabulary skills were assessed using an isiXhosa translation of the *PPVT-4* that was developed by the Sombambisana initiative (Dawes et al., 2012). She achieved a raw score of 21. It is interesting to note that all the words Lulama understood in English, she understood in isiXhosa. However, the opposite was not true, as she was able to identify some words when the stimuli were given in isiXhosa that she could not identify when the stimuli were given in English. These included "toe", "belt" and "fly". Considering her greater understanding of isiXhosa, her ability to name more words independently in *Masincokoleni*, as well as the parental report of her only starting to learn English when she started attending crèche, it was clear that Lulama's isiXhosa skills are greater than her English skills. However, although both English and isiXhosa receptive vocabulary skills were relatively weak, they were considered adequate for participation in intervention.

## 4.6 Summary of Assessment Results

Lulama's assessment results are summarized in Table 52, and show that although she has a complete phonetic inventory in English, she is missing a wide range of consonants in isiXhosa, including two plosives, a fricative, three affricates and seven clicks. This is not age appropriate as she should have developed /ɣ/, as well as the basic clicks, and considering her age she should be in the process of developing /kx/ and /dz/. Her PCC, PVC and PPC scores are similar across both English and isiXhosa. She used many isolated developmental and non-developmental phonological processes in both languages. She also made consistent use of cluster reduction for s-clusters and the non-developmental process of lateralization of /ɹ/ in English, as well as velar and alveolar simplification of clicks in isiXhosa. Her speech was more inconsistent in English than in isiXhosa, but in both languages her level of inconsistency was appropriate. She had age appropriate oro-motor skills. Although diagnosis was not clear, a possible diagnosis of a consistent phonological disorder was suggested. Her receptive language skills appeared to be slightly stronger in isiXhosa than English.

Table 52: Summary of Lulama's assessment results (initial assessment)

| | English | isiXhosa |
|---|---|---|
| **Speech Inventory (missing sounds)** | All present | /cʰ/, /ɟ/, /ɣ/, /dz/, /kx'/, /tsʰ/, /ǀ/, /ǁ/, /!/,/ǁg/, /ǀʰ/, /ǁʰ/, /!ʰ/ |
| **PCC** | 85% | 80% |
| **PVC** | 96% | 99% |
| **PPC** | 87% | 90% |
| **Phonological processes** | Cluster reduction, lateralization, fronting of /ʃ/ and many isolated processes | Velar simplification, alveolar simplification, and many isolated processes |
| **Inconsistency** | 28% | 13% |
| **Oro-motor skills** | Age appropriate | |
| | | |
| **Language (receptive)** | RS 15 | RS 21 |

## 4.7 Intervention Plan

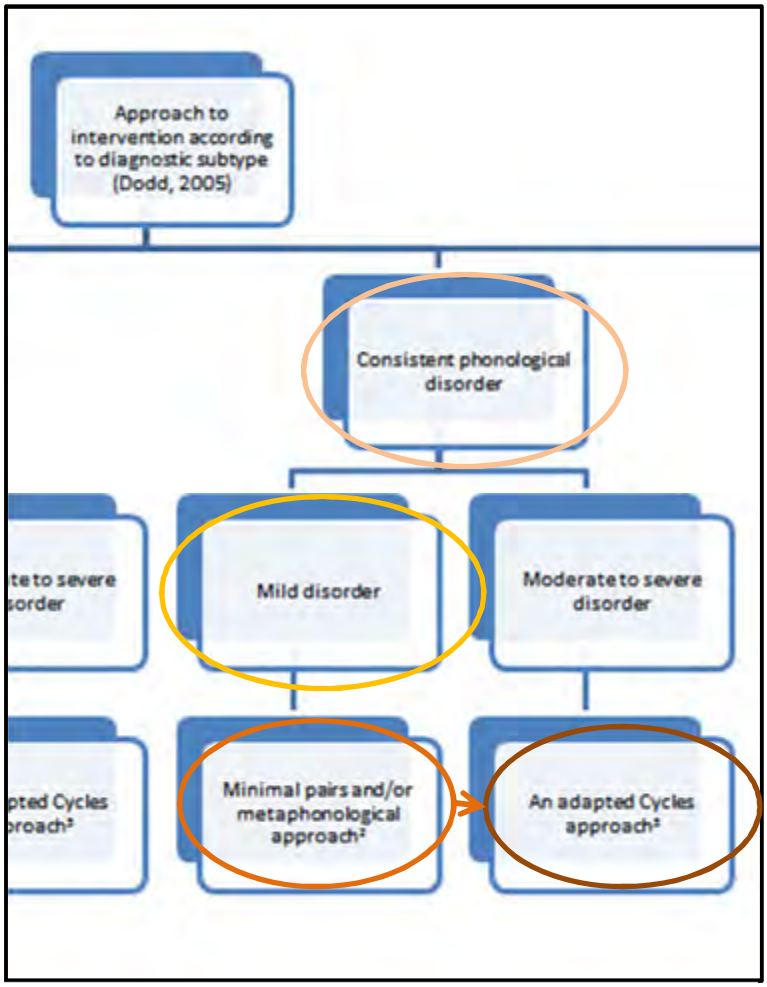



Figure 11: Decision making process for approach to intervention

### 4.7.1 Overview

An intervention plan was developed according to the decision making process outlined in section 2.9.2. This process was more challenging than it was for Gcobisa, resulting in some revisions being made to the intervention plan according to the outcomes of the first few sessions. Figure 11 summarizes the decision making process to determine the appropriate approach to intervention, showing the relevant section from Figure 2 in section 2.9.2. This is explained in more

detail in section 4.7.2. It was concluded that intervention should take place in English. This decision is diagrammed in Figure 12 and discussed in more detail in section 4.7.6.

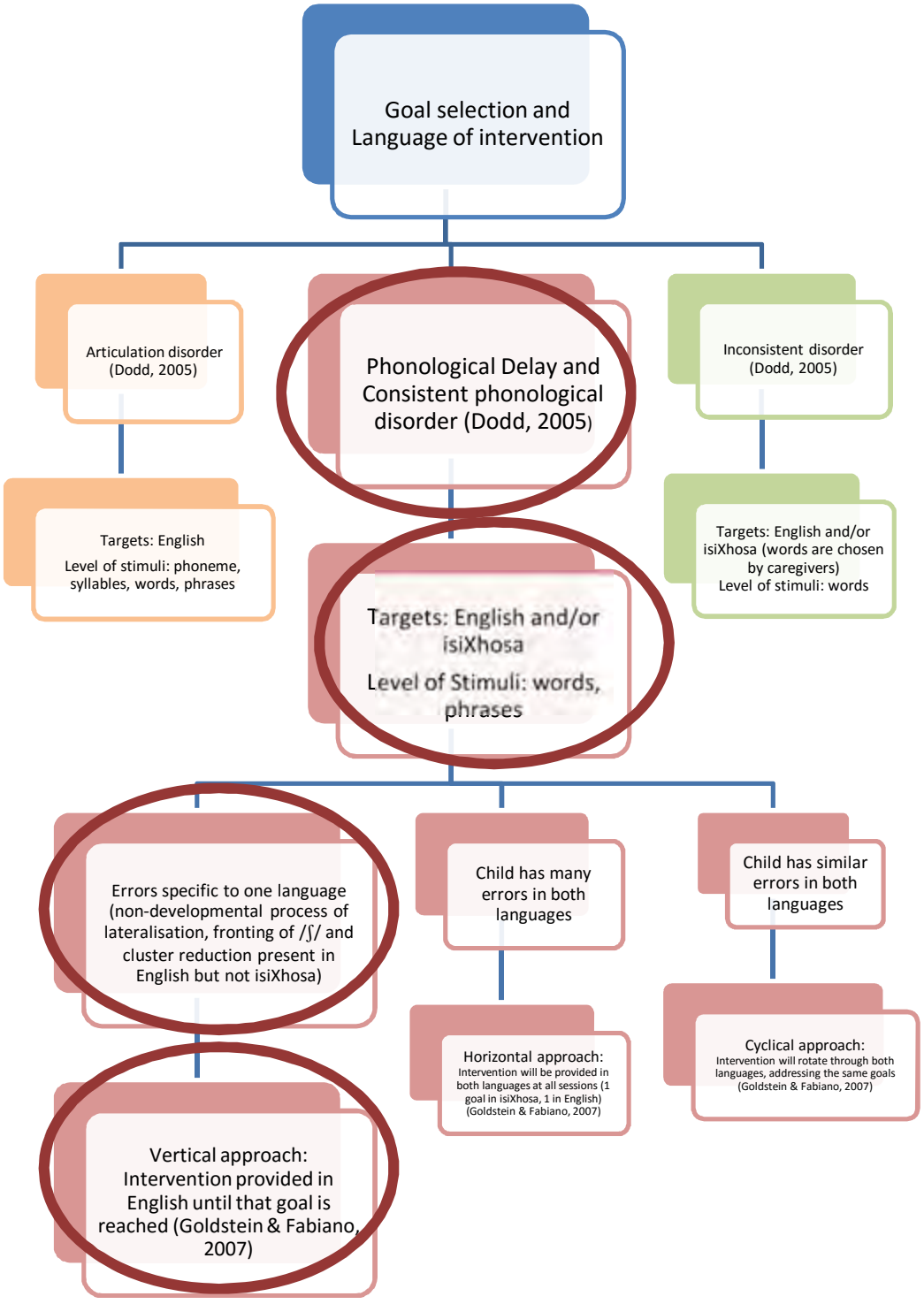



Figure 12: Decision making for language of intervention

### 4.7.2 Approach

As Lulama had a mild consistent phonological disorder, a minimal pairs approach was selected. However, after eight sessions of intervention using minimal pairs to work on one phonological process, it was noted that the child was making little progress and becoming frustrated. It was decided to include some additional phonological processes using an adapted cycles approach (Prezas & Hodson, 2010) to vary the intervention and provide Lulama with more opportunities for success.

### 4.7.3 Rationale

Lulama was diagnosed with a mild, consistent phonological disorder, as although she used a variety of phonological processes on isolated instances, she consistently used only a few phonological processes: cluster reduction and lateralization in English, and velar and alveolar simplification of clicks in isiXhosa. Minimal pairs is appropriate for this type of speech sound disorder (Baker, 2010). However, following eight sessions of intervention, the approach was changed to a modified cycles approach, still using meaningful contrasts, in order to provide Lulama with the opportunity to be successful and to motivate her. The cycles approach (described in section 1.5.3) was originally developed for children with highly unintelligible speech, and uses cycles of targets in order to increase a child's intelligibility more quickly than focusing on one target until mastery is achieved (Prezas & Hodson, 2010).

### 4.7.4 Theoretical Framework

Both minimal pairs and the cycle approach are appropriate intervention approaches for a consistent phonological disorder (Baker, 2010; Prezas & Hodson, 2010). This has been discussed in section 1.5.1 and 1.5.3. Both approaches focus on the phonological system, making it appropriate for a speech sound disorder that is phonological in nature. Although minimal pairs have been used with bilingual children (e.g. Holm & Dodd, 2001; Ray, 2002), there has been limited research into the use of cycles approach with this population (Prezas & Hodson, 2010).

### 4.7.5 Aim for Intervention

Considering Lulama's speech profile and diagnosis of consistent phonological disorder, it was decided that it would be appropriate to target one of Lulama's non-developmental phonological processes. Lulama made use of more non-developmental phonological processes in English than in isiXhosa, so this data was initially examined to determine an appropriate aim. Considering Lulama seemed to be able to produce /ɹ/ on some occasions, and yet on the majority of attempts used the non-developmental phonological process of lateralization, this was chosen as an appropriate target. Initially, the aim was that Lulama will be able to produce /ɹ/ accurately as a singleton and in clusters in initial and medial position in words.

Following eight sessions of intervention, the approach and target of intervention was reviewed as Lulama appeared to be making little progress and was getting frustrated. An adapted cycles approach led to two further phonological processes being included in the intervention aims. Considering Lulama's main developmental phonological process in English was cluster reduction, this was considered as an appropriate phonological process to target. McLeod et al. (2001) summarize the development of clusters, and suggest that by her age, Lulama should be producing the clusters /tw/ and /kw/ accurately. Close investigation of her speech in the assessment suggested that her production of these clusters was not yet consistent. In addition, the cluster /sw/ was included as it too was not yet consistently used, and s-clusters are recommended as one of the primary targets in the cycles approach (Prezas & Hodson, 2010). These three clusters containing /w/ were therefore considered appropriate to address as they were not consistently used, and targeting them may provide Lulama with more opportunities for success, an important aspect of the cycles approach. Finally, the phoneme /ʃ/ was included as a target, as Lulama had difficulty producing this phoneme, often fronting it. She should have eliminated the phonological process of fronting by the age of 3;5 years (Dodd et al., 2002). It was considered an appropriate target considering the developmental order of phonological process elimination.

From session nine to sixteen, Lulama's aims were as follows:

- Lulama will be able to produce /ɹ/ accurately as a singleton and in clusters in initial and medial position in words.
- Lulama will be able to produce the clusters /tw/, /kw/ and /sw/ accurately in initial position in words.
- Lulama will be able to produce the phoneme /ʃ/ accurately in initial position in words without fronting it to /s/.

### 4.7.6 Language

As Lulama had many errors in her speech in both languages, it was initially difficult to determine the appropriate language for targets and consideration was given to the horizontal approach where intervention would be provided in both languages in all sessions (Goldstein & Fabiano, 2007). However, considering that the majority of her errors were isolated occurrences, her more consistent phonological processes were considered: cluster reduction for s-clusters and the non-developmental process of lateralization of /ɹ/ in English, as well as velar and alveolar simplification of clicks in isiXhosa. It was concluded that she had more consistent errors in English, as her isiXhosa phonological processes only affected the click sounds, while her consistent phonological processes in English affected a wider range of phonemes and clusters. A few factors were taken into consideration: isiXhosa does not contain the approximant /ɹ/, but rather a dialectal variant, the trill /r/ (Pascoe et al., 2015), and the phoneme/r/ is often only used in loanwords (e.g. *i-orenji* [orange] and *irayisi* [rice]) and is therefore not frequently used (Maphalala et al., 2014; Niesler et al., 2005); Lulama did not exhibit fronting of /ʃ/ in isiXhosa; and there are few clusters in isiXhosa (Maphalala et al., 2014). From this, it was determined that it would be appropriate to provide intervention in English, using English targets.

### 4.7.7 Hypothesis/Research Questions

Lulama had a consistent phonological disorder and intervention was designed to focus on her phonological system. However, in contrast to Gcobisa, Lulama did not exhibit with phonological processes that were common across both isiXhosa and English, and her

phonological processes were considered non-developmental. The bilingual intervention studies considered included children who were diagnosed with an articulation disorder (Holm & Dodd, 2001; Holm, Dodd, & Ozanne, 1997), a phonological delay (Holm & Dodd, 2001; Holm, Dodd, & Ozanne, 1997; Ray, 2002), an inconsistent disorder (Holm & Dodd, 2001; Holm & Dodd, 1999b), or apraxia of speech (Gildersleeve-Neumann & Goldstein, 2015). There is little considering intervention for a bilingual child with a consistent phonological disorder.

The similarities between Lulama's English and isiXhosa speech were considered to determine whether there were any indications of interaction between her two phonological systems. It was noted that Lulama had difficulties with the affricates /tʃ/ and /dʒ/ in both languages, although the phonological process of deaffrication was more consistent in isiXhosa than in English. Another common phonological process was stopping, although this was used for phonemes Lulama had yet to acquire in isiXhosa but for phonemes Lulama had already acquired in English. In addition, Lulama did produce one instance of lateralization in isiXhosa, for the phoneme /x/, but used lateralization of /ɹ/ frequently in English. There were common phonological processes, but differences in how she used them in the two languages, showing an interaction between the two systems. Considering this, changes in her English phonological system may result in changes in her isiXhosa phonological system, depending on the nature and extent of interaction between the two systems.

Considering the first aim (to produce /ɹ/ accurately as a singleton and in clusters in initial and medial position in words) Lulama showed evidence of producing /ɹ/ with adequate accuracy to be perceived as correct both as a singleton and in clusters. As such, it was hypothesized that she would be able to eliminate this non-developmental process of lateralization with relative ease. The phoneme/ɹ/ is not found in isiXhosa. The dialectal variant /r/ appears although it is infrequent in the language (Maphalala et al., 2014; Niesler et al., 2005). Since Lulama produced it accurately in the only word containing /r/ in *Masincokoleni*, it was hypothesized that the results of this aim would not be evident in her isiXhosa speech due to there being little opportunity to demonstrate it.

The second aim considered consonant clusters (to produce the clusters /tw/, /kw/ and /sw/ accurately in initial position in words). As there are few consonant clusters in isiXhosa (Maphalala et al., 2014) and Lulama did not show any difficulties with the few clusters present in the *Masincokoleni*, it was hypothesized that the results would also not be evident in her isiXhosa speech, again due to the lack of opportunity to demonstrate it.

The third aim considered the phoneme /ʃ/. The assessment results suggested that Lulama was able to produce this accurately in isiXhosa, although there were only limited opportunities to produce it in *Masincokoleni*. However, she had more difficulty with this phoneme in English, at times producing it accurately, at times distorting it and at times fronting it to /s/. Her apparent ease of production of /ʃ/ in isiXhosa and difficulty of production of /ʃ/ in English again suggests the possibility that Lulama may have two differentiated phonological systems for her two languages, but as has been suggested, these two systems interact (Hambly et al., 2013). Considering she initially acquired isiXhosa as a home language, and then began acquiring English at school (successive bilingualism), it may suggest she either is applying the rules from her isiXhosa phonology to English, or she has developed a second phonological system for English that is being influenced by her more established isiXhosa phonology.

Considering the aims chosen for intervention, it was suggested change would occur in Lulama's English speech but that little or no change would occur in her isiXhosa speech as she would have little opportunity to use the targeted phonemes in isiXhosa speech.

### 4.7.8 Short Term Aims

As intervention initially followed a minimal pairs approach, similar short term aims to Gcobisa (see section 3.7.8) were developed for Lulama:

1. **Familiarize Lulama with the minimal pair pictures and words.**

Target words and cognate pairs were introduced to Lulama. The following minimal pairs were used:

*Rain – lane*

*Rock – lock*

*Rake – lake*

*Read – lead*

*Right – light*

As suggested by Baker (2010), meaningful minimal pairs were used. In addition, one of Lulama's errors (*rain – lane*) were included in the minimal pairs. All of the words included the target sound in the initial position, and were single syllable words with a consonant – vowel – consonant (CVC) structure.

2. **Perception training**

Lulama was required to identify the correct picture when either of the minimal pair words was named.

3. **Imitation of target words**

Lulama was then required to imitate each of the five target words presented in section one (*rain, rock, rake, read* and *right*), and was provided with articulatory instruction if necessary.

4. **Production of minimal pairs**

Lulama was then required to request a target word, and meaning-based feedback was provided to highlight the breakdown in communication as described by Baker (2010).

However, following revision of the intervention approach, each session was also started with the following aim:

5. **Auditory stimulation of the target sound**

Part of the cycles approach includes providing the child with opportunity to hear the adult model of a sound in words, as typically children acquire speech by listening to an adult model (Ingram, 1986).

Within the sessions, a minimal pairs approach was continued, but new target sounds were included. As such, further minimal pairs were used in order to address the process of fronting:

*See – she*

*Sore – shore*

*Sue – shoe*

*Sip – ship*

*Sign – shine*

Words were chosen that could be represented by pictures, and the word structures included CV and CVC words.

In order to address Lulama's production of clusters, a word list was developed that contained clusters with /w/ that could easily be depicted by pictures as follows: *twins, twenty, twelve, queen, question, quick, swim, sweet, swing*. As Lulama's difficulties with these clusters were not consistent (at times she would reduce the cluster and at times she would substitute the /w/ with /l/), it was decided that minimal pairs would not be used for this aim.

#### 4.7.9 Generalisation Activities

The intervention plan included activities that could elicit phrases and sentences to aid generalization to other words containing the target sound, and to connected speech. However, during the 16 sessions of intervention, this stage was not reached by Lulama, and these activities were not carried out.

## 4.8 Outcomes

Lulama attended 16 sessions of intervention over eight weeks. She was seen twice a week in an empty room at her crèche. Whenever possible, sessions lasted 30 minutes, although on one or two occasions, crèche activities resulted in a shorter session. In addition, on one occasion Lulama was distracted by activities occurring in her adjoining classroom so the planned activities were abandoned as Lulama would not have benefited from them. She received

approximately seven hours and 45 minutes of intervention. The fidelity rubric was completed at each session, and 100% fidelity recorded. Lulama became familiar with the researcher quickly following the assessment sessions. However, her weaker language skills became a barrier as intervention continued, as well as her difficulties staying focused on the activity for long enough to understand what was expected of her.

**Step 1: Familiarization with words and pictures: Outcome**

Lulama was introduced to the pictures of the minimal pairs. Examples of minimal pairs for /ɹ/ and /l/ as well as /ʃ/ and /s/ are in Figure 13.

Figure 13: Examples of minimal pairs: *lock* and *rock; sip* and *ship*

**Step 2: Perception training: Outcome**

The first set of minimal pairs presented to Lulama included the sounds /ɹ/ and /l/. Lulama had difficulty with this task at first, although she soon understood the task and improved by the third session. Throughout this step, she was presented with one pair of minimal pairs at a time, rather than all five pairs. Outcomes are summarized in Figure 14.

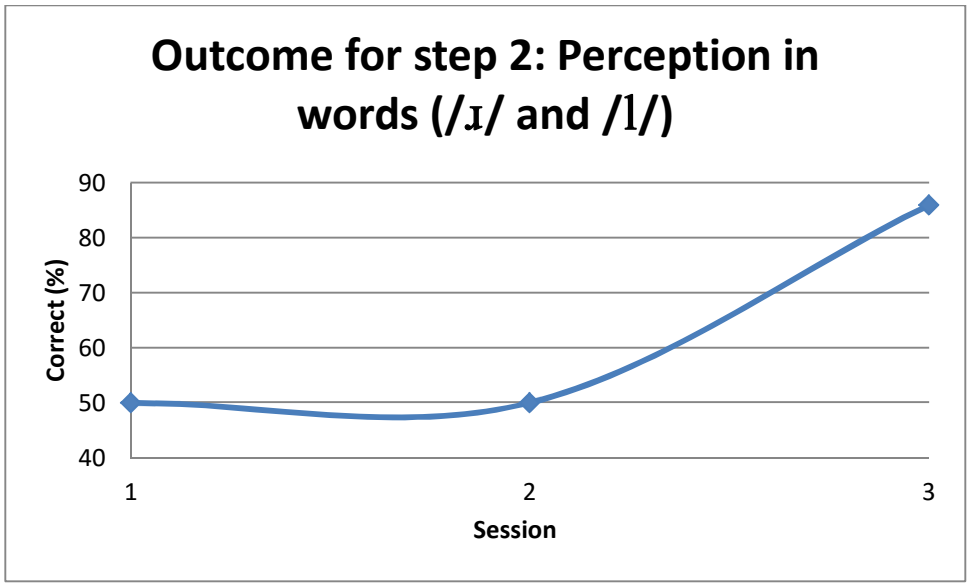



Figure 14: Graph showing Lulama's progress for step 2: /ɹ/ and /l/

In the first session she achieved an accuracy of 50%, suggesting her responses were mostly based on chance. She achieved a similar result in session two. However, by session three, Lulama was able to discriminate between the two phonemes in initial position in words with 86% accuracy, and this aim was considered to be achieved.

After session eight, further target sounds were introduced, and Lulama was required to make a judgment between words containing /ʃ/ and /s/ in initial position. This has been summarized in Figure 15.

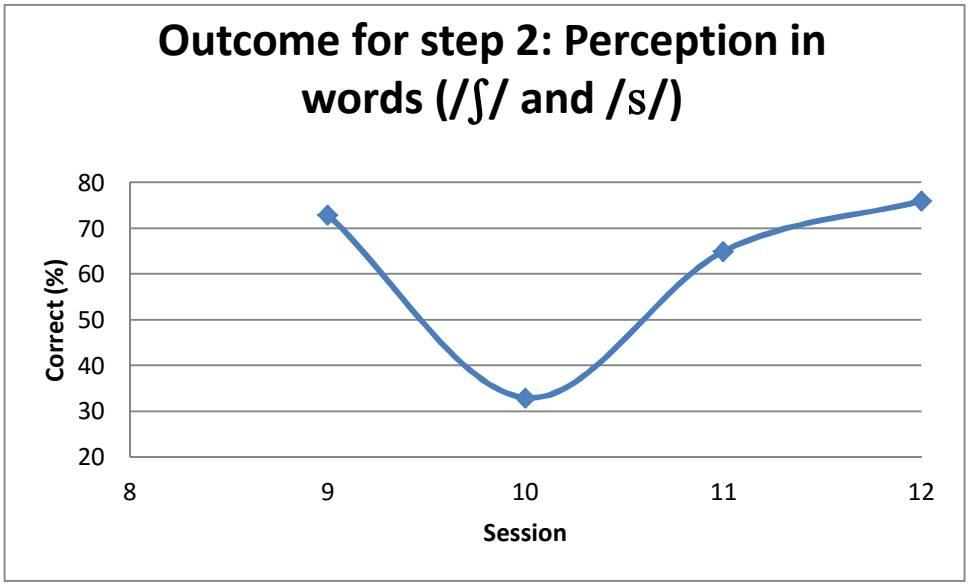



Figure 15: Graph showing Lulama's progress for step 2: /ʃ/ and /s/

Lulama started with relative success, as she was able to discriminate between the sounds in words with an accuracy of 73% in session nine. However, during session ten Lulama was very distracted, listening more closely to the children in the adjoining classroom and not concentrating on the discrimination task. After 15 minutes it was decided that continuing with the session would not be of any benefit, and she returned to class. She had achieved an accuracy of 33% in that session. In session 11, it was noted that Lulama relied heavily on the meaning of words. For example, she had a good understanding of the words "shoe" and "sore", and was able to identify these pictures with ease. She was therefore able to discriminate between the words in these two pairs with 100% accuracy. She had more difficulty discriminating between words where her understanding of the words was not as established, such as the pairs "shine" and "sign", and "ship" and "sip". By session 12, Lulama was able to discriminate between the words with 76% accuracy.

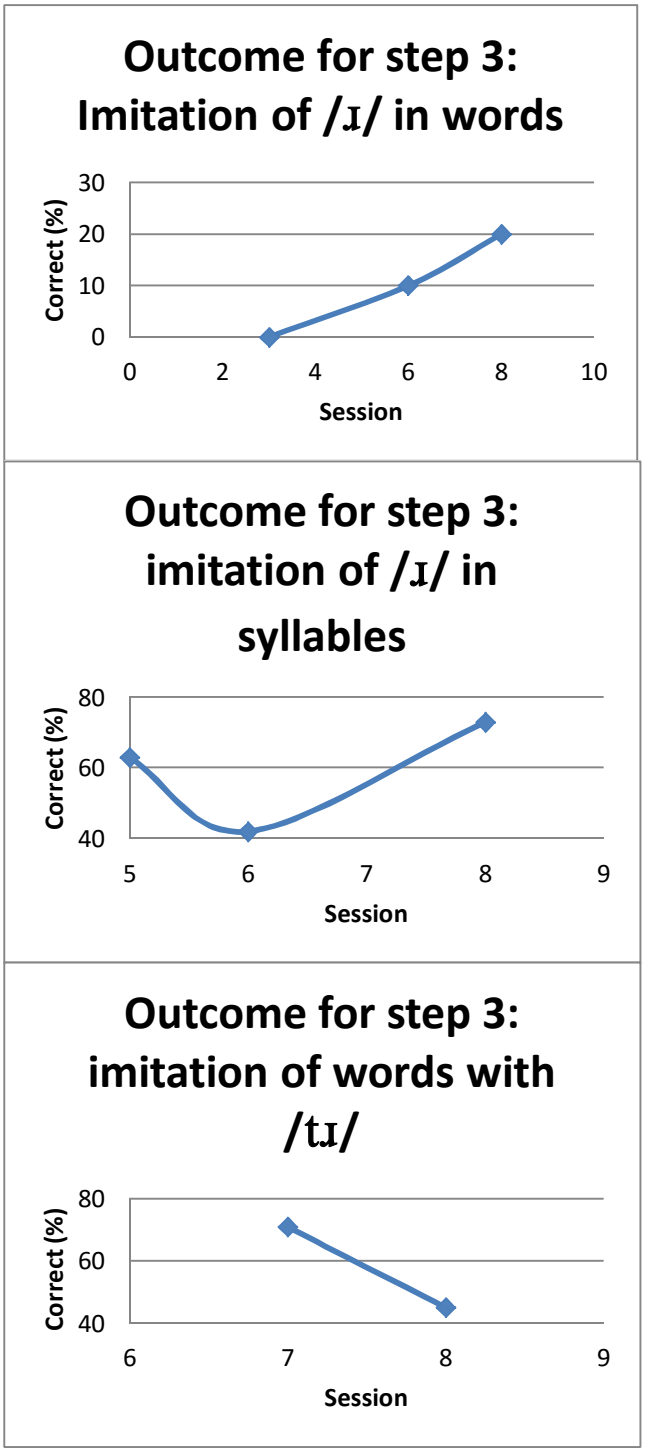



Figure 16: Graph showing Lulama's outcomes for step 3

**Step 3: Imitation of target words: Outcome**

In session 3, the repetition activity was introduced to Lulama. Her success in the different tasks has been summarized in Figure 16. She had great difficulty at first, and was unable to imitate any words correctly in this initial activity. In session 4, Lulama was encouraged to produce the

phoneme /ɹ/ in isolation before including it in words. However, this was also challenging. This was unexpected, as she could produce the phoneme in the assessment. Various activities were used to aid Lulama's production of /ɹ/, including a "play dough tongue" to help her position her tongue, working in front of the mirror to aid her placement of articulators, as well as using other sounds to transition to /ɹ/ (including /iː/ and /ʃ/). She enjoyed playing with the play dough, but did not understand the connection between the play dough tongue and her own tongue. She became very distracted by her own appearance when looking in the mirror. When transitioning from the phoneme /iː/ to /ɹ/ she was able to obtain some success, although had great difficulty when required to produce a syllable with /ɹ/. At this point, intervention moved to a more motoric/traditional articulation approach, as a lot of focus was placed on tongue placement and producing the sound in isolation. In addition, it was noted that Lulama's difficulty understanding English was affecting her ability to take part in intervention effectively, and the researcher had to consider ways to help Lulama understand what was expected of her using a level of language appropriate for Lulama. In session six, Lulama's accuracy of producing syllables with /ɹ/ in initial position decreased to 23%. However, it was noted on some occasions Lulama produced the glide /j/. This would be the age appropriate developmental error of gliding, and as such was considered correct. Her accuracy, including accurate productions of both /ɹ/ and /j/, was therefore calculated to be 42%.

In session seven, clusters containing /ɹ/ were targeted. This is because Lulama had had greater success with clusters containing /ɹ/ in the assessment in comparison to singletons (see section 4.2.3.1), and it has been suggested that the phoneme /ɹ/ may appear in clusters before it appears as a singleton in a child's speech (McLeod & Bleile, 2003). Lulama was able to imitate words at an accuracy of 71%, although this decreased to 45% in session eight. However, in session eight she was more consistent in imitating syllables containing /ɹ/, achieving an accuracy of 73%.

Over the sessions, Lulama's ability to imitate the target words with /ɹ/ in initial position continued to be probed, and in session eight she was able to produce 20% of the words accurately.

Although the perception of /ʃ/ and /s/ was introduced (step 2), there was insufficient time to move on to repetition of /ʃ/ in words.

The third target was clusters containing /w/. Lulama was introduced to these words in session 14 and imitation activities were included. Outcomes are summarized in Figure 17.

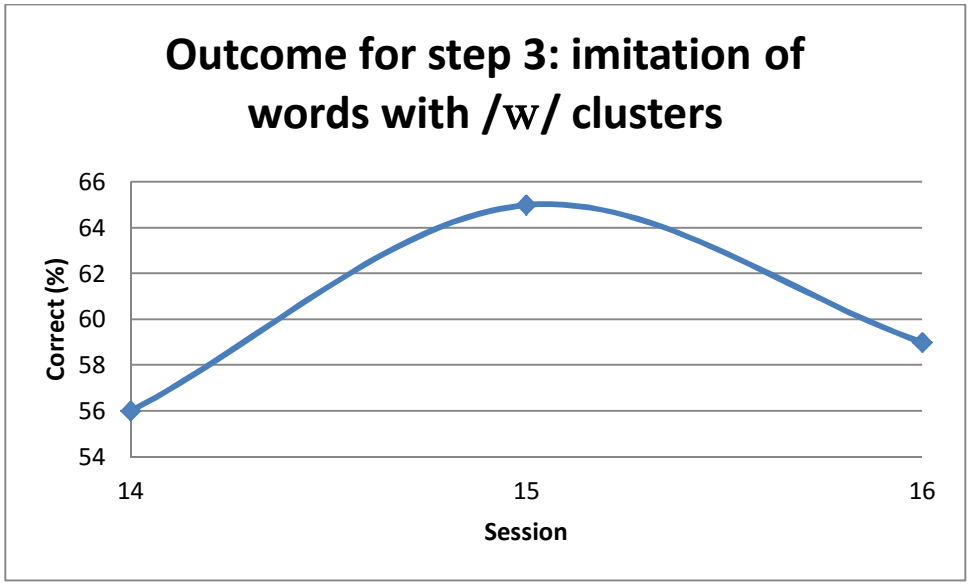



Figure 17: Graph showing Lulama's outcome for step 3: clusters

Lulama initially made progress, from 56% accuracy in session 14 to 65% accuracy in session 15. However, in the final session she only achieved 59%. Her errors included both cluster reduction, and substitution of the /w/ with /l/.

**Step 4: Production of minimal pairs: Outcome**

Following four sessions targeting /ʃ/ (approximately one and a half hours, the time that should be allocated for each target within a cycle (Prezas & Hodson, 2010)), and considering Lulama had shown some, albeit limited success at producing /ɹ/ in words in previous sessions, it was decided to include a minimal pairs activities where Lulama was required to request a word, and

an incorrect production would result in a communication breakdown. It was hypothesized that this may result in motivating Lulama to produce /ɹ/ more consistently. However, Lulama did not understand the concept, and could not make sense of why she was given the incorrect picture/object when she used the incorrect word.

**Home Programme**

Over the course of intervention, activities were sent home for Lulama to do with her parents. Lulama's parents were eager for their child to progress in therapy, as they could see that she was struggling to communicate. They completed many of the activities at home. Activities included stimuli with the phoneme /ɹ/, where Lulama's parents were encouraged to stimulate her production of /ɹ/ in syllables and words. Her parents reported that they engaged with her in an "informal" way to ensure she was comfortable, and they noted slow progress.

## 4.9 English Speech Reassessment Results

Following intervention, Lulama was reassessed. She was 4;4 years at the time of reassessment. The results were as follows:

### 4.9.1 Consonant and Vowel Inventories

On analysis of Lulama's consonant inventory, it was noted that, as before, she was able to produce all English consonants (see Table 37). Although all consonants were present in her speech, she was not always able to use them accurately in words. In addition, although she was able to use the phoneme /ð/ in the word *feather*, she had more difficulty producing this phoneme in isolation. Lulama again showed evidence of being able to produce all English vowels and diphthongs (Table 38). However, she still made use of some vowel substitutions (e.g. /gal/ for /gɜl/).

### 4.9.2 Severity Indices (PCC, PVC, PPC)

The PCC, PVC and PPC were calculated for the phonology subtest. As can be seen in Table 53, although Lulama's PCC reduced slightly, there was also a slight improvement in her PVC on reassessment. Her percentile rank for PPC remained the same, and was still within the average

range for her age. However, this suggests there had been little improvement in her speech over the eight weeks of intervention.

The data from the small sample of isiXhosa-English bilingual 3 year olds assessed in Cape Town was considered, and their mean PCC of 83.5% (Pascoe et al., 2015), suggests that Lulama's PCC was still in a similar range. However, it is important to note that on reassessment, Lulama was 4 years 4 months, while the data is based on 3 year old children.

Table 53: Lulama's PCC, PVC and PPC for initial assessment and reassessment

| | INITIAL ASSESSMENT (4;0 years) | | REASSESSMENT (4;4 years) | |
|---|---|---|---|---|
| | | Percentile rank (Dodd et al., 2002) | | Percentile rank (Dodd et al., 2002) |
| **PCC** | 85 | 37 | 82 | 25 |
| **PVC** | 96 | 9 | 99 | 50 |
| **PPC** | 87 | 25 | 88 | 25 |

### 4.9.3 Phonological Processes

Lulama's phonological processes used in the phonology assessment were analysed, and again she showed evidence of using cluster reduction, lateralization of /ɹ/ as well as a range of other isolated phonological processes. These have been listed in Table 54.

Lulama still makes use of the phonological process of cluster reduction. However, it is interesting to note that while on initial assessment she reduced the tricluster /skw/ to only one element (/k/), on reassessment she produced two elements of the tricluster, to produce /kwɛə/. In this word, she produced the cluster /kw/ accurately, which was one of the targets of intervention. In addition, there was only one instance of each of the developmental phonological processes of fronting, stopping, assimilation and deaffrication.

Considering Lulama's non-developmental phonological processes, she appeared to use more instances of lateralization of /ɹ/ to /l/, as in the initial assessment she used this process on four occasions in the phonology assessment, while on reassessment she used the process nine times in the phonology assessment. However, she no longer used the non-developmental phonological process of lateralization of /w/ to /l/. She continued to use an intrusive

consonant in the word *pig*, which she only used in this word, as well as a range of substitutions for the phoneme /θ/.

Table 54: Lulama's phonological processes in English on reassessment

| Phonological process | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Cluster reduction** | /sp/ → /p/ | /paɪdə/ for *spider* | Age appropriate (Dodd et al., 2002) |
| | /sn/ → /n/ | /nɛk/ for *snake* | |
| | /sk/ → /k/ | /kul/ for *school*<br>/bɪkɪt/ for *biscuit* | |
| | /θɹ/ → /f/ | /fi/ for *three* | |
| | /spl/ → /pl/ | /plaʃ/ for *splash* | |
| | /skw/ → /k/ | /kwɛə/ for *square* | |
| | /stɹ/ → /tɹ/ | /tɹɔbəɹi/ for *strawberry* | |
| **Isolated developmental phonological processes** | | | |
| **Fronting** | /ʃ/ → /s/ | /sip/ for *sheep* | |
| **Stopping** | /ð/ → /d/ | /dɪs/ for *this* | |
| **Assimilation** | /j/ → /l/ | /lɛloʊ/ for *yellow* | |
| **Deaffrication** | /tʃ/ → /ts/ | /wɔts/ for *watch* | |
| **Non-developmental phonological processes** | | | |
| **Lateralisation** | /ɹ/ → /l/ | /labɪt/ for *rabbit*<br>/dʒəlɑf/ for *giraffe*<br>/blɛd/ for *bread*<br>/ʌmblɛlə/ for *umbrella*<br>/plam/ for *pram* | |
| **Isolated non-developmental phonological processes** | | | |
| **Intrusive consonant** | Insertion of /ŋ/ | /piŋk/ for *pig* | |
| | /θ/ → /s/ | /tis/ for *teeth* | |
| | /θ/ → ø | /tublʌʃ/ for *toothbrush* | |
| | /θ/ → /h/ | /haŋkju/ for *thank you* | |
| | /θ/ → /f/ | /fi/ for *three* | |

#### *4.9.3.1 Lateralisation*

As can be seen in Table 55, Lulama's reassessment results suggested that she made use of the phonological process of lateralization of /ɹ/ more often on reassessment than during the initial assessment, as she was able to produce 29% accurately on initial assessment, and only 14% accurately on reassessment. In comparison, on initial assessment Lulama produced only 73% of the phoneme /w/ accurately, while on reassessment she produced 100% accurately. This suggests that targeting /ɹ/ and the phonological process of lateralization in intervention did not result in a change in Lulama's phonological system.

**Table 55: Lulama's use of /ɹ/ on reassessment**

| | **Initial assessment** | | | **Reassessment** | | |
|---|---|---|---|---|---|---|
| **/ɹ/ in *DEAP*** | **Initial** | **Medial** | **Total** | **Initial** | **Medial** | **Total** |
| **/ɹ/** | | | | | | |
| **Accurate productions** | 1/5 (20% accurate) | 3/10 (0% accurate) | 4/15 (27% accurate) | 0/5 (0% accurate) | 1/9 (11% accurate) | 1/14 (7% accurate) |
| **Analysis of substitutions/omissions** | /l/: 4/5 | /l/: 7/10 | | /l/: 5/5 | /l/: 8/9 | |
| | | | | | | |
| **/bɹ, tɹ, kɹ, fɹ, pɹ, stɹ/** | | | | | | |
| **Accurate productions** | 5/12 (42% accurate) | 2/11 (18% accurate) | 7/23 (30% accurate) | 4/12 (33% accurate) | 0/11 (0% accurate) | 4/23 (17% accurate) |
| | | | | | | |
| **Analysis of substitutions/omissions** | /l/: 7/12 | /l/: 9/11 | | /l/: 8/12 | /l/: 11/11 | |
| | | | | | | |
| **TOTAL accurate productions of /ɹ/** | | | 11/38 29% accurate | | | 5/37 (14% accurate) |

#### *4.9.3.2 Cluster reduction*

Again, Lulama showed evidence of only reducing s-clusters, and the cluster /θɹ/. She produced the cluster in the word *swing*, and was inconsistent in her ability to produce the cluster in the word *slide*. As mentioned in section 4.2.3.2, although cluster reduction should be eliminated by 3;11 years (Dodd et al., 2002), there has been some evidence that clusters continue to develop

between the ages of four years and seven years (McLeod et al., 2001), and as such this may be age appropriate for Lulama.

#### *4.9.3.3 Production of /ʃ/ and /tʃ/*

Lulama's use of the phonemes /ʃ/ and /tʃ/ was analysed (Table 56). In comparison to the initial assessment, she was less accurate in her production of the phoneme /ʃ/, only achieving an accuracy of 14% compared to the initial assessment where she was achieving an accuracy of 43%. This is unexpected, as her accuracy has decreased and this was one of the targets of intervention. In contrast, her production of /tʃ/ has increased to 33%, from the initial assessment accuracy of 15%. Again, this is an unexpected result as this was not a target during intervention.

**Table 56: Lulama' production of /ʃ/ and /tʃ/ on reassessment**

| | Initial Assessment | | | | Reassessment | | | |
|---|---|---|---|---|---|---|---|---|
| | **Initial** | **Medial** | **Final** | **Total** | **Initial** | **Medial** | **Final** | **Total** |
| **Accurate production of /ʃ/** | 2/5 | 1/3 | 3/6 | 6/14 (43% accurate) | 0/5 | 0/3 | 2/6 | 2/14 (14% accurate) |
| **Analysis of substitution:** | /s/: 3/5 | /s/: 2/3 | /s/: 3/6 | | /s/: 5/5 | /s/: 3/3 | /s/: 2/6 | |
| **Accurate production of /tʃ/** | 0/4 | 1/1 | 1/8 | 2/13 (15% accurate) | 3/4 | 1/1 | 0/7 | 4/12 (33% accuracy) |
| **Analysis of substitution:** | /s/: 3/4 /t/: 1/4 | | /ts/: 6/8 /t/: 1/8 | | /ʃ/: 1/4 | | /ts/: 7/7 | |

### 4.9.4 Connected Speech

Again, Lulama did not produce sentences or phrases when presented with the connected speech pictures. She only produced single words, and her connected speech could not be compared to her single word naming.

### 4.9.5 Oro-Motor Assessment

As Lulama had exhibited age appropriate oro-motor skills in the initial assessment, this was not reassessed.

### 4.9.6 Stimulability and Articulation

In the articulation assessment, Lulama did not use the following sounds in words: /ʃ/, /θ/, /ð/, /ɹ/, and /j/. In addition, her use of /tʃ/ was inconsistent, as she used it accurately in initial position, but inaccurately in final position. She was stimulable for /θ/ and /ɹ/ in isolation, but not in syllables. She was also stimulable for /j/ in a syllable. However, she did not appear to be stimulable for /ð/, /ʃ/ or /tʃ/ in isolation. This was unexpected, as she had shown evidence of using /ð/ and /ʃ/ in the phonology assessment, and she used /tʃ/ in the initial position in the articulation subtest. This suggested that although she struggled to produce these phonemes consistently, they are present in her inventory. Her production of these phonemes may be affected by her phonological, rather than her articulatory abilities.

### 4.9.7 Consistency

Although Lulama had an inconsistency score of 30% in the diagnostic screener, which does not require the administration of the inconsistency assessment, the inconsistency assessment was administered to compare her results to her initial data. Lulama produced six words differently, but three of these productions were a variation of the correct production and use of a phonological process. She therefore only had three words that met the definition of inconsistency (Table 57), giving her an inconsistency score of 12%. This is more consistent than in the initial assessment.

Table 57: Lulama's inconsistent productions on reassessment

| Target | First production | Second production | Third production |
|---|---|---|---|
| ***raining*** | leɪdiŋ | leɪndiŋ | leɪndiŋ |
| ***slide*** | laiŋ | slai | slai |
| ***umbrella*** | ʌmblɛlə | ʌblɛlə | ʌmblɛlə |

### 4.9.8 Summary

Lulama's English speech assessment results are summarized in Table 58. She presented with a complete phonetic inventory, although her ability to use these phonemes was, at times, inconsistent; there were certain phonemes that she could produce in words, but not in isolation. She had a similar PCC, PVC and PPC on reassessment. She again made use of the developmental phonological process of cluster reduction, as well as the non-developmental phonological process of lateralization. For both of these processes, Lulama demonstrated more examples in reassessment than on the initial assessment. In addition, she used various other developmental phonological processes in isolated instances, including fronting, stopping, assimilation and deaffrication. She made use of more errors in reassessment than in the initial assessment. Her speech is more consistent, as she achieved an inconsistency score of 12%.

Table 58: Summary of Lulama's initial and reassessment results in English

| | INITIAL ASSESSMENT (4;0 years) | REASSESSMENT (4;4 years) |
|---|---|---|
| **Inventory** | Complete | Complete |
| **PCC in phonology assessment** | 87% | 88% |
| **Number of times error patterns used in phonology assessment:** | | |
| Cluster reduction | 6 | 8 |
| Lateralisation | 5 | 9 |
| Total number of errors in phonology assessment (including isolated processes) | 22 | 26 |
| **Inconsistency in screener** | 10% | 30% |
| **Inconsistency assessment** | 28% | 12% |
| | | |

### 4.9.9 Diagnostic Category

Considering Lulama's continued and increased use of the non-developmental phonological process of lateralization of /ɹ/, she still presents with a consistent phonological disorder.

## 4.10 IsiXhosa Speech Reassessment Results

### 4.10.1 Consonant and Vowel Inventories

As can be seen in Table 59, there was a change in Lulama's isiXhosa inventory on reassessment. The most notable change is evident in Lulama's affricates, where she showed evidence of having acquired the affricates /dz/ and /ts$^{h}$/. Considering the previous research into isiXhosa consonant acquisition (Maphalala et al., 2014; Mowrer & Burger, 1991; Tuomi et al., 2001), Lulama should be in the process of acquiring the affricate /kx'/. Another phoneme that has been added to her inventory is the fricative /ɣ/. Previous research has suggested this phoneme should be acquired by the age of four (Maphalala et al., 2014; Mowrer & Burger, 1991; Tuomi et al., 2001), suggesting it is age appropriate that Lulama has acquired this phoneme. Finally, she again produced all voiced and nasalized clicks, but could not produce the basic or aspirated clicks. This is unexpected, as Gxilishe (2004) suggests that children acquire basic clicks before acquiring voiced or nasalized clicks. As with the initial assessment, Lulama showed evidence of having a complete phonetic inventory of isiXhosa vowels (Table 48).

Table 59: Lulama's isiXhosa inventory on reassessment

| | INITIAL ASSESSMENT (4;0) | | REASSESSMENT (4;4) | |
|---|---|---|---|---|
| **INVENTORY** | Present | Not present | Present | Not present |
| **Plosive** | p', p$^{h}$, b, t', t$^{h}$, d, k', k$^{h}$, g, c' | c$^{h}$, ɟ | p', p$^{h}$, b, t', t$^{h}$, d, k', k$^{h}$, g, c' | c$^{h}$, ɟ |
| **Implosive** | ɓ | | ɓ | |
| **Nasals** | m, n, ŋ, ɲ | | m, n, ŋ, ɲ | |
| **Fricatives** | f, v, s, z, ʃ, h, x | ɣ | f, v, s, z, ʃ, h, x, **ɣ** | |
| **Lateral** | ɬ, l, ɮ | | ɬ, l, ɮ | |
| **Trill** | r | | r | |
| | | | | |
| **Affricates** | tʃ', tʃ$^{h}$, dʒ, ts', tɬ | dz, kx', ts$^{h}$ | tʃ', tʃ$^{h}$, dʒ, ts', tɬ, **dz, ts$^{h}$** | kx' |
| **Glides** | w, j | | w, j | |
| **Clicks** | ŋ\|, ŋ‖, ŋ!, \|g, !g | \|, ‖, !,‖g, \|$^{h}$, ‖$^{h}$, !$^{h}$ | ŋ\|, ŋ‖, ŋ!, \|g, **‖g**, !g | \|, ‖, !, \|$^{h}$, ‖$^{h}$, !$^{h}$ |

### 4.10.2 Severity Indices (PCC, PVC, PPC)

Lulama's PCC, PVC and PPC were calculated. Again, allowance was made for vowels omitted in prefixes, or vowel elision (Maphalala et al., 2014). As can be seen in Table 60, Lulama's PCC has improved from 80% to 90%. This resulted in her PPC also increasing to 95%. As she has added four phonemes to her inventory, it was expected that her PPC would improve. In comparison to the data collected by Maphalala et al. (2014), Lulama's PPC appears slightly below the mean for her age which was 95%, although her PVC is age appropriate.

Table 60: Lulama's severity indices on initial assessment and reassessment

| | INITIAL ASSESSMENT (4;0 years) | REASSESSMENT (4;4 years) |
|---|---|---|
| **PCC** | 80 | 90 |
| **PVC** | 99 | 99 |
| **PPC** | 90 | 95 |

### 4.10.3 Phonological Processes

As can be seen in Table 61, Lulama continued to use the immature developmental phonological process of velar simplification and alveolar simplification. She made use of fewer isolated errors, only displaying two instances of fronting, and one instance of deaffrication. She also made use of fewer non-developmental errors, with only three examples used (backing, nasalization and lateralization). However, it was noted that Lulama produced /l/ for /r/ in the word *iorenji* [orange], using lateralization of the trill /r/ in isiXhosa. She had previously only used this phonological process for the liquid approximant /ɹ/ in English.

Table 61: Lulama's phonological processes in isiXhosa on reassessment

| PHONOLOGICAL PROCESSES | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Developmental Processes** | | | |
| **Velar simplification** (Lewis & Roux, 1996) | /ǁ/ → /k/ | kɔlɔ for ixolo | Although this is a developmental error, Lulama should be using these basic clicks in words and as such this is not age appropriate. |
| | /ǁʰ/ → /k/ | isikɔsʌ for isiXhosa | |
| | /!/ → /k/ | imʌkʌndʌ for iqanda | |
| | /!ʰ/ → /k/ | ujʌkub for uyaqhuba | |

| | | | |
|---|---|---|---|
| **Alveolar simplification** (Lewis & Roux, 1996) | /ǀʰ/ → /t/ | ujʌtɛbʌ for uyacheba | Not age appropriate |
| | /ǀ/ → /t/ | utʌŋgɔ for ucango | |
| | /!g/ → /d/ | udixʌ for ugqirha | |
| **ISOLATED INSTANCES OF DEVELOPMENTAL PHONOLOGICAL PROCESSES** | | | |
| **Fronting** | /ɟ/ → /d/ | idʌsi for idyasi | Not recorded in Maphalala et al. (2014). /ɟ/ not present in Lulama's inventory. |
| | /n/ → /m/ | ŋ!imimʌ for ingqiniba | |
| **Deaffrication** | /kx/ → /k/ | ujʌkʌzulʌ for uyakrazula | Used by 37.5% of children aged 4;0 – 4;11 years in Maphalala et al. (2014) |
| **ISOLATED INSTANCES OF NON-DEVELOPMENTAL PHONOLOGICAL PROCESSES** | | | |
| **Backing** | /cʰ/ → /k/ | ujʌkʌlʌ for uyatyhala | |
| **Nasalisation** | /b/ → /m/ | ŋ!imimʌ for ingqiniba | |
| **Lateralisation** | /r/ → /l/ | ɔlɛndʒi for iorenji | |

### 4.10.4 Connected Speech

As much of the interaction between Lulama and the researcher had been in English, Lulama did not produce many isiXhosa utterances. This made it difficult to compare her spontaneous speech with her single word naming skills.

### 4.10.5 Consistency

Although *Masincokoleni* does not include an inconsistency subtest, over the course of the reassessment, Lulama produced eleven of the target words twice. Of these eleven words, two were produced differently, and are listed in Table 62. This is an inconsistency of 18%. Although this is more than the initial assessment of 13%, it should be noted that Lulama produced fewer words twice on reassessment. In addition, in the initial assessment she struggled with the same two words (*ugqirha* [doctor] and *ingqiniba* [elbow]), as well as a few others, whereas on reassessment she only produced the *ugqirha* [doctor] and *ingqiniba* [elbow] inconsistently, producing all other words consistently over repeated trials.

Table 62: Lulama's inconsistent productions in isiXhosa on reassessment

| Target | First production | Second production |
|---|---|---|
| **ugqirha** | udixʌ | usixʌ |
| **ingqiniba** | ŋǃimimʌ | ŋǃinimʌ |

### 4.10.6 Summary

Lulama's isiXhosa speech assessment results are summarised in Table 63. Her inventory has improved, with the addition of /dz/, /tsʰ/ and /ɣ/. Considering her age, she should soon be acquiring the sound /kxʼ/, as well as the basic clicks. Due to this, her inventory is not yet age appropriate. She still makes use of the phonological processes of velar simplification and alveolar simplification, which are not age appropriate. Although she does still make use of isolated developmental and non-developmental phonological processes, she has decreased her use of these processes, as in the initial assessment she made a total of 20 errors and on reassessment she made a total of 12 errors. Although her percentage of inconsistency has seemed to increase, this is most likely due to this score being based on a smaller sample of words, and not an indication of an increase in inconsistency.

Table 63: Summary of Lulama's isiXhosa assessment results

| | **INITIAL ASSESSMENT (4;0 years)** | **REASSESSMENT (4;2 years)** |
|---|---|---|
| **Inventory** | Incomplete and not age appropriate. Phonemes not present: cʰ, ɟ, ɣ, dz, kxʼ, tsʰ, ǀ, ǁ, ǃ,ǁg, ǀʰ, ǁʰ, ǃʰ | Incomplete and not age appropriate Phonemes not present: cʰ, ɟ, kxʼ, ǀ, ǁ, ǃ, ǀʰ, ǁʰ, ǃʰ |
| **PCC in assessment** | 80% | 90% |
| **Number of times error patterns used in assessment:** | | |
| Velar simplification | 4 | 4 |
| Alveolar simplification | 4 | 4 |
| Deaffrication | 4 | 1 |
| **Overall number of errors** | 20 | 12 |
| **Inconsistency** | 13% | 18% |

### 4.10.7 Diagnostic Category

Lulama made use of only a few consistent phonological processes which were developmental. Although she did still make use of some non-developmental phonological processes, these were isolated occurrences. As such, it is suggested Lulama presents with a phonological delay in isiXhosa, as she is mostly using immature developmental phonological processes.

## 4.11 Summary/Overall Profile of Reassessment Results

Table 64 summarises Lulama's English and isiXhosa assessment results. Lulama has increased her isiXhosa speech inventory. In addition, her isiXhosa PCC and PPC has improved from the initial assessment to the reassessment. However, her PPC in English has decreased slightly, suggesting that little change took place in her English speech. Although she is still using similar phonological processes in both English and isiXhosa from initial assessment to reassessment, she is using fewer isolated errors in isiXhosa, again indicating more change in her isiXhosa speech than in her English speech. Her consistency has improved in her English speech, as well as her isiXhosa speech (although the percentage seems to indicate otherwise, this is due to a smaller sample of words being produced twice on reassessment).

**Table 64: Summary of Lulama's English and isiXhosa speech assessment and reassessment results**

| | **INITIAL ASSESSMENT (4;0)** | | **REASSESSMENT (4;2)** | |
|---|---|---|---|---|
| | English | isiXhosa | English | isiXhosa |
| **Speech Inventory (missing sounds)** | All sounds present | /cʰ/, /ɟ/, /ɣ̈/, /dz/, /kxʼ/, /tsʰ/, /ǀ/, /ǁ/, /!/, /ǁg/, /ǀʰ/, /ǁʰ/, /!ʰ/ | All sounds present | /cʰ/, /ɟ/, /kxʼ/, /ǀ/, /ǁ/, /!/, /ǀʰ/, /ǁʰ/, /!ʰ/ |
| **PCC** | 85 | 80 | 82 | 90 |
| **PVC** | 96 | 99 | 99 | 99 |
| **PPC** | 87 | 90 | 88 | 95 |
| **Phonological processes** | Cluster reduction, lateralisation, other isolated developmental and non-developmental phonological processes | Velar and alveolar simplification and other isolated developmental and non-developmental phonological processes | Cluster reduction, lateralisation, other isolated developmental and non-developmental phonological processes | Velar and alveolar simplification and other isolated developmental and non-developmental phonological processes |

| | | | | |
|---|---|---|---|---|
| **Inconsistency** | 28% | 13% | 12% | 18% |
| **Oro-motor skills** | Age appropriate | | Not retested | |
| **Language (receptive)** | RS 25 | RS 22 | Not retested | |

## 4.12 Intelligibility Reassessment

Lulama's parents and teachers were asked to complete the *ICS* following intervention. As can be seen in Table 65, Lulama's parents were able to notice a small change in Lulama's speech. Her speech became more intelligible to immediate family members and strangers. Lulama's teacher noticed a greater improvement in Lulama's intelligibility, as she reported her and the other children now always understand Lulama, while acquaintances and teachers assistants usually understand Lulama. This suggests that although the assessment results did not indicate a change in Lulama's English speech at a segmental level, there has been a perceived change in her intelligibility.

**Table 65: *Intelligibility in Context* (McLeod et al., 2012a) results in initial assessment and reassessment**

| | Parent Initial assessment | Parent reassessment | Teacher Initial assessment | Teacher reassessment |
|---|---|---|---|---|
| **1. Do you understand your child?** | 4 - usually | 4 – usually | 3 – sometimes | 5 – always |
| **2. Do immediate members of your family understand your child?** | 3 - sometimes | 4 – usually | - | - |
| **3. Do extended members of your family understand your child?** | 3 - sometimes | 3 – sometimes | - | - |
| **4. Do your child's friends understand your child?** | 4 - usually | 4 – usually | 3 – sometimes | 5 – always |
| **5. Do acquaintances understand your child?** | 3 - sometimes | 3 – sometimes | 3 – sometimes | 4 – usually |
| **6. Do your child's teachers (teacher assistants) understand your child?** | 3 - sometimes | 3 – sometimes | 3 – sometimes | 4 – usually |
| **7. Do strangers understand your child?** | 2 - rarely | 3 - sometimes | - | - |
| **TOTAL** | 22/35 | 24/35 | 12/20 | 18/20 |
| **AVERAGE** | 3 | 3.2 | 3 | 4.5 |

# Chapter 5: Ntando

## 5.1 Background information

Ntando was a 3 year old boy living and attending crèche in Cape Town. He was referred to the researcher by his teacher, who reported concerns regarding his speech development. A consent form and information letter (Appendix D) was sent home for Ntando's parents, and following consent being provided, they continued to communicate with the researcher either face-to-face when dropping Ntando at crèche, over the phone or by email. His parents reported that they did not believe Ntando's speech difficulties were of concern considering his age as well as his exposure to both English and isiXhosa, but agreed Ntando could take part in the research project.

Ntando's father completed a case history information form, providing the following information. Ntando lives at home with his parents and his cousin. He speaks English both at school and home, and uses isiXhosa intermittently at home. He was exposed to isiXhosa from birth, and at twelve months of age he was exposed to English. His crèche is an English crèche, and thus during the day he is only exposed to and uses English. His father estimated that he speaks English 90% of the time. However, he is exposed to isiXhosa at home, as his parents communicate with each other in that language. Ntando's father reported that Ntando usually communicates using words but had started using short sentences. He makes use of gestures when people do not understand him. No family history of speech, language or hearing problems was reported.

Ntando was born via C-section at 9 months, weighing 3kg. No concerns were noted regarding the pregnancy or birth. He suffered from asthma from 3 months of age, and has been hospitalized briefly for this condition on one occasion. Ntando's hearing had not been screened or assessed at the time of the assessment, but his father reported no concerns regarding Ntando's hearing. Ntando's parents reported that all his milestones were achieved at the expected age, and there had been no problems or concerns noted regarding his development.

Ntando's teacher reported concerns regarding Ntando's speech. However, at the time of the initial assessment, Ntando had just moved to her class and she was unfamiliar with him. She reported that at the beginning of the year, only Ntando's friend was able to understand him, as the other children found it difficult to understand him. The teaching assistant reported that she had known Ntando since he was very young, and she had come to understand Ntando's speech. She reported that she knows his speech is not like the other children's, but she had come to understand what Ntando was referring to.

## 5.2 English speech assessment results

Ntando was the youngest of the participants, and was the most challenging to assess. He required a great deal of coaxing and frequent breaks. He often complained and became frustrated with the assessment activities.

The *DEAP* diagnostic screener was administered. Ntando did not produce the phoneme /l/, and used a range of phonological processes, including gliding, cluster reduction, deaffrication, stopping, nasalization and intrusive consonants. In addition, he produced four of the ten words differently on the two trials. As a result, the phonology, oro-motor and inconsistency assessments were completed. As he showed evidence of producing all phonemes in these subtests apart from /θ/ and /ð/, suggesting his phonetic inventory was complete, and due to his frustration with the assessment, the articulation assessment was not completed.

### 5.2.1 Consonant and Vowel Inventories

Ntando's consonant inventory has been summarized in Table 66. He could produce most phonemes, with the exception of the fricatives /θ/ and /ð/. Considering monolingual English norms, this is age appropriate, as these are typically acquired after many of the other consonants, even as late as 6 years 11 months (Dodd et al., 2002). In addition, these phonemes are not present in isiXhosa (Niesler et al., 2005).

Table 66: Ntando's English consonant inventory (initial assessment)

| INVENTORY | Present | Not present | Comment |
|---|---|---|---|
| **Stops** | p, b, t, d, k, g | | |
| **Fricatives** | f, v, s, z, ʃ, h | θ, ð, ʒ | Age appropriate (Dodd et al., 2002); /ʒ/ was not elicited. |
| **Affricates** | tʃ, dʒ | | |
| **Nasals** | m, n, ŋ | | |
| **Liquids** | l, r | | |
| **Glides** | w, j | | |

Ntando showed evidence of producing all the English vowels and diphthongs as listed in Table 67.

Table 67: Ntando's English vowel inventory

| | Present |
|---|---|
| **Front** | i (beet)<br>ɪ (bit)<br>ɛ (bet)<br>a (bat) |
| **Central** | ə (sofa)<br>ʌ (but)<br>ɜ (bird) |
| **Back** | u (boot)<br>ʊ (book)<br>ɒ (pot)<br>ɑ (palm)<br>ɔ (bought) |
| **Diphthongs** | ɪə (ear)<br>eɪ (play)<br>ɔɪ (boy)<br>ɑɪ (my)<br>ɑʊ (house)<br>oʊ (boat) |

### 5.2.2 Severity Indices (PCC, PVC and PPC)

Ntando's PCC, PVC and PCC were calculated for the phonology assessment (see Table 68). He achieved a PCC of 72%, suggesting his PCC is within the average range when comparing it to

monolingual children in the UK. However, the data collected by Pascoe et al. (2015) suggests three year old bilingual children have a mean PCC of 83.5%. This would result in Ntando's PCC of 72% falling at a percentile of 1.7. Ntando's PCC is not age appropriate in comparison to three year old isiXhosa-English bilingual children in Cape Town. He was able to produce all his vowels accurately, resulting in a high PVC score.

Table 68: Ntando's PCC, PVC and PPC for English (initial assessment)

| | **Percentage** | **Percentile rank compared to monolingual children in the UK** (Dodd et al., 2002) | **Percentile rank compared to bilingual children in Cape Town** (Pascoe et al., 2015) |
|---|---|---|---|
| **PCC** | 72 | 37 | 1.7 |
| **PVC** | 100 | 91 | |
| **PPC** | 82 | 37 | |

### 5.2.3 Phonological Processes

The phonological processes used in the phonology assessment were analysed. Ntando used a range of processes, using three consistently, and a range of isolated phonological processes. These have been summarized in Table 69. His most frequently used process was cluster reduction. However, the majority of occasions that he used this phonological process included clusters with the phoneme /ɹ/. Ntando also showed evidence of stopping /θ/ consistently, as well as /l/. The stopping of liquids is non-developmental, as this processes usually affects affricates and fricatives (Bowen, 2011; McLeod & Bleile, 2003), but Ntando's use of this was inconsistent, as he was able to produce the phoneme accurately in words such as *helicopter*. However, it should be noted that on most other occasions Ntando made use of the phonological process of gliding the phoneme /l/ to produce /j/. He also made use of this phonological process for the liquid approximant /ɹ/.

In addition to these three phonological processes, Ntando made isolated use of the developmental processes of fronting and deletion of consonants. He also made isolated use of some non-developmental phonological processes, often only on one or two words, and these included affrication, backing, metathesis and intrusive consonants. As mentioned in section 1.7.1, backing may be a typical phonological process used by isiXhosa-English bilingual children

(Pascoe et al., 2015). Apart from the deletion of consonants, Ntando's use of developmental phonological processes was age appropriate, and Ntando only deleted consonants on two specific words, suggesting this is not a phonological process he uses frequently. This suggested that his speech is age appropriate. However, his use of isolated developmental and non-developmental phonological processes resulted in his speech often being perceived as unintelligible by unfamiliar listeners.

**Table 69: Ntando's phonological processes in the phonology subtest in English (initial assessment)**

| Phonological process | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Cluster reduction** | /fɹ/ → /f/ | /fɒg/ for *frog* | Age appropriate (Dodd et al., 2002) |
| | /bɹ/ → /b/ | /bɛd/ for *bread* | |
| | /tɹ/ → /t/ | /teɪn/ for *train* | |
| | /pɹ/ → /p/ | /pam/ for *pram* | |
| | /kɹ/ → /k/ | /kab/ for *crab* | |
| | /stɹ/ → /t/ | /tɔbəji/ for *strawberry* | |
| | /spl/ → /pl/ | /plas/ for *splash* | |
| | /sn/ → /s/ | /seɪŋk/ for *snake* | |
| | /sk/ → /k/ | /bɪkɪts/ for *biscuits* | |
| | /kj/ → /k/ | /taŋku/ for *thank you* | |
| | /gl/ → /g/ | /gʌbz/ for *gloves* | |
| **Stopping** | /θ/ → /t/ | /taŋku/ for *thank you*<br>/tit/ for *teeth*<br>/twi/ for *three* | Age appropriate (Bowen, 2011; Dodd et al., 2002) |
| | /l/ → /d/ | /jɛdoʊ/ for *yellow*<br>/daɪthaʊs/ for *lighthouse*<br>/ɛndəfənt/ for *elephant* | Stopping of /l/ not usually noted in typically developing speech (Bowen, 2011) |
| | /l/ → /b/ | /gʌbz/ for *gloves* | |

| | | | |
|---|---|---|---|
| **Gliding** | /l/ → /j/ | /ʌmbɛjə/ for *umbrella* | Age appropriate (Dodd et al., 2002) |
| | /ɹ/ → /j/ | /jabɪt/ for *rabbit* | |
| | /ɹ/ → /w/ | /twi/ for *three* | |
| **ISOLATED DEVELOPMENTAL PHONOLOGICAL PROCESSES** | | | |
| **Fronting** | /tʃ/ → /ts/ | /wɔts/ for *watch* | Age appropriate (Bowen, 2011; Dodd et al., 2002) |
| | /ʃ/ → /s/ | /sip/ for *sheep* | |
| **Deletion of medial consonant** | /θ/ → ø | /tubrʌʃ/ for *toothbrush* | Not age appropriate (Dodd et al., 2002) |
| **Deletion of final consonant** | /ŋ/ → ø | /tʃwi/ for *swing* | Not age appropriate (Dodd et al., 2002) |
| **ISOLATED NON-DEVELOPMENTAL PHONOLOGICAL PROCESSES** | | | |
| **Affrication** | /s/ → /tʃ/ | /tʃwi/ for *swing* | |
| **Backing** | /w/ → /j/ | /jɛb/ for *web* | |
| | /ð/ → /z/ | /zɪs/ for *this* | |
| **Metathesis** | | /sɛɪŋk/ for *snake* | |
| **Intrusive consonants** | | /ɛndəfənt/ for *elephant* | |

### 5.2.4 Connected Speech

A few short phrases were elicited from Ntando, who produced six words in short phrases. He produced two of these six words differently, suggesting that he had a single word versus connected speech agreement ratio of 67%. According to the data collected from monolingual children in the UK, this would place Ntando on the 37th percentile, which is age appropriate. However, it should be noted the elicited words were produced in very short phrases, usually consisting of two to three words.

### 5.2.5 Oro-Motor Assessment

Ntando's oro-motor abilities were assessed and the results have been summarized in Table 70. Although Ntando had some difficulty producing the correct sound sequence during the assessment of his diadochokinetic rates, his standard score and percentile suggest this is still appropriate for a child of his age. It was concluded that Ntando's oro-motor skills were age appropriate.

Table 70: Ntando's oro-motor assessment results

| | Raw score | Standard score | Percentile |
|---|---|---|---|
| **Diadochokinetic** | 5/9 | 10 | 50 |
| **Isolated movement** | 10/12 | 11 | 63 |
| **Sequenced movement** | 16/18 | 13 | 84 |

### 5.2.6 Stimulability and Articulation

Ntando showed evidence of having an age appropriate phonetic inventory. He found it challenging to complete the assessment. As a result, the articulation subtest was not completed. However, it could be concluded that Ntando's difficulties were not articulatory in nature, as he often showed evidence of producing a phoneme in one context, but having difficulty with the same phoneme in a different context, suggesting his difficulty was phonological.

### 5.2.7 Consistency

In the diagnostic screener, Ntando produced four of the ten words differently on repeated trials. Although this would not usually warrant the administration of the inconsistency assessment, it was administered due to Ntando's relatively high levels of inconsistency in the screener, as well as the use of some isolated non-developmental phonological processes in the phonology assessment. Although fourteen words were produced differently during this assessment, only five of them included inconsistent errors (Table 71). This resulted in an inconsistency score of 20%, suggesting Ntando's inconsistencies are at a typical level.

Table 71: Ntando's inconsistent productions in English (initial assessment)

| Target | Trial 1 | Trial 2 | Trial 3 |
|---|---|---|---|
| ***Raining*** | neɪniŋ | leɪniŋ | neɪniŋ |
| ***Vacuum cleaner*** | vakumkinə | vakumkinə | vakukinə |
| ***Bridge*** | bɪdʒ | bɪdʒ | bɔdʒ |
| ***Slide*** | saɪd | saɪd | dzaɪd |
| ***Kangaroo*** | kanəwu | kaŋgəju | kanəju |

### 5.2.8 Summary

Ntando's phonetic inventory was age appropriate in comparison to monolingual English development, but was missing the fricatives /θ/ and /ð/ (Dodd et al., 2002). He presented with a PCC of 72%, which is below the mean identified by Pascoe et al. (2015) for 3 year old isiXhosa-English bilingual children, but is age appropriate when considering 3 year old monolingual children (Dodd et al., 2002). He presented with three main phonological processes: cluster reduction, gliding and stopping. These are all age appropriate (Bowen, 2011; Dodd et al., 2002). He also presented with a range of isolated developmental and non-developmental phonological processes: fronting, deletion of consonants, affrication, backing, metathesis and intrusive consonants. In the inconsistency assessment he produced five words inconsistently, resulting in an inconsistency score of 20%.

### 5.2.9 Diagnostic Category

Considering the majority of Ntando's phonological processes are age appropriate, it could be suggested Ntando has typically developing speech. However, comparing his PPC to that of three year old isiXhosa-English bilingual children living in Cape Town, he achieved a percentile of 1.7 (Pascoe et al., 2015). In addition, throughout the assessment it was noted that Ntando seemed to make use of some unusual but consistent errors. For example, his production of *elephant* was /ɛndəfənt/; his production of *snake* was /sɛɪŋk/; and his production of *boat* was /goʊt/. His teacher also reported that his speech was unintelligible to her and many of the other children in her class (see section 5.4). She reported that this impacted on how Ntando interacted with the other children, as he would only play with one child in the class who understood him. In addition, the other children tended to avoid him as they could not understand him. Considering the International Classification of Functioning, Disability and Health – Children and Youth Version (ICF-CY), there are various factors that have been identified as being relevant to children with communication disorders (McLeod & Threats, 2008; Simeonsson, 2003). The codes that could be applied to Ntando's case considering his difficulties participating in class include "Communicating with, receiving spoken messages" (d310); "speaking" (d330); "initiating, maintaining and terminating a discussion" (d350); "conversation" (d355); and "play" (d880) (McLeod & Threats, 2008; Simeonsson, 2003). As

such, it was concluded that Ntando could be diagnosed as having a speech sound disorder. However, it was more challenging to place Ntando into one of the diagnostic subcategories suggested by Dodd (2005). His use of some non-developmental phonological processes (stopping of /l/, affrication, backing, metathesis and intrusive consonants) suggests his speech difficulties may fall into the consistent phonological disorder category.

## 5.3 IsiXhosa speech assessment results

Ntando's isiXhosa speech was assessed using the *Masincokoleni* Assessment (Maphalala et al., 2012). He required prompting to complete this assessment, which was expected considering the parental report of Ntando communicating predominantly in English.

### 5.3.1 Consonant and Vowel Inventories

Ntando's isiXhosa inventory is incomplete (Table 72). Many of the lacking phonemes are those that, when considering the ages of acquisition suggested in previous research (Maphalala et al., 2014; Mowrer & Burger, 1991; Tuomi et al., 2001), Ntando should be in the process of acquiring.

**Table 72: Ntando's isiXhosa consonant inventory (initial assessment)**

| INVENTORY | **Present*** | **Not present** | **Comment** |
|---|---|---|---|
| **Plosive** | p', $p^h$, b, t', $t^h$, d, k', $k^h$, g | c', $c^h$, ɟ | Age appropriate, should be acquiring /c'/ |
| **Implosive** | | ɓ | |
| **Nasals** | m, n, ŋ | ɲ | Should be acquiring this phoneme |
| **Fricatives** | f, v, s, z, h, ɣ, ʃ | x | Should be acquiring this phoneme |
| **Lateral** | l | ɬ, ɮ | Should be acquiring these phonemes |
| **Trill** | | r | Age appropriate |
| **Affricates** | tʃ',$tʃ^h$ , dz, ts' | dʒ, kx', tɬ, $ts^h$ | Should be acquiring /dʒ/. |
| **Glides** | w, j | | |
| **Clicks** | ǀ, !, ŋǀ,ǀg, $ǀ^h$ | ǁ, ŋǁ, ŋ!, !g, ǁg, $ǁ^h$, $!^h$ | See details below |

*As Ntando needed prompting for the majority of the words, he often imitated the researcher's productions. As such, the distinction between ejective and aspirated plosives and affricates (/p'/and /$p^h$/, /t'/ and /$t^h$/, /k'/ and /$k^h$/, /tʃ'/ and /$tʃ^h$/) as well as the plosive /b/ and implosive /ɓ/ was not always clear. This was as a result of the researcher not being able to produce the phonemes with the accuracy of first-language speakers of isiXhosa. However, they were considered correct, as this was the model provided, and according to parental report the language Ntando uses predominantly is English, suggesting isiXhosa would be a second language.

As can be seen in Table 73, there is some variability in the previous research regarding the age of acquisition of many of Ntando's missing phonemes (Maphalala et al., 2014; Mowrer & Burger, 1991; Tuomi et al., 2001). This made it difficult to determine whether his inventory is age appropriate. However, the research suggests that many of the phonemes Ntando has not yet acquired are usually acquired around his age, suggesting that he should be in the process of acquiring these phonemes. It is age appropriate for him not to have acquired /cʰ/, /ɟ/, /r/, /kx/, /tɬ/ and /tsʰ/.

**Table 73: Summary of age of acquisition of Ntando's missing phonemes in other studies**

| | **Mowrer & Burger, 1991** | **Tuomi et al., 2001** | **Maphalala et al., 2014** | **Ntando's age** | **Comment** |
|---|---|---|---|---|---|
| **Age of children in study** | Ages 2;6 – 6;0 | Ages 1;0 – 3;0 years | Ages 3;0 – 6;0 years | | |
| **c'** | 2;6 – 3;0 | After 3 years | Before 3;0 | 3;0 | Should be acquiring this phoneme |
| **cʰ** | 6 and over | After 3 years | After 6;0 | 3;0 | Age appropriate |
| **ɟ** | 6 and over | After 3 years | 5;1 – 6;0 | 3;0 | Age appropriate |
| **ɲ** | Not specified | After 3 years | Before 3;0 | 3;0 | Should be acquiring this phoneme |
| **x** | 2;6 – 3;0 | After 3 years | 3;7 – 4;0 | 3;0 | Should be acquiring this phoneme |
| **ɬ** | 2;6 – 3;0 | 2;6 – 3;0 (40% - 50% frequency of correct production) | 3;7 – 4;0 | 3;0 | Should be acquiring this phoneme |
| **ɮ** | Not specified | After 3 years | 3;0 – 3;6 | 3;0 | Should be acquiring this phoneme |
| **r** | 4;0 – 4;6 | After 3 years | 4;1 – 5;0 | 3;0 | Age appropriate |
| **dʒ** | 2;6 – 3;0 | 2;6 – 3;0 (60% - 70% frequency of correct production) | 3;7 – 4;0 | 3;0 | Should be acquiring this phoneme |

| | | | | | |
|---|---|---|---|---|---|
| kx | 2;6 – 3;6 | After 3 years | 4;1 – 5;0 | 3;0 | Age appropriate |
| tɬ | Not specified | After 3 years | 5;1 – 6;0 | 3;0 | Age appropriate |
| $ts^h$ | 2;6 – 3;0 | Not specified | Some children aged 3;7 to 4;0 used this phoneme, otherwise 5;1 – 6;0. | 3;0 | Age appropriate |

Ntando's was able to produce the basic clicks /|/ and /!/, as well as the nasalized, voiced and aspirated versions of /|/ (/ŋ|/, /|g/ and /$|^h$/). His use of the clicks /|/ and /!/ corresponds with the suggestion by Mowrer and Burger (1991) and Maphalala et al. (2014) that the dental and palatal clicks are acquired before the lateral clicks. However, Lewis and Roux (1996), as well as Gxilishe (2004) found the lateral click /‖/ is acquired before the palatal click /!/, suggesting the possibility of some variability in the acquisition of clicks. Lewis and Roux (1996) state that clicks tend to develop at the age of 3 years, and are fully acquired by 4 years, while Maphalala et al. (2014) found the youngest children in the study (3;0 – 3;6) had acquired some, but not all clicks. This would suggest that Ntando's development of clicks is age appropriate.

Ntando's showed evidence of using all isiXhosa vowels (see Table 74).

**Table 74: Ntando's isiXhosa vowel inventory**

| | Present | Example |
|---|---|---|
| **Front** | i, ɛ | ***i**papa* [porridge], *amay**e**za* [medicine] |
| **Central** | ʌ | *lp**a**p**a*** [porridge] |
| **Back** | u, ɔ | ***u**mgca* [line], *isiXh**o**sa* |

### 5.3.2 Severity Indices

Provision was made for Ntando's production of differing prefixes to those suggested by *Masincokoleni*. In addition, vowel elision was considered typical. Ntando achieved a PCC of 62%. This is well below the mean PCC of 3;0 – 3;6 year old children of 91.25% (Maphalala et al., 2014). This suggests that Ntando's intelligibility is below the level expected for his age. He

obtained a PVC of 98%, on par with similar aged peers (Maphalala et al., 2014). This resulted in a PPC of 81%. Ntando's isiXhosa PCC was below his English PCC of 82%, but his PVC and PPC appeared to be similar across the languages.

### 5.3.3 Phonology

Ntando made use of five processes that could be considered age appropriate (Lewis & Roux, 1996; Maphalala et al., 2014). These were gliding, velar simplification of clicks, stopping, denasalisation and weak syllable deletion (Table 75). It was noted that these phonological processes were not always used consistently. In addition to this, Ntando made use of some phonological processes that were not noted by Maphalala et al. (2014). These processes were fronting, backing and nasalization. In English, backing is considered to be an unusual/idiosyncratic process that may be indicative of a phonological disorder. Pascoe et al. (2015) suggested that backing may be typical of children acquiring isiXhosa and English. As there is limited data on the typical phonological processes used by isiXhosa speaking children, it is difficult to determine whether these phonological processes are typical and age appropriate for Ntando, or whether they suggest he presents with a phonological delay or disorder.

**Table 75: Ntando's use of phonological processes in isiXhosa (initial assessment)**

| PHONOLOGICAL PROCESSES | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Gliding** | /l/ → /j/ | kɔjɔ for *ixolo* [peel]<br>bʰɔjʌ for *ibhola* [ball] | Age appropriate (Maphalala et al., 2014) |
| | /r/ → /j/ | ɔjɛnds for *iorenji* [orange] | |
| **Velar simplification** (Lewis & Roux, 1996) | /ǁ/ → /k/ | kɔjɔ for *ixolo* [peel] | Age appropriate (Lewis & Roux, 1996) |
| | /ŋǁ/ → /g/ | igimʌ for *uyanxiba* [dress up] | |
| | /ǁʰ/ → /k/ | ikɔtʌ for *isiXhosa* [the language] | |
| | /ŋǁʰ/ → /k/ | bʌjʌkɔnʌ for *bayangxola* [noise] | |
| | /ǁg/ → /k/ | mʌkʌ for *amagxa* [shoulders] | |
| | /ŋ!/ → /k/ | kinʌ for *inqina* [chicken feet] | |

| | | | |
|---|---|---|---|
| | /!g/ → /g/ | gikʌ for *ugqirha* [doctor] | |
| | /!$^{h}$/ → /k/ | kubʌ for *uyaqhuba* [driving] | |
| | /ŋk\|/ → /k/ | kɛkɛsɛlʌ for *nkcenkceshela* [watering] | |
| **Stopping** | /x/ → /k/<br><br>/s/ → /t/ | gikʌ for *ugqirha* [doctor]<br><br>ikɔtʌ for *isiXhosa* [the language] | Age appropriate (Maphalala et al., 2014) |
| **Denasalisation** | | izɛbɛ for *indlebe* [ear]<br><br>isɔkɔ for *intloko* [head]<br><br>\|ʌbɔ for *icango* [door]<br><br>kɛkɛsɛlʌ for *nkcenkceshela* [watering] | Age appropriate (50% of children aged 3;7 – 4;0 made use of this process (Maphalala et al., 2014)) |
| **Weak syllable deletion** | | izulʌ for *uyakrazula* [tear]<br><br>gimʌ for *ingqiniba* [elbow] | 50 – 75% of children aged 3;0 – 3;6 struggled with 4 to 5 syllable words in the study by Maphalala et al. (2014) |
| **Phonological processes not noted by Maphalala et al. (2014)** | | | |
| **Fronting** | /dʒ/ → /ds/<br><br>/tʃ/ → /ts/<br><br>/tɬ/ → /s/<br><br>/c'/ → /t/<br><br>/g/ → /b/<br><br>/ɬ/ → /s/<br><br>/ɮ/ → /z/ | ɔjɛnds for *iorenji* [orange]<br><br>iwɔtsi for *iwotshi* [watch]<br><br>isɔkɔ for *intloko* [head]<br><br>ukutʌ for *ukutya* [food]<br><br>\|ʌbɔ for *icango* [door]<br><br>isɛkʌ for *uyahleka* [laughing]<br><br>izɛbɛ for *indlebe* [ear] | Not noted by Maphalala et al. (2014) |
| **Backing** | /ɟ/ → /g/<br><br>/c$^{h}$/ → /k/ | igʌsi for *idyasi* [jacket]<br><br>ikʌlʌ for *uyatyhala* [push] | Not noted by Maphalala et al. (2014), but noted in the English speech of bilingual isiXhosa-English children by Pascoe et al. (2015) |

| | | | |
|---|---|---|---|
| **Nasalization** | /b/ → /m/ | igimʌ for *uyanxiba* [dress up]<br>gimʌ for *ingqiniba* [elbow] | Not noted by Maphalala et al. (2014) |
| | /l/ → /n/ | bʌjʌkɔnʌ for *bayangxola* [noise] | |

### 5.3.4 Connected Speech

As Ntando's predominant language is English, and he associated the researcher with English, it was difficult to obtain a spontaneous speech sample. As such, it was difficult to compare his connected speech with his single word naming.

### 5.3.5 Consistency

During the course of the assessment, six words were produced on two different occasions, and one word on three occasions. As can be seen in Table 76, Ntando produced three of the words with inconsistent errors, a rate of 43%. Errors were not noted if caused by the lack of a prefix (e.g. /kubʌ/ and /ikubʌ/). It was also noted that Ntando made use of some unusual errors when producing *inja* and *iwotshi* for a second time. This raised some concerns regarding the consistency of his speech in isiXhosa.

Table 76: Ntando's repeated utterances in isiXhosa (initial assessment)

| Target | First production | Second production | Third production |
|---|---|---|---|
| ***ibhanana*** | bʌnʌnʌ | bʌnʌnʌ | |
| ***ixolo*** | kɔjɔ | kɔjɔ | |
| ***iorenji*** | ɔjɛnds | ɔjɛnds | |
| ***inja*** | indzʌ | ingi | |
| ***uyanxiba*** | igimʌ | imʌ | |
| ***uyaqhuba*** | kubʌ | ikubʌ | |
| ***iwotshi*** | wʌʃ | iwɔtsi | igɔntsi |

### 5.3.6 Summary

Ntando presented with an incomplete phonetic inventory in isiXhosa. However, this was considered age appropriate, as he was at the age where he would be expected to acquire many of the missing phonemes. He also made use of all of the isiXhosa vowels. He presented with a low PCC of 62%, suggesting that he made use of many phonological processes in isiXhosa. This

was confirmed by analyzing his use of phonological processes. He made use of the developmental and age appropriate phonological processes of gliding, velar simplification of clicks, stopping, denasalisation and weak syllable deletion. However, he also made use of some processes that have not been well documented in monolingual isiXhosa speech: fronting, backing and nasalization. As limited studies have investigated the isiXhosa speech of isiXhosa-English bilingual children, it is difficult to determine whether these phonological processes are developmental or non-developmental, and the typical age of elimination. Ntando also made use of some inconsistent errors, raising concerns regarding the inconsistency of his speech.

### 5.3.7 Diagnostic Category

Ntando's isiXhosa speech development appears similar to his English speech development in that his phonetic inventory, as well as the majority of his phonological processes, is age appropriate, suggesting his speech is typically developing. However, in isiXhosa, he made use of three phonological processes that were not noted in the sample assessed by Maphalala et al. (2014). Due to limited research into isiXhosa-English bilingual development, it is difficult to determine whether these are developmental or non-developmental phonological processes. Based on evidence from the literature (Maphalala et al., 2014; Mowrer & Burger, 1991), Ntando's speech could be considered as demonstrating features of a consistent phonological disorder. This correlates with his English speech.

## 5.4 Intelligibility

Ntando's intelligibility was assessed using the *ICS* (McLeod et al., 2012a). This was sent home for Ntando's father to complete, and was completed by his teacher. His teacher reported on Ntando's English speech, as this is the language spoken at crèche. As can be seen in Table 77, she noted that she rarely understood him. However, she considered that Ntando's friends usually understand him, although this was limited to one child, as Ntando's unintelligible speech resulted in him only playing with the child who understood him. Ntando's assistant teacher has known him since he was very young, and she reported that she understood Ntando as he communicated "in his own way". She acknowledged Ntando's speech was unintelligible in comparison to his peers, but due to her experience with Ntando she had learnt to

understand him. Ntando's father reported that Ntando's immediate family usually understood him, and his friends always understood Ntando. He reported that extended family, acquaintances and strangers only sometimes understand Ntando. The researcher noted that Ntando often used short phrases which made it easier to understand his speech. However, on occasions his speech was unintelligible, even when using short phrases, but particularly when using longer sentences.

**Table 77: Ntando's *Intelligibility in Context* (McLeod et al., 2012a) scores (initial assessment)**

| | Father | Teacher |
|---|---|---|
| **1. Do you understand your child?** | 4 - usually | 2 - rarely |
| **2. Do immediate members of your family understand your child?** | 4 – usually | - |
| **3. Do extended members of your family understand your child?** | 3 – sometimes | - |
| **4. Do your child's friends understand your child?** | 5 - always | 4 - usually |
| **5. Do acquaintances understand your child?** | 3 – sometimes | - |
| **6. Do your child's teachers (teacher assistants) understand your child?** | 4 – usually | 4 – usually |
| **7. Do strangers understand your child?** | 3 - sometimes | - |
| **TOTAL** | 26/35 | 10/15 |
| **AVERAGE** | 4 | 3 |

## 5.5 Receptive vocabulary assessment results

### 5.5.1 English Receptive Vocabulary

Ntando's English receptive vocabulary was assessed using the *PPVT-4*. Ntando achieved a raw score of 25, resulting in a standard score of 85 and a percentile of 16. This suggests his receptive vocabulary in English is age appropriate.

### 5.5.2 IsiXhosa Receptive Vocabulary

Ntando's receptive vocabulary was assessed using an isiXhosa translation of the *PPVT-4*. Ntando achieved a raw score of 14. This suggests that his English vocabulary is stronger than his isiXhosa vocabulary, which was expected considering the parental report of Ntando predominantly using English. It was noted that there were many words Ntando understood in English but not in isiXhosa, including "cup", "flower", "mouth", "pencil", "drum", "jumping",

"toe", "square" and "empty". There were only two words that he understood in isiXhosa but not in English: "carrot" and "fly".

## 5.6 Summary of Assessment Results

Ntando presented with incomplete but age appropriate phonetic inventories in both English and isiXhosa (Table 78). His PCC, PVC and PPC were higher in English than isiXhosa, which was expected as English is the language Ntando uses most frequently. He presented with three main phonological processes in English (cluster reduction, gliding and stopping), all of which were age appropriate. However, he did make use of a range of isolated developmental and non-developmental processes that made his speech difficult to understand at times. In isiXhosa, he made use of more phonological processes. Most of them were developmental and age appropriate, although the processes of fronting, backing and nasalization were not noted in the sample of children assessed by Maphalala et al. (2014), suggesting they may be non-developmental phonological processes in isiXhosa. Ntando's oro-motor skills were age appropriate. His English receptive vocabulary was larger than his isiXhosa receptive vocabulary.

**Table 78: Summary of Ntando's initial assessment results**

| | **English** | **isiXhosa** |
|---|---|---|
| **Speech Inventory (missing sounds)** | θ, ð, ʒ | c', $c^h$, ɟ, ɓ, ɲ, x, ɬ, ɮ, r, dʒ, kx', tɬ, $ts^h$, ǁ, ŋǁ, ŋ!, !g, ǁg, $ǁ^h$, $!^h$ |
| **PCC** | 72% | 62% |
| **PVC** | 100% | 98% |
| **PPC** | 82% | 81% |
| **Phonological processes** | Cluster reduction, gliding and stopping (isolated instances of fronting, deletion of consonants, affrication, backing, metathesis and intrusive consonants) | Gliding, velar simplification of clicks, stopping, denasalisation, weak syllable deletion, fronting, backing and nasalization. |
| **Consistency** | 20% | 43% |
| **Oro-motor skills** | Age appropriate | |
| | | |
| **Language (receptive)** | RS 25 | RS 14 |

## 5.7 Intervention Plan

### 5.7.1 Overview

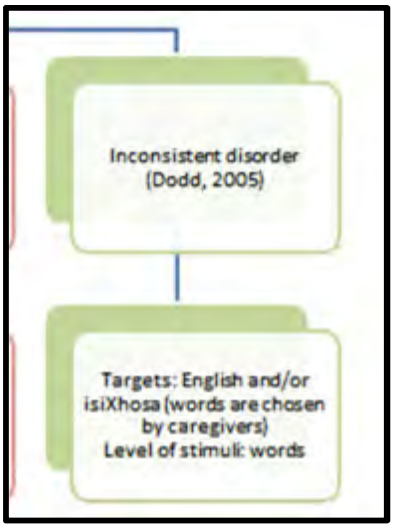



Figure 18: Selection of language of targets for Ntando

Considering the majority of Ntando's phonological processes were age appropriate, and yet his speech was unintelligible and affected his ability to participate in the classroom, a functional approach was selected. Even though it was suggested his speech may fall into the consistent phonological disorder category, the variability of the non-developmental processes used was taken into account. There was no process Ntando used frequently and consistently and yet his speech was often unintelligible. As a result, the core vocabulary approach was selected, as it aims to target fifty high frequency functional words and maximise intelligibility. Considering Ntando's varying use of phonological processes as well as his age, it was considered the most appropriate approach to intervention. Ntando's parents were consulted regarding the list of words to be included, and were given the option to include both English and isiXhosa words (see Figure 18). However, they preferred to include only English words, as this is the language that Ntando uses most frequently.

### 5.7.2 Approach

As a functional approach was required, the core vocabulary approach was selected. This allows 50 – 70 functional words to be targeted in order to make a child's speech more consistent and intelligible.

### 5.7.3 Rationale

Ntando's speech presented with some age appropriate phonological processes, but also included a range of non-developmental processes that he used inconsistently. In spite of his age appropriate phonetic inventory and phonological processes, the inconsistent use of non-developmental processes resulted in Ntando presenting with unintelligible speech that affected his ability to participate in classroom activities. Although his inconsistency score in English was

age appropriate, during the isiXhosa assessment it was noted some inconsistent errors were used. From this, it was concluded that the core vocabulary approach would be appropriate, due to the functional nature of target selection, and due to the possibility of some inconsistency in Ntando's speech.

### 5.7.4 Theoretical Framework

As discussed in section 1.5.4, core vocabulary is an approach to intervention typically used for children who present with an inconsistent disorder (Dodd et al., 2010). Although it has only been used for children who present with inconsistent errors, it was hypothesized that the focus on functional words in this approach would be beneficial for Ntando. In addition, Ntando's inconsistency of above 40% in the isiXhosa assessment hints that there may be an element of inconsistency to his speech. Core vocabulary is appropriate for bilingual children above the age of two years (Dodd et al., 2010), making it appropriate for Ntando. Storkel and Morrisette (2002) suggest that phonological development and lexical development are linked, and intervention that focuses on whole words and vocabulary will aid in phonological development. This suggests that while Ntando does not present with an inconsistent disorder, he may still benefit from the core vocabulary approach as it is functional, and includes words that are used frequently. This would help him participate more in the classroom, and the focus on whole words may result in change in his phonological system.

### 5.7.5 Aim for Intervention

The aim for intervention was for Ntando to produce words consistently and, where possible, with age appropriate developmental phonological processes rather than non-developmental phonological processes.

### 5.7.6 Language

The core vocabulary approach requires a list of words to be collected that are functional and meaningful for the child. Ntando's parents were contacted in order to help with this process. They were given the opportunity to include both English and isiXhosa words; however, they chose only English words. As English is the language Ntando uses most frequently, with

parental reports that he uses it for about 90% of the time, as well as it being the language spoken at his crèche, it was concluded that all the words would be in English.

### 5.7.7 Hypothesis/Research Questions

Core vocabulary is typically used for children with inconsistent disorders (Dodd et al., 2010). Ntando did not present with a clear inconsistent disorder, however his PCC scores as well as reports from his teacher suggested his speech was often unintelligible and limits his participation in the classroom. As such, it was hypothesized that core vocabulary would have a positive impact on Ntando's intelligibility.

Intervention would be provided in English. There have been previous studies that have provided core vocabulary intervention to a bilingual child in English, but not their other language (Holm & Dodd, 2001; Holm & Dodd, 1999). In both cases, even though intervention was provided in English, there were gains in consistency in the untreated language. It was hypothesized that this is as a result of the underlying deficit in the phonological planning of words being targeted, not just the surface errors (Holm & Dodd, 1999).

It was hypothesized that by providing Ntando with core vocabulary intervention in English, his English speech would increase in intelligibility. It was also hypothesized that there would be a change in his isiXhosa speech, possibly resulting in more consistent and intelligible isiXhosa speech.

### 5.7.8 Short Term Aims

During each session, four to six words were selected as targets. In these sessions, the following aims, as outlined by Dodd et al. (2010) were included:

1. Establishing best production

   Each session started with the target words being introduced to Ntando. The phonological structures of the words were introduced by using blocks to illustrate the phonemes or the syllables of the word. Ntando was encouraged to produce the words, and the best production of the words was agreed upon. At times, this included some age appropriate developmental phonological processes.

2. Drill

   Following this, the words were then used in activities where Ntando was required to produce the words multiple times. This included activities that Ntando enjoyed in order to make the sessions interesting for him, e.g. fishing, playing with cars, and posting pictures through a slot in a box. Throughout the drill activities, Ntando was provided with feedback if he did not produce the agreed upon best production, and was reminded of the production of the word.

3. Monitoring consistent production

   Once ten to twenty words had been targeted, Ntando's production of these words was monitored. In these session, activities were introduced that required Ntando to produce the previously targeted words on multiple occasions. If Ntando was able to produce them using the best production on three occasions, they were removed from the list of targets. If he still struggled with his production of the words, they were put back onto the list in order to be targeted again in a future session.

4. Home practice

   The targeted words with pictures would be sent home with Ntando after each session, and his parents were informed of the best production. They were asked to encourage Ntando to produce the word using his best production. In addition, his teacher was provided with a list of Ntando's words and encouraged to remind him to use his best production when using the words in the classroom.

## 5.8 Outcomes

Ntando attended 14 sessions of intervention. Sessions took place at the crèche, in any available space. Due to the busy nature of the crèche, the available areas for intervention were not always quiet or free of distractions, so the researcher attempted to include activities that would hold Ntando's attention. Intervention was provided two or three times a week, over a period of five weeks. Sessions were 30 minutes in length and a total of four to six words were targeted at each session. Over the 14 sessions, Ntando received a total of seven hours of intervention, and 50 words were targeted. The fidelity rubric was completed at each session, and 100% fidelity recorded.

These words and Ntando's best production of them are listed in Table 79.

**Table 79: Ntando target words for intervention**

| TARGET | NTANDO's BEST PRODUCTION | TARGET | NTANDO's BEST PRODUCTION | TARGET | NTANDO's BEST PRODUCTION |
|---|---|---|---|---|---|
| 1. thank you | taŋkju | 19. TV | tivi | 37. sleeping | sipɪŋ |
| 2. yellow | jɛloʊ | 20. hello | hɛloʊ | 38. elephant | ɛlʌfənt |
| 3. rain | weɪn | 21. bread | bwɛd | 39. friend | fwɛnd |
| 4. boat | boʊt | 22. mouth | maʊf | 40. grandpa | gwanpɑ |
| 5. goat | goʊt | 23. nose | noʊs | 41. wake up | weɪkʌp |
| 6. snake | sneɪk | 24. eyes | aɪs | 42. falling | fɔlɪŋ |
| 7. bridge | bwɪdʒ | 25. ears | ɪəs | 43. vienna | vɪnɛnʌ |
| 8. swing | swɪŋ | 26. lips | lɪps | 44. teeth | tif |
| 9. jumping | dʒʌmpɪŋ | 27. car | kɑ | 45. hand | hand |
| 10. chips | tʃɪps | 28. tank | taŋk | 46. computer | kɒmjutə |
| 11. watch | wɔtʃ | 29. truck | twʌk | 47. laughing | lɑfɪŋ |
| 12. catch | katʃ | 30. train | tweɪn | 48. dancing | dansɪŋ |
| 13. fridge | fwɪdʒ | 31. choo choo | tʃutʃu | 49. happy | hapi |
| 14. boy | bɔɪ | 32. blue | bənu | 50. aeroplane | awəpeɪn |
| 15. girl | gal | 33. red | wɛd | | |
| 16. teacher | titʃə | 34. chart | tʃɑt | | |
| 17. school | skul | 35. star | stɑ | | |
| 18. tools | tuls | 36. running | wʌnɪŋ | | |

Ntando participated well in most sessions. However, there were times when he became distracted by other children, making it difficult to continue with the activities. At times, he became aware of the fact that we were working on words that were difficult for him to produce, and he would refuse to produce them. He was very clear about which activities he wanted to do, sometimes refusing to take part in other activities. On most occasions, Ntando required targeting a word in one session to establish best production. However, a few words were targeted over a few sessions in order for Ntando to use his best production accurately. Words that were targeted over more than one session included "blue", "sleeping", "vienna", "running" and "thank you".

## 5.9 English Speech Reassessment Results

Ntando found the reassessment sessions difficult, and required a great deal of motivation to complete these sessions. At times, he refused to name a picture, making it difficult to elicit all of the required words. Ntando was 3;4 years at the time of reassessment.

### 5.9.1 Consonant and Vowel Inventories

Ntando's consonant inventory is summarized in Table 80. He showed evidence of being able to produce the phonemes /θ/ and /ʒ/, adding them to his inventory. However, he did not use all the phonemes in his inventory accurately in words. He could use all English vowels and diphthongs (see Table 67).

Table 80: Ntando's English phonetic inventory on initial assessment and reassessment

| | INITIAL ASSESSMENT (3;0 years) | | REASSESSMENT (3;4 years) | |
|---|---|---|---|---|
| INVENTORY | Present | Not present | Present | Not present |
| **Stops** | p, b, t, d, k, g | | p, b, t, d, k, g | |
| **Fricatives** | f, v, s, z, ʃ, h | θ, ð, ʒ | f, v, s, z, ʃ, ʒ, h, θ, | ð |
| **Affricates** | tʃ, dʒ | | tʃ, dʒ | |
| **Nasals** | m, n, ŋ | | m, n, ŋ | |
| **Liquids** | l, r | | l, r | |
| **Glides** | w, j | | w, j | |

### 5.9.2 Severity Indices (PCC, PVC, PPC)

Ntando's PCC in the phonology assessment was 76% (Table 81). This is a slight improvement compared to the initial assessment, resulting in a percentile of 50 according to English norms, suggesting his PCC is similar to the mean PCC of monolingual English speakers. However, in comparison to 3 year old isiXhosa-English bilingual children (Pascoe et al., 2015), he achieved a percentile of 11.5. While this is an improvement, it suggests his PCC is still below the expected level for his age in comparison to his peers. His vowels continued to be accurate, although on reassessment he substituted one vowel, resulting in a slightly lower PVC. Again, he made a slight improvement in his PPC, with a percentile rank of 50.

Table 81: Ntando's PCC, PVC and PPC on reassessment

| | INITIAL ASSESSMENT (3;0 years) | | | REASSESSMENT (3;4 years) | | |
|---|---|---|---|---|---|---|
| | Percentage | Percentile rank (Dodd et al., 2002) | Local data (Pascoe et al., 2015) | Percentage | Percentile rank (Dodd et al., 2002) | Local data (Pascoe et al., 2015) |
| **PCC** | 72 | 37 | 1.7 | 77 | 50 | 11.5 |
| **PVC** | 100 | 91 | | 99 | 63 | |
| **PPC** | 82 | 37 | | 85 | 50 | |

### 5.9.3 Phonological Processes

In reassessment, Ntando again presented with cluster reduction, stopping and gliding (Table 82). He showed fewer instances of cluster reduction, only reducing seven clusters in comparison to 14 on initial assessment. In addition, he no longer presented with the stopping of /l/, which is not usually noted in typically developing speech, but only stopped affricates and fricatives on reassessment, a developmental process. Although he exhibited more instances of gliding on reassessment (eight, in comparison to five on initial assessment), at least four of these instances occurred in clusters that he had previously reduced on initial assessment. He used similar isolated developmental and non-developmental phonological processes, but overall used fewer phonological processes on reassessment, with a total of 30 instances of processes in comparison to 35 on initial assessment.

Table 82: Ntando's phonological processes in English on reassessment

| Phonological process | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Cluster reduction** | /fɹ/ → /f/ | /fɒg/ for *frog* | Age appropriate (Dodd et al., 2002) |
| | /bɹ/ → /b/ | /ʌmbɛlə/ for *umbrella* | |
| | /stɹ/ → /st/ | /stɔbəɹi/ for *strawberry* | |
| | /spl/ → /p/ | /pat/ for *splash* | |
| | /sn/ → /s/ | /seɪŋk/ for *snake* | |

| | | | |
|---|---|---|---|
| | /gl/ → /g/ | /gʌvz/ for *gloves* | |
| **Stopping** | /θ/ → /t/ | /taŋkju/ for *thank you*<br>/tit/ for *teeth*<br>/twi/ for *three* | Age appropriate (Bowen, 2011; Dodd et al., 2002) |
| | /ð/ → /d/ | /dɪs/ for *this* | |
| | /dʒ/ → /d/ | /dəwɑf/ for *giraffe* | |
| | /s/ → /t/ | /tɪzəz/ for *scissors*<br>/pat/ for *splash* | |
| **Gliding** | /l/ → /j/ | /hɛjikɒptə/ for *helicopter* | Age appropriate (Dodd et al., 2002) |
| | /ɹ/ → /j/ | /jabɪt/ for *rabbit* | |
| | /ɹ/ → /w/ | /twi/ for *three* | |
| **ISOLATED DEVELOPMENTAL PHONOLOGICAL PROCESSES** | | | |
| **Fronting** | /ʃ/ → /s/ | /sip/ for *sheep* | Age appropriate (Bowen, 2011; Dodd et al., 2002) |
| | /ð/ → /v/ | /tsʌvə/ for *feather* | |
| **Deletion of initial consonant** | /t/ → ø | /əmɑtoʊ/ for *tomato* | Not age appropriate (Dodd et al., 2002) |
| **Deletion of medial consonant** | /θ/ → ø | /tubrʌʃ/ for *toothbrush* | Not age appropriate (Dodd et al., 2002) |
| | /ɹ/ → ø | /ɒɪndʒ/ for *orange* | |
| **ISOLATED NON-DEVELOPMENTAL PHONOLOGICAL PROCESSES** | | | |
| **Affrication** | /f/ → /ts/ | /tsʌvə/ for *feather* | |
| **Backing** | /b/ → /d/ | /wɛd/ for *web* | |
| **Intrusive consonants** | | /piŋk/ for *pig* | |

### 5.9.4 Connected Speech

On reassessment, Ntando produced seven words in short phrases. Of these seven words, only one was different to the single word naming task, resulting in a single word versus connected speech ratio of 86%. This is a percentile of 63, which is age appropriate, an improvement from the initial assessment where he achieved a percentile of 37.

### 5.9.5 Oro-Motor Assessment

As Ntando had no difficulties in the initial assessment, this aspect was not reassessed.

### 5.9.6 Stimulability and Articulation

On reassessment, Ntando's stimulability for /θ/ and /ð/ was assessed. Ntando was not stimulable for /θ/ or /ð/ in words or syllables. However, he was able to produce the phoneme /θ/ in isolation, suggesting this is part of his phonetic inventory. He continued to have difficulty producing /ð/, even in isolation.

### 5.9.7 Consistency

Even though Ntando produced no words inconsistently on the diagnostic screener, the inconsistency assessment was conducted to compare the results to the initial assessment. On reassessment, Ntando produced six words differently, in comparison to the 14 words produced differently on initial assessment. Of those six words, only three words contained inconsistent errors (Table 83). This results in an inconsistency of 12%.

**Table 83: Ntando's inconsistent productions in English on reassessment**

| TARGET | FIRST PRODUCTION | SECOND PRODUCTION | THIRD PRODUCTION |
|---|---|---|---|
| **vacuum cleaner** | vajutin | vakjukinə | vakjukinə |
| **teeth** | ti | ti | tit |
| **kangaroo** | kaŋgəju | kaŋgəu | kaŋgəju |

### 5.9.8 Summary

Ntando's phonetic inventory is age appropriate, with only /ð/ missing from his inventory (Table 84). His PCC improved slightly, with a PCC of 77% on reassessment, which is a percentile of 50 in comparison to monolingual speakers (Dodd et al., 2002) but 11.5 in comparison to bilingual peers (Pascoe et al., 2015). Ntando still presented with the same consistent developmental phonological processes of cluster reduction, stopping and gliding, although he produced fewer examples of cluster reduction and no longer used stopping for the liquid /l/. He also made use of fewer isolated developmental and non-developmental phonological processes. His connected speech was more similar to his single word naming on reassessment. In addition, he only produced three words inconsistently on reassessment, suggesting his speech is more consistent.

Table 84: Summary of Ntando's English assessment results on reassessment

| | INITIAL ASSESSMENT (3;0 years) | REASSESSMENT (3;4 years) |
|---|---|---|
| **Inventory** | Incomplete but age appropriate (missing θ, ð, ʒ) | Incomplete but age appropriate (missing ð) |
| **PCC in phonology assessment** | 72% | 77% |
| **Number of times error patterns used in phonology assessment (5 or more instances):** | | |
| Cluster reduction | 14 | 7 |
| Stopping | 6 | 7 |
| Gliding | 5 | 8 |
| Total number of errors in phonology assessment (including isolated processes) | 35 | 30 |
| **Single word vs connected speech ratio** | 67% | 86% |
| **Inconsistency in screener** | 40% | 0% |
| **Inconsistency assessment** | 20% | 12% |
| | | |

### 5.9.9 Diagnostic Category

Ntando presented with an age appropriate speech inventory, phonological processes and consistency of speech. In addition, his single word to connected speech ratio is age appropriate. This may suggest his English speech is age appropriate. However, it is important to note that in comparison to similar aged isiXhosa-English bilingual children in Cape Town, Ntando's PCC is below what is expected. In addition, although stopping is age appropriate for 3;5 years (Dodd et al., 2002), Ntando was 3;4 years, so it should soon be eliminated from his speech. As such, Ntando's speech was described as age appropriate, but his parents and teachers were urged to monitor his speech development to ensure he continued to increase his intelligibility and develop age appropriate speech.

## 5.10 IsiXhosa Speech Reassessment Results

### 5.10.1 Consonant and Vowel Inventories

Two additional phonemes were added to Ntando's inventory: /dʒ/ and /ǁ/ (Table 85). However, he did not use the click /ǁ/ accurately in words. During this assessment, Ntando was

very distracted and some words could not be elicited. Therefore, phonemes that he showed evidence of having acquired in the initial assessment were considered present, even if Ntando did not show evidence of this during the reassessment. His inventory is age appropriate, but he should be adding additional phonemes to his inventory soon. Table 73 shows more details regarding expected age of acquisition. Ntando again showed evidence of producing all isiXhosa vowels (Table 74).

Table 85: Ntando's isiXhosa speech inventory on reassessment

| | INITIAL ASSESSMENT (3;0 years) | | REASSESSMENT (3;4 years) | |
|---|---|---|---|---|
| INVENTORY | Present | Not present | Present | Not present |
| **Plosive** | p', $p^h$, b, t', $t^h$, d, k', $k^h$, g | c', $c^h$, ɟ | p', $p^h$, b, t', $t^h$, d, k', $k^h$, g | c', $c^h$, ɟ |
| **Implosive** | | ɓ | | ɓ |
| **Nasals** | m, n, ŋ | ɲ | m, n, ŋ | ɲ |
| **Fricatives** | f, v, s, z, h, ɣ, ʃ | x | f, v, s, z, h, ɣ, ʃ | x |
| **Lateral** | l | ɬ, ɮ | l | ɬ, ɮ |
| **Trill** | | r | | r |
| **Affricates** | tʃ',$tʃ^h$ , dz, ts' | dʒ, kx', tɬ, $ts^h$ | tʃ',$tʃ^h$ , dz, ts', **ʤ** | kx', tɬ, $ts^h$ |
| **Glides** | w, j | | w, j | |
| **Clicks** | ǀ, !, ŋǀ,ǀg, $ǀ^h$ | ǁ, ŋǁ, ŋ!, !g, ǁg, $ǁ^h$, $!^h$ | ǀ, !, ǁ, ŋǀ,ǀg, $ǀ^h$ | ŋǁ, ŋ!, !g, ǁg, $ǁ^h$, $!^h$ |

### 5.10.2 Severity Indices (PCC, PVC, PPC)

Ntando's PCC was 71% (Table 86). This is an improvement from his previous score of 62% on initial assessment. However, it is still below the mean PCC of 3;0 – 3;6 year old children of 91.25% found by Maphalala et al. (2014). He achieved a PVC of 95%, slightly below his initial score of 98%. His PVC on reassessment was slightly below the mean suggested by Maphalala et al. (2014) of 97.25%. He had a PPC of 84%, slightly higher than the initial result of 82%.

Table 86: Ntando's PCC, PVC and PPC in isiXhosa on reassessment

| | INITIAL ASSESSMENT (3;0 years) | REASSESSMENT (3;4 years) |
|---|---|---|
| **PCC** | 62 | 71 |
| **PVC** | 98 | 95 |
| **PPC** | 82 | 84 |

### 5.10.3 Phonological Processes

As can be seen in Table 87, Ntando continued to use many phonological processes in isiXhosa. However, in some cases the process use was reduced. For example, on initial assessment Ntando used gliding for /l/ or /r/ six times while on reassessment he used gliding for these two phonemes twice. However, Ntando used other processes, such as stopping, more frequently. It was noted that Ntando was less compliant during reassessment making it more difficult to elicit speech from him. This may have influenced his results. In total, Ntando used 33 instances of phonological processes on reassessment, similar to the initial assessment where he used 36 instances of phonological processes.

**Table 87: Ntando's phonological processes in isiXhosa on reassessment**

| PHONOLOGICAL PROCESSES | Realisation | Example | Comment/age appropriacy |
|---|---|---|---|
| **Gliding** | /l/ → /j/ | ijʌŋgʌ for *ilanga* [sun] | Age appropriate (Maphalala et al., 2014) |
| | /r/ → /j/ | ɔjɛnds for *iorenji* [orange] | |
| | /ɟ/ → /j/ | ijʌsi for *idyasi* [jacket] | |
| **Velar simplification** (Lewis & Roux, 1996) | /ǁ/ → /k/ | kɔjɔ for *ixolo* [peel] | Age appropriate (Lewis & Roux, 1996) |
| | /ǁʰ/ → /g/ | isigɔtʌ for *isiXhosa* [the language] | |
| | /ǁg/ → /k/ | ʌmʌkʌ for *amagxa* [shoulders] | |
| | /ŋǃ/ → /g/ | ginʌ for *inqina* [chicken feet] | |
| | /ǃg/ → /g/ | gikʌ for *ugqirha* [doctor] | |
| | /ǃʰ/ → /k/ | ujʌkubʌ for *uyaqhuba* [driving] | |
| | /ǃ/ → /k/ | ʌkʌndʌ for *iqanda* [egg] | |
| | /ŋk\|/ → /k/ | kukiʃɛlʌ for *nkcenkceshela* [watering] | |
| **Alveolar simplification** (Lewis & Roux, 1996) | /\|/ → /t/ | itʌŋgɔ for ucango | Age appropriate (Lewis & Roux, 1996) |
| **Stopping** | /j/→ /g/ | ʌmʌgɛzʌ for *amayeza* [medicine] | Age appropriate (Maphalala et al., 2014) |

| | | | |
|---|---|---|---|
| | /x/ → /k/ | gikʌ for *ugqirha* [doctor] | |
| | /s/ → /t/ | isigɔtʌ for *isiXhosa* [the language] | |
| | /kx/ → /k/ | ɛjʌkʌzulʌ for *uyakrazula* [tear] | |
| | /ɣ/ → /k/ | ikɔmbʌ for *uyagromba* [digging] | |
| | /tɬ/ → /t/ | itɔkɔ for *intloko* [head] | |
| | /ɮ/ → /d/ | idɛbɛ or igɛbɛ for *indlebe* [ear] | |
| **Backing** | /ɮ/ → /g/ | igɛbɛ for *indlebe* [ear] | Not noted by Maphalala et al. (2014) |
| | /c$^{h}$/ → /k/ | ukʌlʌ for *uyatyhala* [push] | |
| **Fronting** | /c/ → /t/ | ukutʌ for *ukutya* [food] | Not noted by Maphalala et al. (2014) |
| | /ɬ/ → /s/ | ʌʌsɛkʌ for *uyahleka* [laughing] | |
| | /tɬ/ → /ts/ | iətsɔkɔ for *intloko* [head] | |
| **Voicing** | /p$^{h}$/ → /b/ | bɛkʌ for *uyapheka* [cook] | Not noted by Maphalala et al. (2014) |
| **Assimilation** | | i!ibibʌ for *ingqiniba* [elbow] | Not noted by Maphalala et al. (2014) |
| **Fricative for click** | /$\vert^{h}$/ → /s/ | ujʌsɛbʌ for *uyacheba* [cutting] | Not noted by Maphalala et al. (2014) |
| **Denasalisation** | | idɛbɛ for *indlebe* [ear]<br>tɔkɔ for *intloko* [head]<br>kukiʃɛlʌ for *nkcenkceshela* [watering] | Age appropriate (50% of children aged 3;7 – 4;0 made use of this process (Maphalala et al., 2014)) |

### 5.10.4 Connected Speech

As with the initial assessment, it was difficult to obtain a spontaneous speech sample. Ntando's connected speech could not be compared with his single word naming.

### 5.10.5 Consistency

Over the course of the *Masincokoleni* assessment, Ntando produced seven words on two occasions. Of these seven words, three included inconsistent errors (Table 88), resulting in an

inconsistency of 43%. This is similar to the initial assessment, suggesting there has been no change in the consistency of Ntando's isiXhosa speech.

Table 88: Ntando's inconsistent productions on reassessment

| TARGET | FIRST PRODUCTION | SECOND PRODUCTION |
|---|---|---|
| **amayeza** | ʌmʌgɛzʌ | jɛzʌ |
| **intloko** | tɔkɔ | iətsɔkɔ |
| **indlebe** | idɛbɛ | igɛbɛ |

### 5.10.6 Summary

On reassessment, Ntando showed evidence of having acquired the phonemes /dʒ/ and /ǁ/. In addition, his PCC improved to 71%, with a PVC of 95% and a PPC of 81%. He continued to use many phonological processes. Many of these are age appropriate, although some of them (e.g. backing, fronting, voicing, assimilation) have not been noted in previous studies of monolingual isiXhosa speaking children. He maintained the same level of consistency from the initial assessment to reassessment.

### 5.10.7 Diagnostic Category

Ntando's phonetic inventory continued to be age appropriate. He used age appropriate developmental phonological processes, as well as a few that were not noted in the sample assessed by Maphalala et al. (2014) and may be considered non-developmental for isiXhosa speaking children. He continued to show a relatively high rate of inconsistency. As there was little change in his isiXhosa speech, his speech difficulties continue to fall into the diagnostic category of consistent phonological disorder.

## 5.11 Summary/Overall Profile of Reassessment Results

Ntando made small improvements in both his English and isiXhosa speech sound inventories, adding two new sounds to each inventory (see Table 89). He has shown an improvement in his PCC in both English and isiXhosa, although his PVC and PPC remained similar. He continued to use multiple developmental and non-developmental phonological processes in both English and isiXhosa, which resulted in his speech still being unintelligible at times. His consistency in

English has improved from 20% inconsistent to 12% inconsistent. However, his isiXhosa inconsistency remained unchanged.

Table 89: Summary of Ntando's English and isiXhosa initial and reassessment results

| | INITIAL ASSESSMENT (3;0 years) | | REASSESSMENT (3;4 years) | |
|---|---|---|---|---|
| | English | isiXhosa | English | isiXhosa |
| **Speech Inventory (missing sounds)** | θ, ð, ʒ | ɕʼ, ɕʰ, ɟ, ɓ, ɲ, x, ɬ, ɮ, r, dʒ, kxʼ, tɬ, tsʰ, ǁ, ŋǁ, ŋǃ, ǃg, ǁg, ǁʰ, ǃʰ | ð | ɕʼ, ɕʰ, ɟ, ɓ, ɲ, x, ɬ, ɮ, r, kxʼ, tɬ, tsʰ, ŋǁ, ŋǃ, ǃg, ǁg, ǁʰ, ǃʰ |
| **PCC** | 72% | 62% | 77% | 71% |
| **PVC** | 100% | 98% | 99% | 95% |
| **PPC** | 82% | 81% | 85% | 84% |
| **Phonological processes** | Cluster reduction, gliding and stopping (isolated instances of fronting, deletion of consonants, affrication, backing, metathesis and intrusive consonants) | Gliding, velar simplification of clicks, stopping, denasalisation, weak syllable deletion, fronting, backing and nasalization. | Cluster reduction, gliding and stopping (isolated instances of fronting, deletion of consonants, affrication, backing, intrusive consonants) | Gliding, velar and alveolar simplification of clicks, stopping, denasalisation, fronting, backing, voicing and assimilation |
| **Consistency** | 20% | 43% | 12% | 43% |
| **Oro-motor skills** | Age appropriate | | Not retested | |
| | | | | |
| **Language (receptive)** | RS 25 | RS 14 | Not retested | |

## 5.12 Intelligibility Reassessment

Ntando's father and teacher were again asked to complete the *ICS* to establish whether there was a change in his intelligibility. As can be seen in Table 90, Ntando's father noticed an improvement, particularly in terms of Ntando's extended family, acquaintances and strangers understanding his speech. In addition, Ntando's parents both reported they had noticed an improvement in his speech and his vocabulary. Ntando's teacher noted an improvement in Ntando's intelligibility. She reported she now usually understands Ntando when before she rarely understood him. She also reported that the other children in the class are able to

understand Ntando, and he is playing with a wider group of children compared to before the initial assessment.

Table 90: Ntando's *Intelligibility in Context* (McLeod et al., 2012a) scores on reassessment

| | Father – Initial assessment | Father - reassessment | Teacher – initial assessment | Teacher – reassessment |
|---|---|---|---|---|
| **1. Do you understand your child?** | 4 - usually | 4 - usually | 2 - rarely | 4 – usually |
| **2. Do immediate members of your family understand your child?** | 4 – usually | 4 - usually | - | - |
| **3. Do extended members of your family understand your child?** | 3 – sometimes | 4 - usually | - | - |
| **4. Do your child's friends understand your child?** | 5 - always | 5 - always | 4 - usually | 4 – usually |
| **5. Do acquaintances understand your child?** | 3 – sometimes | 4 - usually | - | - |
| **6. Do your child's teachers (teacher assistants) understand your child?** | 4 – usually | 4 - usually | 4 – usually | 4 - usually |
| **7. Do strangers understand your child?** | 3 - sometimes | 4 - usually | - | - |
| **TOTAL** | 26/35 | 29/35 | 10/15 | 12/15 |
| **AVERAGE** | 4 | 4 | 3 | 4 |

# Chapter 6: Discussion

## 6.1 Gcobisa

The intervention approach of minimal pairs was chosen as it is appropriate for a child with a mild phonological delay (Baker, 2010) and therefore considered to target Gcobisa's speech sound disorder. This approach resulted in a change in Gcobisa's phonological system, as she was able to accurately produce the phoneme /l/ in both trained and untrained words and phrases in isiXhosa. As discussed in section 3.7.7, it was hypothesized that one of two possible outcomes would occur in terms of generalization of results to English:

1) No generalization into English, suggesting Gcobisa had two separate phonological systems with little interaction between them.
2) Generalization into English words, suggesting that Gcobisa's two phonological systems interact.

The reassessment results clearly indicate that there was generalization from isiXhosa, the targeted language, to English. This suggests that although Gcobisa may have two phonological systems, these two systems interact. This correlates with the *interactional dual systems model* suggested by Paradis (2001) that states that bilingual children have two phonological systems that interact.

This is in contrast to the findings of Holm et al. (1997), who found no generalization between the treated and untreated language, and who suggested that Jason, the child aged 5;2 in their study, had two separate phonological systems for his two languages (Cantonese and English) that did not interact.

When comparing the language history of Jason and Gcobisa, there are some differences. Jason was exposed to Cantonese only at home, and began acquiring English at the age of three years three months when he started attending an English crèche for 10 hours a week, later increased to 25 hours a week (Holm et al., 1997). In comparison, Gcobisa's mother reported that she had been exposed to both English and isiXhosa from a young age, and that she speaks both languages at home. This suggests that Gcobisa's language acquisition could be described as

simultaneous (Hua & Dodd, 2006; Kohnert, 2008), as opposed to Jason's which was more sequential (Grech & McLeod, 2012; Hua & Dodd, 2006). It has been hypothesised that a child's phonological system is usually established when they reach the age of 30 months (Hua & Dodd, 2006), and acquiring a second language after this (as in the case of Jason) may result in different outcomes compared to acquiring two languages simultaneously before this age (as in the case of Gcobisa).

Ray (2002) provided intervention for a trilingual five-year old child (MC) who had acquired English sequentially at the age of four years when he attended preschool, after acquiring his home languages of Hindi and Gujarati. Although MC's sequential multilingualism is similar to Jason's sequential bilingualism, intervention for MC in English resulted in generalization to the untreated home languages of Hindi and Gujarati (Ray, 2002). Ray (2002) hypothesized that MC had one phonological system, and provided evidence by giving examples of rules he was applying from his home languages to the newly acquired language, English, as well as the generalization of positive change in his phonological system from English to his home languages following intervention. The differences between MC and Jason could possibly be as a result of the length of time each child had been exposed to English: Jason had been exposed to approximately two years of English in comparison to MC's one year (Holm et al., 1997; Ray, 2002). The age of acquisition and amount of exposure to the second language of a bilingual child is always important to take into account, as this may affect how the two languages interact with each other (Hambly et al., 2013).

The differences between Jason, where generalisation did not occur, and MC and Gcobisa, where generalisation did occur is likely due to more than the varying age of second language acquisition. Another factor to consider is that intervention for Jason targeted a phonological process only present in his English speech (gliding), and cluster reduction, and there are few clusters in Cantonese (Holm & Dodd, 1999b, 2001). In contrast to Jason, but similar to Gcobisa, MC's intervention included targeting phonological processes common to all three of his languages. Intervention was only provided in one language, and this resulted in generalisation to all three (Ray, 2002).

In contrast to the studies where intervention was provided in only one of the children's languages, Ramos and Mead (2014) provided intervention in both languages of a bilingual child. From their results, they concluded that intervention in both languages was more effective than intervention provided in only one of the child's languages, even if generalisation takes place (Ramos & Mead, 2014). Considering the case of Gcobisa, although the targets chosen were in isiXhosa, the main language used within the sessions was English. Some simple isiXhosa instructions were used when possible (e.g. *hlala pantsi* [sit down]; *mamela* [listen]; *ewe* [yes]). However, as Gcobisa found the tasks more and more challenging and required considerable input from the researcher to stay focused and motivated, less isiXhosa phrases were used as the researcher did not always have the language skills to provide that encouragement in isiXhosa. This was a situation not well-documented in the literature, where the targets were in isiXhosa while the instructions and other interactions with the researcher took place in English. It is difficult to say whether this bilingual context may have had an effect on the generalization from isiXhosa to English. This will be discussed further in section 6.9.

## 6.2 Lulama

Lulama received intervention that aimed to address three areas of concern: lateralization of /ɹ/, cluster reduction, and fronting of /ʃ/. It was hypothesized that there would be a change in Lulama's phonological system, as the targeted phonemes were in Lulama's inventory, but she was not using them accurately, and intervention could result in Lulama learning how to use these phonemes appropriately. In addition, it was hypothesized that there would be little evidence of generalization to isiXhosa, as isiXhosa presents no opportunity to produce the phoneme /ɹ/ or w-clusters, and Lulama had shown evidence of using /ʃ/ accurately in isiXhosa on initial assessment. Evidence for this included studies by Holm and Dodd (1999b, 2001) and Mamdouh (2008) who noted that phonemes targeted in one language that were not used frequently or were not present in a second language, would not result in generalization to that second language.

The results obtained were unexpected. Lulama's use of the phonological process of lateralization of /ɹ/ seemed more frequent on reassessment, as did the fronting of /ʃ/. In

addition, the process of lateralization of /ɹ/ that had only been an isolated error in English on initial assessment, was evident in isiXhosa on reassessment for the trill /r/.

Research considering the typical speech development of bilingual children has yielded contrasting results, but some studies have found that bilingual children tend to have less intelligible speech than monolingual children, and that bilingual children make use of more phonological processes that are considered non-developmental in monolingual development (e.g. Fabiano-Smith & Goldstein, 2010b; Gildersleeve-Neumann & Wright, 2010; Holm & Dodd, 2006). This is known as negative transfer - when bilingual speech development occurs at a slower rate than monolingual speech development (Goldstein & Bunta, 2011). This could suggest that although on assessment Lulama appeared to present with a consistent phonological disorder, these non-developmental errors and decreased intelligibility may be typical of bilingual speech development, and be an example of negative transfer. This could be explained using the *dynamic systems theory* discussed in section 1.3.3, which suggests that the interaction between two languages is dynamic, with both progression and regression occurring (Goldstein & Gildersleeve-Neumann, 2015).

On reassessment it was suggested that in English she presented with a consistent phonological disorder while in isiXhosa she presented with a phonological delay. If these diagnoses are accurate it suggests differing underlying difficulties for the surface errors for each language. It has been suggested that this will not be the case for bilingual children (Holm et al., 1999). It is possible that the errors that Lulama presented with are typical for isiXhosa-English bilingual development, even though they were considered to be atypical or disordered when compared to monolingual norms. There is a paucity of information about the nature of typical isiXhosa-English bilingual speech development, which makes holistic interpretation of the children's abilities a challenge.

In isiXhosa, the approximant liquid /ɹ/ is pronounced as a dialectal variant trill /r/ in loanwords (words that have originated in another language but have been phonologised so that they are part of the language (Niesler et al., 2005)). Considering Lulama was exposed to English

subsequent to a period of only learning isiXhosa, producing the approximant /ɹ/ may have been difficult for her. She substituted it with /l/, a phoneme with a similar placement as the trill /r/ but a different manner of articulation, as /l/ is a lateral approximant liquid. This may explain why her attempts to produce the approximant /ɹ/ resulted in the production of the approximant /l/. In addition, Mowrer and Burger (1991) found that substituting /l/ for /r/ was evident in the isiXhosa speaking children in their study, and note it as a common substitution in languages other than English. Her variability in the production of this phoneme may be an indication of an interaction between the phonological systems of her stronger language, isiXhosa, and her second language, English. The interaction between the two phonological systems of a bilingual child has been widely accepted (e.g. Burrows & Goldstein, 2010; Fabiano-Smith & Goldstein, 2010b; Goldstein & Gildersleeve-Neumann, 2015; Grech & Dodd, 2008; Hambly et al., 2013; Kim, 2015; Prezas et al., 2014; Salameh et al., 2003; Tamburelli et al., 2015; Twinky, 2011; Vihman, 2015).

It is suggested that Lulama's speech showed evidence of having two phonological systems that interact. Some examples of the evidence for two phonological systems may include the following:

- She used /ʃ/ in isiXhosa but not consistently in English.
- She used fronting of /ʃ/ to /s/ in English, but not isiXhosa on reassessment.
- She used deaffrication of /tʃ/ in English but not isiXhosa on reassessment.
- She did not make use of phonemes specific to isiXhosa in English.

However, as discussed, there was interaction between the phonological systems of each language resulting in some errors in English that seemed to have been influenced by the production of isiXhosa phonemes (e.g. /ɹ/ → /l/).

Even though her errors may have been as a result of negative transfer and the interaction between the phonological systems of isiXhosa and English, it was still expected that there would be some change in her English phonological system. There did not seem to be an

obvious change in English, apart from her more consistent use of w-clusters. This may be due to the main focus and the majority of intervention time being spent on /ɹ/. When considering typical acquisition of the phoneme /ɹ/ by monolingual English speakers, Dodd et al. (2002) found only 50% of the children in the youngest age group in the sample used for norms of the *DEAP* (3;0-3;5) had this phoneme present in their inventory. It is generally accepted that monolingual English-speaking children are only expected to be producing /ɹ/ accurately after the age of 5;11 years (Dodd et al., 2002). This suggests that even though Lulama showed evidence of being able to produce /ɹ/ on occasion in the assessment, it may not have been an appropriate target in terms of the developmental sequence of phonemes, resulting in little change in her phonological system in either English or isiXhosa.

There was more change in her isiXhosa speech. She acquired four phonemes that had been missing from her phonetic inventory, and used fewer phonological processes. This change may have been a result of natural maturation and development that occurred between initial and reassessment. However, this may have also been caused by an increase in awareness of speech intelligibility following intervention sessions, resulting in Lulama producing more accurate isiXhosa speech.

## 6.3 Ntando

It was challenging to place Ntando's speech difficulties into one of Dodd's diagnostic subcategories (Dodd et al., 2005). He presented with a range of phonological processes in both English and isiXhosa, some of which are considered developmental (e.g. cluster reduction, gliding, velar simplification, stopping) and some of which are considered non-developmental (e.g. affrication, backing, nasalization). Typically, if a child presents with any consistent non-developmental phonological processes, their speech sound disorder can be placed into the subcategory of consistent phonological disorder (Dodd et al., 2005). This resulted in Ntando's speech difficulties being placed in the subcategory of consistent phonological disorder. However, as little is known about the typical phonological processes used by bilingual isiXhosa-English speaking children, it cannot be determined whether the processes Ntando used are developmental or non-developmental phonological processes. It has been suggested that

bilingual children may typically use phonological processes not considered developmental in monolingual development (e.g. Fabiano-Smith & Goldstein, 2010b; Gildersleeve-Neumann & Wright, 2010; Holm & Dodd, 2006). Ntando's use of non-developmental phonological processes may in fact be typical for a child acquiring both isiXhosa and English.

Even though Ntando's speech was placed in the consistent phonological disorder category, it was hypothesized that an approach usually only used with children with inconsistent speech disorder (Crosbie et al., 2005; Crosbie, Pine, Holm, & Dodd, 2006; Dodd & Bradford, 2000; McIntosh & Dodd, 2008) would be better suited to Ntando than a minimal pairs or a metaphonological approach. Of the non-developmental processes or immature developmental processes used by Ntando, it was difficult to determine which he used frequently, and yet they all influenced his speech intelligibility resulting in Ntando not fully participating in the classroom. Although Ntando's speech sound disorder was not diagnosed as being inconsistent, as his did not make inconsistent errors across a single word (e.g. producing the same word differently across repeated trials), there may have been an element of inconsistency in his speech in that he used a variety of different sound substitutions that were interpreted as a range of isolated phonological processes, making it difficult to determine which error pattern to target. In this way, his speech sound disorder may have been similar to the description of an inconsistent disorder (Crosbie et al., 2005). As a result, core vocabulary was hypothesized as being appropriate, as it considers whole words as opposed to phonological patterns of sounds, and also focuses on meaningful functional vocabulary (McIntosh & Dodd, 2008). Ntando made small gains in his English speech. His speech became more intelligible, he used fewer instances of some phonological processes (e.g. cluster reduction), and more instances of age appropriate processes such as gliding. In English, his inconsistency score decreased from 20% to 12.5%. This indicates there was a change in the consistency of his English. Interestingly, the same could not be said of isiXhosa, where his inconsistency remained at 43%. This may have been due to the isiXhosa inconsistency score being calculated on a smaller number of targets, and Ntando's eagerness to complete the reassessment quickly rather than carefully. In spite of this, his isiXhosa PCC increased from 62% to 71%, suggesting there had been a change in the accuracy of his isiXhosa speech. These results suggest that core vocabulary was an appropriate

intervention that resulted in change to Ntando's speech. This is discussed further in section 6.7.

Holm and Dodd (1999b) provided core vocabulary intervention to a bilingual child, and found that even when providing intervention in only one language, there was generalization of results to the untreated language. In Ntando's case, his PCC in the untreated language (isiXhosa) increased more than in the treated language (English), while his consistency in isiXhosa remained the same but improved in English. This suggests that there was change in the underlying phonological systems of both his languages, but not necessarily a generalisation of the consistency gains to the untreated language.

## 6.4 IsiXhosa and English bilingualism in South Africa

This intervention study aimed to describe the changes in the speech of three isiXhosa-English bilingual children with speech sound disorders following intervention. In the recruitment process, a number of children were referred to the researcher and assessed. However, very few of these children presented speech sound disorders. Estimated prevalence of speech sound disorders varies, even across one language spoken in different countries. For example, it is estimated that in the US, 7.5% of children will present with a speech sound disorder (Ruscello, 2008), while in Australia, 1.06% - 1.3% of children will present with such difficulties (Keating, Turrell, & Ozanne, 2001; McKinnon, McLeod, & Reilly, 2007). In South Africa, a preliminary study investigating the speech of 150 three year old children acquiring English identified that 6.66% of the children presented with speech sound disorders (Pascoe et al., 2015). Of the 6.66%, none were isiXhosa-English bilingual children.

The research conducted regarding isiXhosa development suggests that the acquisition of phonemes appears to occur earlier in isiXhosa in comparison to English (Mowrer & Burger, 1991; Tuomi et al., 2001). There has been limited research into the phonological processes used by isiXhosa children (Lewis & Roux, 1996; Maphalala et al., 2014; Mowrer & Burger, 1991), but the research of Mowrer and Burger (1991) found that the isiXhosa speaking children in their sample made use of phonological processes 50% less than the English speaking children. This highlights the need for further research investigating the prevalence of speech sound disorders

in the isiXhosa speaking population. Considering the children in this study were bilingual, their acquisition of both English and isiXhosa may have resulted in positive transfer (Goldstein & Bunta, 2011), a possible reason for the difficulties identifying appropriate participants. Further research into the speech development of bilingual children, particularly those acquiring isiXhosa and English, would be useful in order to aid SLPs in being able to differentiate between a speech disorder and speech differences.

As discussed in section 1.1, isiXhosa and English are languages with many differences. They have phonological, lexical, and syntactic differences. IsiXhosa includes the use of clicks, ejected and aspirated plosives, implosives, and a range of specific plosives, fricatives, affricates and nasals, all of which are not present in English (Finlayson et al., 1994). English makes use of two fricatives not present in isiXhosa (/θ/ and /ð/), as well as consonant clusters. Despite these differences in the two languages, all three of the participants showed evidence of having acquired many of the isiXhosa phonemes, and using them specifically in isiXhosa, not in English. Differences in languages can have an effect on the acquisition of phonemes as well as the interaction of phonological systems in bilingual children (Catano, Barlow, & Moyna, 2009). The presence of certain phonemes or combinations of phonemes only in isiXhosa or only in English influenced the participants' speech. For example, all three participants made use of cluster reduction. This will be discussed in more detail in section 6.5. However, the absence of consonant clusters in isiXhosa should be taken into account when considering the reason for the use of cluster reduction in the participants' speech. This is an example of the effect of the differing languages on the participants' speech.

## 6.5 Typical speech development for isiXhosa-English bilingual children

The lack of information regarding typical bilingual development was clearly evident throughout the interpretation of the data in the current study. Interpretation was based on monolingual norms, but this is problematic, as bilingual speech development is known to differ from the monolingual development of the languages (e.g. Fabiano-Smith & Goldstein, 2010b; Gildersleeve-Neumann & Wright, 2010; Holm & Dodd, 2006). This results in bilingual children often being under or over referred for intervention (Hambly et al., 2013). The possibility of this

was evident in the cases presented in this study. Although the children's teachers, and in Lulama's case, parents were eager to refer them to the researcher and reported concerns regarding intelligibility, detailed analyses of phonological skills were difficult, as little is known about isiXhosa-English bilingual acquisition. Their results were compared to monolingual norms, and their difficulties participating within the classroom due to speech difficulties, or parental concerns guided the decision to provide intervention. However, if one considers that the children are acquiring both English and isiXhosa, and this acquisition is different to monolingual development of each language, their speech development may be typical for bilingual children. In addition, the participants may have been exposed to varying dialects of both English in isiXhosa, and this needs to be considered.

Preliminary research into the typical development of South African English included a small sample of isiXhosa-English bilingual children (n = 25) and provided some information regarding their English speech development (Pascoe et al., 2015). One of the findings in that study suggested that backing, a phonological process considered non-developmental in English, was prevalent in the English speech of isiXhosa-English bilingual participants. All three participants in the current study showed some evidence of backing in their speech: Gcobisa and Lulama used backing in isiXhosa, and Ntando used backing in English and isiXhosa. This adds to the data collected by Pascoe et al. (2015), adding to the evidence that backing may be a typical process in bilingual isiXhosa-English children. However, unlike Pascoe et al. (2015), this study also considered the isiXhosa speech of the children. Backing was evident in the isiXhosa speech of all three participants, but was not evident in the monolingual isiXhosa sample under consideration by Maphalala et al. (2014). This process may be considered typical when evident in one or both languages of isiXhosa-English bilingual children, highlighting a difference between monolingual and bilingual speech acquisition of the two languages. However, a larger sample of isiXhosa-English children is required to determine whether this is typical of the larger population, as previous research has focused on fairly small samples.

Another process identified as being more prevalent in isiXhosa-English bilinguals than in monolinguals is cluster reduction (Pascoe et al., 2015). This may be the result of the effect of

one language on the other: isiXhosa makes use of very few clusters, and those that appear are found in loan words (Maphalala et al., 2014). It is therefore, not surprising that children who speak isiXhosa as a home language find the production of clusters difficult, often reducing them. This was noted in the English speech of all three participants. Cluster reduction is expected to be eliminated from the speech of monolingual English children by the age of 3;11 (Dodd et al., 2003) and yet both Gcobisa (4;6 at the end of the study), and Lulama (4;4) still made use of this process. In both cases, it was one of the most prevalent processes used. This suggests that it may be typical for isiXhosa-English children to continue to use cluster reduction beyond the age of 4 years. However, again, this would need to be explored further with a larger sample of isiXhosa-English bilingual children.

The study investigating three year olds acquiring South African English (Pascoe et al., 2015) allowed for Ntando's PCC to be compared to his peers. As both Gcobisa and Lulama were 4 years or older at the time of the study, their PCC could not be compared directly to the data. When Ntando's English PCC was compared to monolingual children, his score was considered age appropriate, with a percentile of 37 on initial assessment and 50 on reassessment according to the monolingual norms provided by the *DEAP* (Dodd et al., 2002). However, when his percentile was calculated according to the mean and standard deviation for isiXhosa-English bilingual children provided by Pascoe et al. (2015), Ntando achieved a percentile of 1.7 on initial assessment and 11.5 on reassessment. These percentiles suggest his speech is not within the average range for his age when compared to bilingual peers. As the sample of bilingual children came from a larger sample of English speaking children, it was relatively small (25 children) (Pascoe et al., 2015) particularly in comparison to the sample of monolingual children used to develop norms for the *DEAP* (136 children between the ages of 3;0 and 3;11) (Dodd et al., 2002). This may have resulted in the bilingual sample not being an adequate representation of isiXhosa-English bilingual children, and Ntando's English PCC being judged below the average range for his age compared to bilingual peers, even though it was considered age appropriate according to the *DEAP* norms.

Another possible explanation could be that monolingual isiXhosa children have been described as precocious in their speech development, with children thought to master phonemes earlier than monolingual English children (Mowrer & Burger, 1991). Studies investigating bilingual children have found positive transfer can occur, resulting in one or more aspects of a bilingual child's speech acquisition occurring at a rate commensurate or above the typical abilities of their monolingual peers (Goldstein & Bunta, 2011; Hambly et al., 2013). Ntando's age appropriate score on the *DEAP* norms but age inappropriate score in comparison to bilingual peers may suggest that isiXhosa-English bilingual children typically present with a higher PCC in English than typical developing monolingual English children as a result of positive transfer. This resulted in Ntando's speech being judged as inappropriate for his age. However, a larger sample of bilingual children will need to be investigated to determine whether this is accurate.

Information regarding the typical phonological development of isiXhosa-English bilingual speech is crucial to guide clinicians in differentiating between a speech sound disorder or a speech difference due to bilingual development (McLeod & Verdon, in press; McLeod, 2012).

## 6.6 The use of Dodd's Diagnostic Framework: *Masincokoleni*, and categorization of speech sound disorders

This study used Dodd's Diagnostic Framework (2005) in order to categorise the speech sound disorders of the participants. This approached is widely used and acknowledged for its strong theoretical base (e.g. Crosbie et al., 2005, 2006; Dodd & Bradford, 2000; Dodd et al., 1997; Waring & Knight, 2013), and because all children with speech sound disorders should, in theory, be able to be placed into one of the categories (Waring & Knight, 2013). The *DEAP* was developed to determine the diagnostic category into which a child's speech falls, and includes subtests that investigate a child's use of developmental and non-developmental phonological processes, their inconsistent errors and articulation errors. *Masincokoleni* was not developed with this theoretical framework explicitly mind, but rather developed to sample all isiXhosa phonemes (Maphalala, 2012). This made it challenging to categorise each child's isiXhosa speech according to Dodd's diagnostic subcategories. According to the guidelines of the *DEAP*, the consistent use of a phonological process is determined by its use five times in the phonology subtest (Dodd et al., 2002), and the presence of an inconsistent disorder is

determined by an inconsistency score of above 40% in the inconsistency subtest. *Masincokoleni* does not clearly define when speech errors should be considered a phonological process. As noted by Maphalala (2012), that assessment tool would benefit from further studies investigating a larger sample of children across a wider area in South Africa, and this could include an investigation of the use of phonological processes to determine appropriate guidelines regarding the presence of phonological processes in a child's speech. In addition, there is no inconsistency component, resulting in judgments regarding the children's inconsistency being based on informal interpretation of the data. The development of a further subtest, with a small number of words that should be repeated multiple times by the child, as well as the gathering of normative data regarding this subtest, would allow for more accurate diagnosis of inconsistent disorder for isiXhosa speaking children. As children with inconsistent speech may make changes to the number of syllables in a word, or the word shape (Dodd et al., 2002), this subtest could include words of varying lengths and structures in order to identify these inconsistencies. In addition, stimuli could be developed to elicit spontaneous speech that includes some items from the single word naming section. This would allow a child's single word naming to be compared to their connected speech, and would allow for investigation into the suprasegmental aspects of speech such as intonation (Dodd et al., 2002).

Dodd's classification system has been shown to be effective in classifying the speech sound disorders of monolingual children who speak English and other languages (e.g. Dodd et al., 2005; Fox & Dodd, 2001; So & Dodd, 1994; Topbas & Yavas, 2006). In addition, it has been used to describe the speech of bilingual children (Holm & Dodd, 1999c). It is suggested that a bilingual child will present with the same type of speech sound disorder in both languages, as the surface errors present in a child's speech are an indication of an underlying deficit affecting a child's speech across language systems (Holm & Dodd, 1999c). In this study, it was not easy to categorise the speech of each child into one of the categories. For all the children, their speech was compared to monolingual norms, and diagnostic decisions made accordingly. However, it was unclear whether the errors they used were as a result of typical isiXhosa-English bilingual development resulting in a speech difference, or due to a speech sound disorder. For example, Gcobisa made use of the phonological process of backing in her isiXhosa

speech. Although this could, according to some monolingual isiXhosa norms (Maphalala et al., 2014), be considered non-developmental, there is some evidence that it may be typically used in the English speech of children acquiring isiXhosa-English (Pascoe et al., 2015). It is not clear whether it is typically used in isiXhosa speech by bilingual children, making it difficult to determine whether this phonological process was developmental or non-developmental.

Another difficulty in clearly diagnosing the speech sound disorders was caused by the variability of the use of phonological processes. For example, using the *DEAP*'s guidelines regarding phonological processes, Lulama only presented with the age appropriate developmental phonological process of cluster reduction. In addition, her score on the inconsistency subtest indicated she did not present with an inconsistent phonological disorder. However, considering the low intelligibility of her speech and her use of multiple phonological processes in both English and isiXhosa on many occasions, it was clear she did require intervention, even though it was not easy to place her speech into one of the diagnostic categories. A similar difficulty was noted when attempting to categorise the speech of Ntando. He, too, presented with age appropriate errors, and yet his PCC was well below that expected for isiXhosa-English children his age, suggesting his speech was not age appropriate and required intervention.

The use of Dodd's classification system was complicated due to the lack of norms regarding isiXhosa-English bilingual development. Although bilingual children are able to develop speech at a similar rate to monolingual children (Goldstein & Bunta, 2011), the development of two languages may result in the use of non-developmental phonological processes, that could be considered typical for a bilingual child (Holm et al., 1999; Holm & Dodd, 1999a; Lin & Johnson, 2010). Due to the lack of data regarding isiXhosa-English bilingual development, it was difficult to determine whether the errors in the children's speech were caused by speech sound disorders or speech differences (McLeod & Verdon, in press). The intelligibility of each child's speech suggested intervention was warranted. A different classification system may have been more appropriate considering the lack of normative data for this population. The psycholinguistic approach may have been more appropriate as it focuses on the individual strengths and weaknesses of a child's speech processing system (Pascoe et al., 2006). Although

formal psycholinguistic tests can be used, information can also be gathered through observation and informal assessments (Stackhouse & Pascoe, 2010), which may be more appropriate for a bilingual population where few norms are available. The approach also allows the specific weaknesses of the child's phonological system to be identified and for intervention to focus on these weaknesses, rather than approaching intervention based on a diagnosis that may not be accurate due to the lack of normative data. Gathering of normative data regarding bilingual isiXhosa-English speech acquisition may make the use of Dodd's diagnostic subcategories more effective in categorising speech sound disorders in this population.

## 6.7 Intervention approaches

The three participants in the study were provided with intervention following differing approaches according to the diagnostic subcategory of their speech sound disorder.

Gcobisa received minimal pairs intervention. This was effective, as she was able to understand that the breakdown in communication was due to her inaccurate production of the target sound. This is an important aspect of minimal pairs (Baker, 2010) and resulted in Gcobisa changing her phonological system in order to communicate effectively with the researcher. Minimal pairs were also used in intervention for bilingual children by Holm et al. (1997), Holm and Dodd (2001), Ramos and Mead (2014) and Ray (2002), and was successful in resulting in changes in the children's speech. However, Holm et al. (1997) and Holm and Dodd (2001) noted that change only occurred in the targeted language.

Lulama's intervention initially used a minimal pairs approach. However, her progress was monitored and it was noted that there was minimal change in her speech. As a result, her intervention approach was changed, as it is important to ensure intervention is appropriate and effective in causing change to justify continuing that intervention (Baker, 2010). She was then provided with intervention using a cycles approach. The cycles approach is commonly used for children with moderate to severe speech sound disorders with many phonological processes (Prezas & Hodson, 2010). Even with the change of intervention, there seemed to be little change in Lulama's speech.

Although it was difficult to categorise Ntando's speech sound disorder, his speech was classified as a consistent phonological disorder. However, as discussed in section 6.3, a more functional approach, core vocabulary was chosen, even though this approach has been recommended for use only for children with inconsistent disorder (Dodd et al., 2010). Although Ntando's diagnosis would suggest his underlying deficit was cognitive linguistic in nature (Dodd et al., 2005), the core vocabulary approach which is developed to target a disorder that is based on motor planning (Bradford & Dodd, 1994; Dodd et al., 2005), was effective in improving his speech. This suggests Ntando's underlying deficit may not have been cognitive-linguistic in nature, or that it may have included a motor planning element. Again, the question regarding typical bilingual development is raised, as many phonological processes used by Ntando were age appropriate, and yet his speech was unintelligible. He may have benefited from core vocabulary due to the whole word approach that aims to increase the intelligibility of a child's speech (Dodd et al., 2010).

## 6.8 Outcomes: Bilingualism

All three participants were acquiring both isiXhosa and English; however, their individual language profiles were unique. Gcobisa's mother reported exposure to both languages at a young age, and that she used both languages at home and at crèche, suggesting she was acquiring the languages simultaneously. Lulama's parents reported she was only exposed to English when she started attending crèche, and isiXhosa remained her stronger, home language, suggesting she was acquiring the languages sequentially. Ntando's parents reported that he was exposed to English from the time he attended crèche, at 12 months of age, and that although he hears and uses isiXhosa infrequently at home, his stronger language is English which he uses both at crèche and at home. This suggests he may be experiencing subtractive bilingualism, where the addition of a second language (in this case, English), results in a child's first language being used less frequently, often replacing the first language completely. The participants' unique language profiles highlight the heterogeneity of bilingual children, and the importance of gathering this information before providing assessment and intervention to a bilingual child (International Expert Panel on Multilingual Children's Speech, 2012; Jordaan, 2008; Kohnert, 2010).

Gcobisa received minimal pairs intervention where the target words were isiXhosa words, but most of the instructions and communication in the session was English. Intervention resulted in a change in both her English and isiXhosa speech. These are similar results to the intervention provided by Ray (2002), where minimal pair intervention resulted in a change in all three of the participant's languages. Ray (2002) considered this was as a result of the participant having a single phonological system, that later started differentiating into separate phonological systems for each language. Change in one language resulted in change in the other languages, due to the single underlying phonological system. In comparison, Holm et al. (1997) and Holm and Dodd (2001) found intervention including minimal pairs did not result in generalisation to both languages, and hypothesised this was due to their participant having two phonological systems that were separate. However, more recently it has been widely accepted that bilingual children have two phonological systems that interact (e.g. Burrows & Goldstein, 2010; Fabiano-Smith & Goldstein, 2010b; Goldstein & Gildersleeve-Neumann, 2015; Grech & Dodd, 2008; Hambly et al., 2013; Kim, 2015; Prezas et al., 2014; Salameh et al., 2003; Tamburelli et al., 2015; Twinky, 2011; Vihman, 2015). Considering Gcobisa's case, it seems that focusing on an error pattern common to both languages in only one language resulted in generalisation to the untreated language due to the interaction between the two languages.

The interaction between phonological systems could also be seen in the speech of Lulama. Her use of a non-developmental error in English (/ɹ/ → /l/) may be caused by the interaction of her two languages, as the error has been noted in isiXhosa speaking children (Mowrer & Burger, 1991). In Ntando's speech, his preference for English was evident as he presented with a more complete inventory and more accurate speech in English. In addition, he preferred to answer the researcher in English, even when asked a question in isiXhosa.

## 6.9 Outcomes: Language of intervention

In this study, Lulama and Ntando received intervention in English. This is often the case in South Africa, where a child receives intervention in English (Pascoe et al., 2010), either due to the SLP not being able to provide intervention in another language or because parents request intervention to take place in English (Pascoe & Norman, 2011). In many of the other studies

investigating intervention for bilingual children with speech sound disorders, intervention was provided in English (Holm et al., 1997; Holm & Dodd, 1999b, 2001; Ray, 2002). In these contexts, English was often the majority language in terms of the number of speakers as well as the status of the language within the community. However, in South Africa, this is not the case. Languages such as isiXhosa are widely spoken, with almost a quarter of the people living in the Western Cape speaking isiXhosa (Statistics South Africa, 2012), and yet it is considered a minority language in terms of its use in public and economic spheres (Kamwangamalu, 2000; Webb, 2002). Kohnert (2010) also highlights that minority languages are often given fewer opportunities for development, which is evident in South Africa. As a result of this, many parents prefer their child to acquire English and may request English as the language of intervention, as this is the language associated with economic advancement and job opportunities (Granville et al., 2010; Pascoe & Norman, 2011).

The use of one language in intervention is similar to previous bilingual intervention studies, where intervention was provided in only one language (Holm et al., 1997; Holm & Dodd, 1999b, 2001; Mamdouh, 2008; Ray, 2002). In the case of Lulama, little progress was noted in English, with a slight improvement in isiXhosa, the untreated language. Lulama may have benefitted more from intervention in both languages. This was found to be effective by Gildersleeve-Neumann and Goldstein (2015) and Ramos and Mead (2014), and is recommended by various individuals and organisations (e.g. Gildersleeve-Neumann & Goldstein, 2012; Goldstein & Fabiano, 2007; International Expert Panel on Multilingual Children's Speech, 2012; RCSLT Specific Interest Group in Bilingualism, 2007; Yavas & Goldstein, 1998). However, it is important to consider the impact of other aspects of her intervention on her outcomes, as discussed in section 6.2 regarding selection of goals. Ntando's intervention was provided in English, as his parents selected targets from English only as he uses this language most frequently. He received core vocabulary intervention, and again only small improvements in both English and isiXhosa were noted. Core vocabulary was also used when providing intervention for a bilingual child by Holm and Dodd (1999b, 2001). Generalisation occurred from the treated language (English) to the untreated language (Punjabi) in terms of the child's consistency and accuracy. It was hypothesized that this was due to core vocabulary focusing on

the underlying deficit of phonological planning, resulting in changes across both languages (Holm & Dodd, 1999b). However, in the case of Ntando, there was an improvement in his consistency in English, the treated language, but not in his inconsistency in isiXhosa, the untreated language. On initial consideration this suggests that core vocabulary intervention in one language may not always result in generalisation to the untreated language. However, it is also important to note the individual factors related to this specific case, particularly Ntando's preference and majority use of English, as well as his frustration during reassessment, possibly resulting in reassessment data being an inaccurate representation of his actual abilities.

Gcobisa was provided with minimal pair intervention with isiXhosa targets. Intervention resulted in generalisation from the treated language (isiXhosa) to the untreated language (English). It is also important to note the use of the second language, English, within the sessions. This may have had an impact on the generalisation from the treated isiXhosa to the untreated English.

Holm et al. (1997), Holm and Dodd (2001), and Mamdouh (2008) reported situations where generalisation did not occur from the treated to the untreated language. In these cases the targeted error or phoneme appeared to be specific to the targeted language, or uncommon in the untreated language. This would suggest that if a targeted error pattern or phoneme is common to both languages, intervention in one language may result in generalisation of results to the untreated language, as evidenced in Gcobisa's results. Gcobisa made use of gliding of /l/, producing the liquid as /j/ in both English and isiXhosa. Intervention that used targets from only one language (isiXhosa) resulted in generalisation of results to the untreated language (English), as Gcobisa showed evidence of eliminating this phonological process from both her isiXhosa and her English speech.

## 6.10 Outcomes: Intelligibility and tone

The caregivers and teachers of all the participants completed the *ICS* (McLeod et al., 2012a). This is a rating scale that requires judgments regarding the child's intelligibility with various listeners. These forms provided valuable information that helped in the decisions regarding intervention. This was particularly evident with Ntando. Although his assessment results

suggested many of his phonological processes were age appropriate, the *ICS* form completed by his teacher, as well as verbal feedback from his teacher, suggested that his intelligibility was affecting his ability to participate in the classroom and interact with the other children in his class.

Intelligibility is not only affected by the segmental aspects of speech, but also supra-segmental aspects (Pascoe et al., 2006). Supra-segmental aspects include pitch or tone, rhythm, loudness, stress patterns, as well as length or duration of phonemes (Pascoe et al., 2006; Wells & Stackhouse, 2016). All of these may affect a child's intelligibility. For example, when first introduced to the researcher, Lulama spoke with a soft voice, and this affected her intelligibility. If a child is learning a new language, they may be unfamiliar with the stress patterns of that language, resulting in the use of unfamiliar stress patterns, making their speech more difficult to understand (Pascoe et al., 2006).

As discussed in section 1.1, isiXhosa is a tone language (van der Merwe & le Roux, 2014), while English is not. *Masincokoleni* does not investigate this aspect of the language and to date there has been little research into the development of tones in Bantu languages (Maphalala, 2012). This made it difficult to investigate the use of tone by the participants of this study, and to determine whether it affected their intelligibility. This is an area that has received little attention to date, as often the assessments used in studies investigating speech production focus on the segmental aspects of speech (e.g. Dodd et al., 1997; En et al., 2014; Holm & Dodd, 1999a). For tone languages such as isiXhosa the inclusion of suprasegmental aspects in assessment is important. Allie, Singh and Pascoe (2015) described their preliminary work in developing an isiXhosa speech assessment for adults with apraxia which incorporates evaluation of tone, but there remains a great deal of work to be done in documenting and assessing tonal development in children acquiring the Bantu languages.

Although intelligibility is often overlooked, it can have a big impact on the child's ability to participate effectively in their environment. The ICF-CY is a framework that allows an SLP to consider the multiple ways a speech sound disorder affects a child's activities and participation, and can help guide intervention (McLeod & Threats, 2008). This was used when considering

Ntando's speech: although many of Ntando's phonological processes were age appropriate, considering the ICF-CY framework, his speech was having an effect on his intelligibility as well as his participation in classroom and social activities, and this guided decisions during intervention.

## 6.11 Parental involvement

Consent was obtained from the parents of all the participants in this study. However, both Gcobisa's and Ntando's parents did not show particular concern regarding the possibility that their child may present with a speech sound disorder. Although material was sent home, little feedback was provided regarding the use of these materials. McLeod and Verdon (in press) discuss how limited knowledge regarding the services of SLPs may impact a parent's decision to seek their services or participate actively in the intervention. Stow and Dodd (2003) report that parents who speak two languages to their child may avoid seeking professional help due to fear that the two languages have resulted in the language or speech delay, and this results in feelings of guilt. These authors also highlight the importance of being aware of the attitudes of various cultures to speech and language disorders, as some cultures may attribute speech or language disorders to laziness and not see the need for a professional. Others may consider the role of the SLP to be similar to a doctor, who should be able to "fix" the problem with little input from them, resulting in reluctance to become involved in intervention (McLeod et al., in press; Watts Pappas, McAllister, & McLeod, 2015). Watts Pappas et al. (2015) describe parents who had a negative connotation regarding intervention due to their child's negative associations with intervention sessions, giving an example of a parent who discontinued intervention due to her child not enjoying intervention, and becoming emotional when required to complete homework. If a child does not enjoy intervention, parents are less likely to want to be involved in that intervention. Although the participants of this study became frustrated at times, they generally enjoyed intervention. However, this did not seem to impact on their parents' willingness to get more involved, possibly due to intervention taking place at their crèche without parents present.

In South Africa, emphasis in the health care system is usually placed on infectious and life threatening diseases, and as a result there is often minimal emphasis placed on communication

disorders (Pascoe & Norman, 2011). In addition, there is low awareness regarding the role of SLPs, and the scope of the profession (Kathard et al., 2011; Pascoe et al., 2013). As parents may be less aware of the impact of communication disorders and the role of the SLP in intervening in these disorders, they may be less concerned regarding their child's speech development and less likely to actively participate in intervention.

South Africa is also multicultural, with a variety of cultures and many languages spoken (Pascoe & Norman, 2011; van Dulm & Southwood, 2013). This may also have an effect on parents' attitudes towards intervention. Burns and Radford (2008) highlight how different communities place different emphasis on the various aspects of interaction between parents and children. For example, the Nigerian community living in London consider it important to teach young children how to behave, and as a result interactions between parents and children in this culture are often more didactic in nature (Burns & Radford, 2008). In addition to cultural considerations, social concerns may also prevent parents from effective interaction with their children, as many parents in South Africa work long hours and travel long distances to work each day (Connor & Geiger, 2009), decreasing the opportunities to interact with their child, who often spends the full day at a crèche or other childcare facility (Popich, Louw, & Eloff, 2007).

Parents play a vital role in the child's speech and language development, and only through their knowledge of communication disorders can they be empowered to actively take part in the identification and intervention of their child's communication disorder (Popich et al., 2007). This is often not the case in South Africa. Speech therapy is traditionally a "Western" profession, and this does not always fit with the culture in countries such as South Africa (Kathard & Pillay, 2013). A community based approach may be beneficial for communities where parents do not have an adequate understanding of communication disorders and the role of a SLP in managing these disorders (Verdon et al., 2015), and where the traditional approach to speech therapy may not be understood by the culture. A community based approach includes engaging with members within the community, rather than expecting parents to bring their children to the SLP's office. Approaches that include an awareness of the

population as a whole, rather than a focus on individuals may be more effective (Kathard & Pillay, 2013). Popich et al. (2007) suggest the importance of educating caregivers to prevent communication disorders. This may include education regarding the role of SLPs as well as typical speech and language development. Through this, caregivers may learn the importance and relevance of SLPs in the communication development of children.

## 6.12 Challenges as an English-speaking therapist: how can SLPs in South Africa provide intervention for bilingual children?

While completing the assessment of the children's speech, as well as during planning and implementation of intervention, various challenges arose that are common among SLPs in South Africa aiming to serve a linguistically diverse population.

One challenge included assessment in a language that is not the researcher's home language. This is common in South Africa, where many SLPs speak English and/or Afrikaans, and few speak Bantu languages such as isiXhosa (Kathard & Pillay, 2013). The difficulty with this was most evident when attempting to elicit spontaneous speech. This could be overcome by observing the child (RCSLT Specific Interest Group in Bilingualism, 2007), particularly when interacting with a home language speaker of the language, such as their parents or siblings. Another challenge included the elicitation of sounds that are unique to isiXhosa, and not always easily produced by non-native speakers, such as the implosive /ɓ/. It is also useful in these situations to ask the child's parents whether the child's production of particular sounds is acceptable within the community, as the inaccurate production of some phonemes may be considered acceptable within bilingual communities (McLeod & Verdon, in press).

Further challenges were faced during the planning of intervention. This included choosing the targets for intervention as well as the language medium in which therapy would be given. As discussed in section 6.5, little is known regarding typical phonological development of isiXhosa-English bilingual children. This made it difficult to determine targets that were appropriate for intervention. Monolingual norms were used when considering Gcobisa's targets, while intelligibility was a main concern when choosing targets for Ntando. Goldstein and Fabiano (2007) suggest addressing phonological processes that are common and frequently used in

both languages first, followed by those used frequently in one language but infrequently in others, and finally addressing the phonological processes or phonemes that are unique to each language. This is an appropriate approach when considering a phonological delay or consistent phonological disorder. However, intervention for a child with an inconsistent disorder may take a more functional approach (e.g. core vocabulary) which has its own criteria for target selection.

It has been recommended that intervention should be provided in both languages of a bilingual child (Goldstein & Fabiano, 2007), and initial intervention case studies have shown positive results using this approach (Gildersleeve-Neumann & Goldstein, 2015; Ramos & Mead, 2014). This is achievable in a country where many SLPs are bilingual, or have ready access to trained interpreters or assistants. However, this is not always possible in South Africa, where 11 official languages results in a language match between SLP and client being difficult (Kathard & Pillay, 2013). Choosing the language of intervention was challenging, as although it is acknowledged that intervention in both languages may be optimal, this is not always a viable option in South Africa at the present time. Language choice was therefore based on parental request, the language that contained the most errors, or the language that contained the immature phonological processes. In Gcobisa's case, it was concluded that targets should be in isiXhosa, resulting in a further challenge as the researcher did not have the linguistic skills to provide all instructions in isiXhosa. It was concluded that providing instructions in English, but using isiXhosa targets was a way of intervening that is achievable for many South African SLPs, and it acknowledges the importance of both of the child's languages, rather than choosing a language of intervention solely based on the clinician's linguistic skills.

As these challenges were confronted and engaged with, a set of guidelines were developed that could aid SLPs in providing intervention for bilingual children with speech sound disorders. These guidelines were based on recommendations of professional bodies and other professionals (International Association of Logopedics and Phoniatrics, 2006; McLeod, Verdon, & Bowen, 2013; McLeod et al., n.d.; McLeod, 2014; RCSLT Specific Interest Group in Bilingualism, 2007; Verdon et al., 2015), as well as the experiences of the researcher during the

assessment and intervention stages of this project. In many ways the process undertaken in this exploratory project was as important as the outcomes achieved.

Four main steps in assessment of bilingual children are described in Table 91. This highlights aspects that are important to include when completing each step, as well as other areas that should be considered during assessment. Following assessment and analysis of the data, a diagnosis can be made regarding the presence of a speech sound disorder, and this could be classified according to Dodd's diagnostic subcategories.

**Table 91: Assessment of bilingual children**

| ASSESSMENT | WHY? | Important aspects to INCLUDE | CONSIDER: |
|---|---|---|---|
| **1. Gather a detailed case history** | All bilingual children will have different language profiles, and this will impact on the child's language proficiency and should be used when interpreting assessment data and planning intervention (McLeod et al., in press). A detailed case history can also help differentiate between dialectical differences and speech sound disorders (Verdon et al., 2015). | - When was the child first exposed to each language? (Goldstein & Fabiano, 2007)<br>- How often does the child hear and use each language? (Goldstein & Fabiano, 2007)<br>- When is each language used? (Goldstein & Fabiano, 2007)<br>- Who speaks each language to the child? (McLeod et al., in press)<br>- Which language is the child's preferred and dominant language? (McLeod et al., in press) | Be aware of differing cultures, and how this may affect the answers provided (De Lamo White & Jin, 2011). Be prepared to consider things from the parent's perspective. |
| **2. Assess speech production in all languages** | Different languages have different phonological structures, so it is important to consider the phonetic inventory and use of phonological processes in both languages (McLeod et al., in press). Children may also have different skills in each language, due to language dominance or age or acquisition (McLeod et al., in press). In addition, typical acquisition may be different for each language (Goldstein & Fabiano, 2007) | - Familiarise yourself with phonetic structure of all languages the child uses and train a native speaker to administer assessments if unable to elicit words in a language yourself (McLeod et al., in press).<br>- Gather single word naming and connected speech samples (Goldstein & Fabiano, 2007).<br>- Use formal tests if available, or informal tests including all phonemes present in the language.<br>- Include stimulability testing (McLeod et al., in press).<br>- If using Dodd's diagnostic subcategories, include repeated elicitations to consider consistency of errors.<br>- If using a psycholinguistic framework, include input, processing and output tasks. | If formal assessments aren't available, use observation or informal assessments to gather speech samples (RCSLT Specific Interest Group in Bilingualism, 2007).<br>If the same person will be administering assessments in both languages, consider administering them on different days to prevent confusion of the child.<br>If the language pair includes isiXhosa, *Masincokoleni* is a valuable tool allowing assessment of all |

| | | | |
|---|---|---|---|
| | | - Familiarise yourself with differing phonemes so that you can transcribe the data reliably (McLeod, 2014) | isiXhosa phonemes. |
| **3. Analyse the data** | Analysing the data carefully allows the SLP to determine whether any "errors" are caused by a speech sound disorder, or whether they are caused by a dialectical variation or cross-linguistic transfer (McLeod et al., in press). It also allows for the child's speech to be described according to Dodd's diagnostic subcategories, which allows for appropriate intervention to be planned (Dodd & Crosbie, 2005). | - Include an independent analysis (phonetic inventory)<br>- Include a relational analysis (phonological processes, percentage consonants, vowels and phonemes correct).<br>- Where possible, compare this to norms.<br>- Determine whether phonological processes used are developmental or non-developmental, but remember that bilingual development may typically include non-developmental errors.<br>- Consider errors that may be as a result of cross linguistic transfer (McLeod et al., in press).<br>- Use your chosen framework (e.g. Dodd's diagnostic subcategories or a psycholinguistic framework) to determine the category the speech sound disorder falls into. | Remember that bilingual children will not necessarily follow the typical developmental trajectory of monolingual speakers. Be aware of how bilingualism may result in speech that is different from typical monolingual development, but not necessarily disordered. If possible, consider bilingual norms. For isiXhosa, consult Gxilishe (2004); Maphalala et al. (2014); Mowrer and Burger (1991); Tuomi et al. (2001) for monolingual norms, and (Pascoe et al., 2015) for preliminary data of 3 year old English speech of isiXhosa-English bilingual children. |
| **4. Consider other sources of information** | The *ICS* can provide valuable information regarding the child's intelligibility with various speakers and can help guide decision making for intervention (McLeod et al., 2012b). Using the ICF can help guide clinicians in identifying ways in which a speech sound disorder is affecting the child's ability to participate effectively in activities (McLeod & Threats, 2008) | - Include an intelligibility assessment.<br>- Consider the child's ability to participate in activities in various contexts – the ICF can be useful in guiding this. | The *ICS* has been translated into many languages (McLeod et al., in press), including South African languages, so is a useful tool to assess intelligibility of a child's speech in South Africa. These are freely available at the following website: www.csu.edu.au/research/multilingual-speech/ics |

Following diagnosis, decisions need to be made regarding intervention. The two main decisions consider the approach to intervention and the language used during intervention. The decision

diagram used in the process of this research could be helpful for speech sound disorders classified according to Dodd's diagnostic subcategories (see Figure 2 in section 2.9.2).

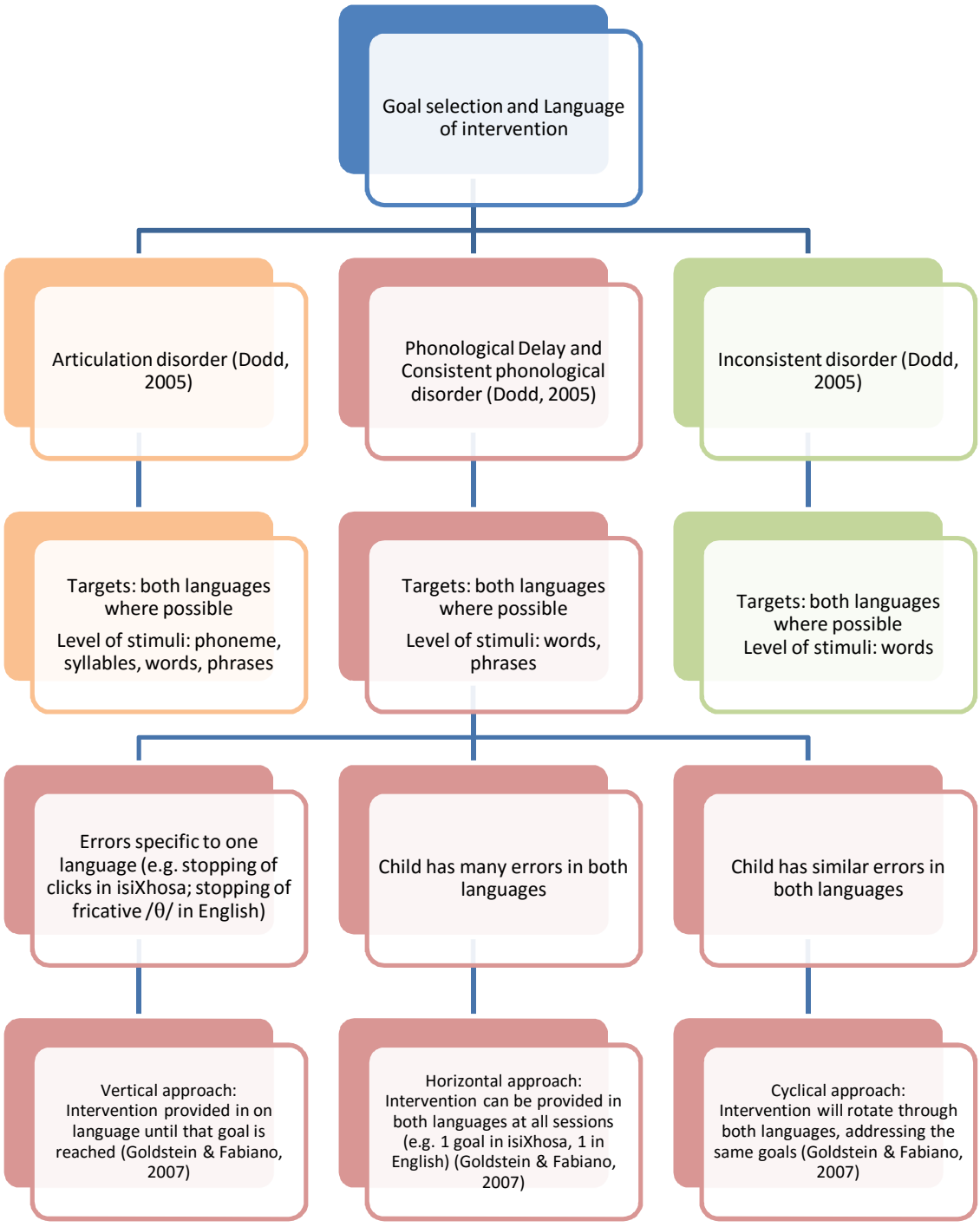



Figure 19: Language of intervention

While selecting goals, the language of intervention needs to be considered. It has been suggested that intervention should take place in both languages (e.g. Gildersleeve-Neumann & Goldstein, 2012; Goldstein & Fabiano, 2007; International Expert Panel on Multilingual Children's Speech, 2012; RCSLT Specific Interest Group in Bilingualism, 2007; Yavas & Goldstein, 1998), and this is therefore recommended. However, as demonstrated in this study, the consideration of using one language in the targets and a second language during instructions should not be dismissed, as it may be effective in affecting change in both languages. In addition, this is often a more achievable feat for South African SLPs who are not fluent in all the languages their client may speak. However, this condition should be investigated in more cases and larger groups of bilingual children in order to make conclusive statements. Figure 19 is a modified version of the decision process used for this study that clinicians can use when making decisions regarding language of intervention for bilingual children with speech sound disorders.

## 6.13 Next steps

This study considered three individual cases of isiXhosa-English bilingual children with speech sound disorders. Case studies are effective in widening our understanding of a topic and also allow for investigation of a specific topic in a realistic setting (Vance & Clegg, 2012). The case studies in this project aimed to add to the knowledge base regarding bilingual development and intervention for speech sound disorders for bilingual children. It aimed to fill a gap in research in South Africa, as little investigation into intervention for bilingual children in South Africa has been done.

Little is known regarding typical phonological development of isiXhosa-English bilingual children, and this is an area that could be investigated in more detail in future work. Although there is some initial data on the English speech of three year olds acquiring both languages (Pascoe et al., 2015), there is scope for larger studies that focus on bilingual children acquiring isiXhosa and English, including more participants and investigating the speech of the children in both languages. This would also allow for the investigation of the prevalence of speech sound

disorders amongst this population, as well as developmental and non-developmental phonological processes. This is valuable information, as it would allow clinicians to make more informed decisions regarding the presence of speech sound disorders in this population, and aid in differentiating disorder from difference.

This study made use of the *Masincokoleni* assessment, which is a valuable tool for assessing isiXhosa speech. Further studies using this tool to assess the speech of a larger number of children would be valuable in developing norms for the isiXhosa monolingual population. Small revisions and additions to this assessment, as well as normative data, would allow for accurate categorization of speech sound disorders according to Dodd's diagnostic framework, which is a clinically useful framework that guides intervention (Waring & Knight, 2013).

Further investigation into the knowledge and attitudes of parents regarding speech-language pathology in South Africa would also be warranted. This would aid SLPs to provide promotion activities that will be effective in educating parents regarding communication development and disorders, but more importantly would allow for the role of speech-language pathology in South Africa to be evaluated, in order to ensure we are providing services in a way that is culturally appropriate and effective.

## 6.14 Limitations

There were various limitations in this project that are discussed below. These include the small sample size resulting in limitations generalising the results to the wider population; the short period of intervention received by the children; language abilities of the researcher; and other contextual factors.

This project considered three case studies. These case studies did not include measures of experimental control, meaning that the results cannot be used to determine the effectiveness of the intervention approaches used or add to the evidence base regarding the various interventions (Vance & Clegg, 2012). Therefore, any results of intervention are only an indication of the effectiveness of the intervention for the specific participant, and cannot be generalised to the wider population. However, this type of descriptive case study is important as it deepens our understanding of various aspects of a child's speech (Vance & Clegg, 2012).

Robey and Schultz (1998) suggest a model that can be used in determining clinical outcomes of an intervention. Small samples without control are an important part of this process, and determine the need for further research including larger samples and experimental control measures. At this phase of research, focus is placed on observations to determine whether any change takes place, and hypotheses are developed (Robey & Schultz, 1998).

Each child received 14 to 16 sessions of intervention, each session lasting approximately 30 minutes. This resulted in seven to eight hours of intervention being received by each child. Although a similar dosage has been used in other studies (e.g. Gildersleeve-Neumann & Goldstein, 2015; Holm & Dodd, 1999b), increased dosage over a longer period of time may have resulted in greater changes in the speech of the participants, particularly that of Lulama. Although receiving more intervention does not always result in greater gains (Baker, 2012), each participant presents with a unique character, and may have responded differently to intervention due to the dosage. For example, Gcobisa made improvements under the conditions of the current study. In contrast, although Lulama received the same dosage of intervention as Gcobisa, it did not result in improvements as clearly defined as Gcobisa's. This may be due to her differences to Gcobisa (e.g. weaker English language skills, younger age, personality differences), and Lulama may have made greater gains had she received more intervention sessions.

The researcher had limited isiXhosa abilities. Although these were adequate to assess the participants and develop a speech profile, providing intervention in isiXhosa became more challenging. This may have had an effect on the reliability, validity and treatment fidelity of the intervention. Although this may be considered a limitation in terms of providing intervention in isiXhosa and therefore limit the ability to investigate the effect of isiXhosa intervention on the participants' isiXhosa and English speech, this is a limiting factor commonly faced by South African SLPs. It allowed for an investigation of the effect of intervention where targets are provided in one language and instructions provided in a second language.

Finally, other factors that may have impacted on the outcomes of this project should be considered. For example, due to the various extra-curricular activities offered by one crèche,

the space provided for intervention was not always quiet, and often included many distractions. Although the researcher attempted to prevent this each day by identifying a quieter area or placing objects strategically out of sight before starting each session, this was not always effective and may have affected the learning that took place during some sessions. In addition, the inclusion of a home programme may have been a confounding variable on the results of the intervention for all three participants. This is particularly evident when considering core vocabulary which was used in the intervention for Ntando, as the participation of parents and teachers is an important part of this intervention approach, and may have been a limiting factor. Although they were provided with information regarding the intervention Ntando received, and provided with words targeted at each session, it was not always clear that the words were being reinforced either at home or in the classroom. This may have affected the outcomes of intervention.

## 6.15 Conclusion

This study described the changes in the speech of three isiXhosa-English bilingual children following intervention for their specific speech sound disorders. Results differed between each participant, with Gcobisa showing clear improvements on the specific process targeted in both English and isiXhosa speech; Lulama showing small improvements in English clusters and isiXhosa accuracy, and Ntando showing an overall improvement in inconsistency in English speech and accuracy in isiXhosa speech.

This study adds to the theoretical knowledge regarding bilingual speech development and approaches to speech sound disorders. It described the participants' speech and related the data to current bilingual theories regarding the acquisition of phonological systems, considering how the participants' two phonological systems interacted (e.g. Goldstein & Gildersleeve-Neumann, 2015; Hambly et al., 2013; Vihman, 2015). It also considered the use of core vocabulary as a functional approach to intervention for Ntando, and was effective in addressing a speech sound disorder that did not necessarily involve inconsistency.

This study has implications for clinical intervention for bilingual children with speech sound disorders in South Africa. Firstly, it highlights the paucity of information regarding typical

speech development of isiXhosa-English bilingual children. Although some possible patterns can be seen across this study and another study that considers this population (Pascoe et al., 2015), research including larger numbers of participants is required to gather normative data. This study also highlights the difficulties in applying Dodd's diagnostic subcategories (Dodd, 2005) to a population where little normative data is available. Although the *DEAP* is effective in identifying speech sound disorders that fit each category, other assessments such as *Masincokoleni* have not been developed with this framework in mind, and require further development in order to be used effectively in categorising speech sound disorders according to Dodd's categories. This study found the use of two languages in one intervention session was effective for one participant (Gcobisa), where intervention targets were in isiXhosa, and instructions were in English. This condition requires further research to determine whether it can be applied to a wider population, but suggests it may be an effective manner to overcome language differences between SLPs and bilingual children in South Africa, where a language mismatch is common. This study considered the importance of suprasegmental aspects of speech and the impact they have on intelligibility, particularly in tone languages such as isiXhosa. This is an area requiring further investigation. Finally, this study considered the role of parents in intervention for speech sound disorders, and questions the "western" approach of SLPs to intervention in South Africa, a country that may be more suited to a community based approach (Kathard & Pillay, 2013).

Bilingualism is becoming the norm internationally, and SLPs need to be prepared to provide intervention to this population (De Lamo White & Jin, 2011; International Expert Panel on Multilingual Children's Speech, 2012; Jordaan, 2008; Kohnert, 2010). This is particularly evident in South Africa, where there are eleven official languages with many others spoken frequently, and many children are able to speak two or more of these languages. This study adds to the evidence base regarding intervention for bilingual children with speech sound disorders. It also adds to the research regarding bilingual development, as there is little information regarding typical acquisition of isiXhosa and English amongst bilingual children in South Africa.

# References


Alexander, N. (1997). Language Policy and Planning in the New South Africa. *African Sociological Review*, *1*(1), 82–92.

Allie, N., Singh, S., & Pascoe, M. (2015). An isiXhosa speech assessment tool for adults with apraxia of speech: Research findings and clinical implications. Paper presented at the SAAA/SASLHA Conference, November 2015.

Almost, D., & Rosenbaum, P. (1998). Effectiveness of speech intervention for phonological disorders : a randomized controlled trial. *Developmental Medicine & Child Neurology*, *40*, 319–325.

Babbie, E., & Mouton, J. (2006). *The practice of social research* (South Afri.). Cape Town: Oxford University Press.

Baker, E. (2010). Minimal Pair Intervention. In A. L. Williams, S. McLeod, & R. J. McCauley (Eds.), *Interventions for Speech Sound Disorders in Children* (pp. 41 – 72). Maryland: Paul H. Brookes Publishing.

Baker, E. (2012). Optimal intervention intensity in speech-language pathology: Discoveries, challenges, and unchartered territories. *International Journal of Speech-Language Pathology*, *14*(5), 478–485. doi:10.3109/17549507.2012.700323

Barlow, J., & Gierut, J. (2002). Minimal pair approaches to phonological remediation. *Seminars in Speech and Language*, *23*(1), 57–68. doi:10.1055/s-2002-24969

Blache, S., Parsons, C., & Humphreys, J. (1981). A Minimal-Word-Pair Model for Teaching the Linguistic Significance of Distinctive Feature Properties. *Journal of Speech and Hearing Disorders*, *46*, 291–296. doi:10.1044/jshd.4603.291

Bowen, C. (2011). Table 3: Elimination of Phonological Processes. Retrieved June 24, 2016, from http://www.speech-language-therapy.com/

Bradford, A., & Dodd, B. (1994). The motor planning abilities of phonologicaly disordered children. *European Journal of Disorders of Communication: The Journal of The College of Speech And Language Therapists, London*, *29*(4), 349–369.

Burns, A., & Radford, J. (2008). Parent – child interaction in Nigerian families: conversation analysis, context and culture. *Child Language Teaching and Therapy*, *24*(2), 193–209.

Burrows, L., & Goldstein, B. (2010). Whole word measures in bilingual children with speech sound disorders. *Clinical Linguistics & Phonetics*, *24*(May), 357–368. doi:10.3109/02699200903581067

Catano, L., Barlow, J., & Moyna, M. (2009). A retrospective study of phonetic inventory complexity in acquisition of Spanish: Implications for phonological universals. *Clinical Linguistics and Phonetics*, *23*(6), 446–472. doi:10.1080/02699200902839818.A

Connor, J. O., & Geiger, M. (2009). Challenges facing primary school educators of English Second ( or Other ) Language learners in the Western Cape. *South African Journal of Education*, *29*, 253–269.

Constitution of the Republic of South Africa (1996).

Crosbie, S., Holm, A., & Dodd, B. (2005). Intervention for children with severe speech disorder: a comparison of two approaches. *International Journal of Language & Communication Disorders*, *40*(4), 467–491. doi:10.1080/13682820500126049

Crosbie, S., Pine, C., Holm, A., & Dodd, B. (2006). Treating Jarrod : A core vocabulary approach. *Advances in Speech Language Pathology*, *8*(3), 316–321. doi:10.1080/14417040600750172

Cruz-Ferreira, M. (2012). Sociolinguistic and Cultural Considerations when Working with Multilingual Children. In S. McLeod & B. Goldstein (Eds.), *Multilingual Aspects of Speech Sound Disorders in Children* (pp. 13–23). Bristol: Multilingual Matters.

Dawes, A., Biersteker, L., & Hendricks, L. (2012). *TOWARDS INTEGRATED EARLY CHILDHOOD DEVELOPMENT An evaluation of the Sobambisana Initiative*. Claremont Cape Town: The DG Murray Trust. Retrieved from http://www.educationinnovations.org/sites/default/files/Sobambisana Initiative - Evaluation.pdf

De Lamo White, C., & Jin, L. (2011). Evaluation of speech and language assessment approaches with bilingual children. *International Journal of Language and Communication Disorders*, *46*(6), 613–627. doi:10.1111/j.1460-6984.2011.00049.x

Demuth, K. (2000). Bantu noun class systems: Loan word and acquisition evidence of semantic productivity. In G. Senft (Ed.), *Classification Systems* (pp. 270–292). Cambridge University Press.

Denne, M., Langdown, N., Pring, T., & Roy, P. (2005). Treating children with expressive phonological disorders : Does phonological awareness therapy work in the clinic? *International Journal of Language and Communication Disorders*, *0*(0), 1–12. doi:10.1080/13682820500142582

Department of Basic Education. (2014). *Education Statistics in South Africa 2012*. Pretoria. Retrieved from http://www.education.gov.za/LinkClick.aspx?fileticket=hakWwIUHlUY=&tabid=462&mid=1326

Dodd, B. (2005). Children with speech disorder: defining the problem. In B. Dodd (Ed.), *Differential Diagnosis and Treatment of Children with Speech Disorder* (pp. 3 – 23). West Sussex: Whurr Publishers.

Dodd, B., & Bradford, A. (2000). A comparison of three therapy methods for children with different types of developmental phonological disorder. *International Journal of Language & Communication Disorders*, *35*(2), 189–209. doi:10.1080/136828200247142

Dodd, B., & Crosbie, S. (2005). A procedure for the classification of speech disorders. In B. Dodd (Ed.), *Differential Diagnosis and Treatment of Children with Speech Disorder* (Second Ed., pp. 140 – 162). Chichester: Whurr Publishers.

Dodd, B., Holm, A., Crosbie, S., & McCormack, P. (2005). Differential diagnosis of phonological disorders. In B. Dodd (Ed.), *Differential Diagnosis and Treatment of Children with Speech Disorder* (Second Edi., pp. 44 – 70). Chichester: Whurr Publishers.

Dodd, B., Holm, A., Crosbie, S., & Mcintosh, B. (2010). Core Vocabulary Intervention. In A. L. Williams, S. McLeod, & R. J. McCauley (Eds.), *Interventions for Speech Sound Disorders in Children* (pp. 117 – 136). Maryland: Paul H. Brookes Publishing.

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

Dodd, B., Holm, A., & Wei, L. (1997). Speech disorder in preschool children exposed to Cantonese and English. *Clinical Linguistics & Phonetics*, *11*(5), 229–243.

Dodd, B., Hua, Z., Crosbie, S., Holm, A., & Ozanne, A. (2002). Diagnostic Evaluation of Articulation and Phonology (DEAP). London: Harcourt Assessment.

Dunn, L., & Dunn, D. (2007). Peabody Picture Vocabulary Test (Fourth Edition). Pearson Inc.

En, L. G. W., Brebner, C., & McCormack, P. (2014). A preliminary report on the English phonology of typically developing English-Mandarin bilingual preschool Singaporean children. *International Journal of Language and Communication Disorders*, *49*(3), 317–332. doi:10.1111/1460-6984.12075

Fabiano-Smith, L., & Goldstein, B. (2010a). Early-, Middle-, and Late-Developing Sounds in Monolingual and Bilingual Children: An Exploratory Investigation. *American Journal of Speech-Language Pathology*, *19*(February), 66–77. doi:10.1044/1058-0360(2009/08-0036)

Fabiano-Smith, L., & Goldstein, B. (2010b). Phonological representation in bilingual Spanish-English speaking children. *Journal of Speech, Language and Hearing Research*, *68*, 160 – 178. doi:10.1044/1092-4388(2009/07-0064)

Finlayson, R., Jones, J., Podile, K., & Snyman, J. (1994). *An Introduction to Xhosa Phonetics*. Cape Town: Marius Lubbe Publishers.

Fox, A. V., & Dodd, B. (2001). Phonologically Disordered German-Speaking Children. *American Journal of Speech-Language Pathology*, *10*(August), 291–307. doi:10.1044/1058-0360(2001/026)

Gildersleeve-Neumann, C., & Goldstein, B. (2012). Intervention for Multilingual Children with Speech Sound Disorders. In S. McLeod & B. Goldstein (Eds.), *Multilingual Aspects of Speech Sound Disorders in Children* (pp. 214 – 227). Bristol: Multilingual Matters.

Gildersleeve-Neumann, C., & Goldstein, B. (2015). Cross-linguistic generalization in the treatment of two sequential Spanish – English bilingual children with speech sound disorders. *International Journal of Speech-Language Pathology*, *17*(1), 26–40. doi:10.3109/17549507.2014.898093

Gildersleeve-Neumann, C., Kester, E. S., Davis, B. L., & Peña, E. D. (2008). English speech sound development in preschool-aged children from bilingual English-Spanish environments. *Language, Speech, and Hearing Services in Schools*, *39*(July), 314–328. doi:10.1044/0161-1461(2008/030)

Gildersleeve-Neumann, C., & Wright, K. L. (2010). English speech acquisition in 3- to 5-year-old children learning Russian and English. *Language, Speech, and Hearing Services in Schools*, *41*(October), 429–444. doi:10.1044/0161-1461(2009/09-0059)

Goldstein, B., & Bunta, F. (2011). Positive and negative transfer in the phonological systems of bilingual

speakers. *International Journal of Bilingualism*, *16*(4), 388 – 401. doi:10.1177/1367006911425817

Goldstein, B., & Fabiano, L. (2007). Assessment and intervention for bilingual children with phonological disorders. *ASHA Leader*, *12*, 6. Retrieved from http://www.asha.org/publications/leader/2007/070213/f070213a.htm

Goldstein, B., Fabiano, L., & Washington, P. S. (2005). Phonological skills in predominantly English-speaking, predominantly Spanish-speaking, and Spanish-English bilingual children. *Language, Speech, and Hearing Services in Schools*, *36*(July), 201–218. doi:10.1044/0161-1461(2005/021)

Goldstein, B., & Gildersleeve-Neumann, C. (2015). Bilingualism and Speech Sound Disorders. *Current Developmental Disorders Reports*, *2*, 237–244. doi:10.1007/s40474-015-0049-3

Goldstein, B., & Kohnert, K. (2005). Speech, language, and hearing in developing bilingual children: Current findings and future directions. *Language, Speech, and Hearing Services in Schools*, *36*(July), 264–267. Retrieved from Publisher URL: www.cinahl.com/cgi-bin/refsvc?jid=977&accno=2009090684\nhttp://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=2009090684&site=ehost-live

Goldstein, B., & McLeod, S. (2012). Typical and Atypical Multilingual Speech Acquisition. In S. McLeod & B. a Goldstein (Eds.), *Multilingual Aspects of Speech Sound Disorders in Children* (pp. 84 – 100). Bristol: Multilingual Matters.

Goldstein, B., & Washington, P. S. (2001). An Initial Investigation of Phonological Patterns in Typically Developing 4-Year-Old Spanish- English Bilingual Children. *Language, Speech & Hearing Services in Schools*, *32*, 153–164. Retrieved from http://digitalcommons.wcupa.edu/comdis_facpub/3

Graham, J. E., Karmarkar, A. M., & Ottenbacher, K. J. (2012). Small sample research designs for evidence-based rehabilitation: Issues and methods. *Archives of Physical Medicine and Rehabilitation*, *93*(8), S111–S116. doi:10.1016/j.apmr.2011.12.017

Granville, S., Janks, H., & Mphahlele, M. (2010). English With or Without G(u)ilt: A Position Paper on Language in Education Policy for South Africa. *Language and Education*, *12*(4), 37–41. doi:10.1080/09500789808666753

Grech, H., & Dodd, B. (2008). Phonological acquisition in Malta : A bilingual language learning context. *International Journal of Bilingualism*, *12*(3), 155–171.

Grech, H., & McLeod, S. (2012). Multilingual speech and language development and disorders. In D. Battle (Ed.), *Communication Disorders and Development in Multilingual Populations* (pp. 120–147). St Louis, MO: Elsevier.

Gxilishe, S. (2004). The acquisition of clicks by Xhosa-speaking children. *Per Linguam*, *20*(2), 1–12.

Hambly, H., Wren, Y., McLeod, S., & Roulstone, S. (2013). The influence of bilingualism on speech production: A systematic review. *International Journal of Language and Communication Disorders*, *48*, 1–24. doi:10.1111/j.1460-6984.2012.00178.x

Herbert, R. K. (1975). Reanalyzing Prenasalized Consonants. *Studies in African Linguistics*, *6*(2), 105–124.

Hesketh, A. (2010). Metaphonological Intervention. In A. L. Williams, S. McLeod, & R. McCauley (Eds.), *Interventions for Speech Sound Disorders in Children* (pp. 247 – 274). Maryland: Paul H. Brookes Publishing.

Hesketh, A., Dima, E., & Nelson, V. (2007). Teaching phoneme awareness to pre-literate children with speech disorder : a randomized controlled trial. *International Journal of Language & Communication Disorders*, *42*(3), 251–271. doi:10.1080/13682820600940141

Hodson, B. (2006). Identifying phonological patterns and projecting remediation cycles: Expediting intelligibility gains of a 7 year old Australian child. *Advances in Speech-Language Pathology*, *8*(3), 257–264. doi:10.1080/14417040600824936

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

Holm, A., Crosbie, S., & Dodd, B. (2005). Phonological approaches to intervention. In B. Dodd (Ed.), *Differential Diagnosis and Treatment of Children with Speech Disorder* (Second edi., pp. 163 – 181). Chichester: Whurr Publishers.

Holm, A., & Dodd, B. (1999a). A longitudinal study of the phonological development of two Cantonese–English bilingual children. *Applied Psycholinguistics*, *20*(3), 349–376. doi:10.1017/S0142716499003021

Holm, A., & Dodd, B. (1999b). An intervention case study of a bilingual child with phonological disorder. *Child Language Teaching and Therapy*, *15*, 139 – 158. doi:10.1177/026565909901500203

Holm, A., & Dodd, B. (1999c). Differential diagnosis of phonological disorder in two bilingual children acquiring Italian and English. *Clinical Linguistics and Phonetics*, *13*(2), 113–129. doi:10.1080/026992099299185

Holm, A., & Dodd, B. (2001). Comparison of Cross-Language Generalisation following Speech Therapy. *Folia Phoniatrica et Logopaedica*, *53*(3), 166–172.

Holm, A., & Dodd, B. (2006). Phonological Development and Disorder of Bilingual Children Acquiring Cantonese and English. In Z. Hua & B. Dodd (Eds.), *Phonological Development and Disorders in Children: A Multilingual Perspective* (pp. 286–325). Clevedon: Multilingual Matters.

Holm, A., Dodd, B., & Ozanne, A. (1997). Case Report: Efficacy of Intervention for a Bilingual Child Making Articulation and Phonological Errors. *International Journal of Bilingualism*, *1*(March), 55–69. doi:10.1177/026565909901500203

Holm, A., Dodd, B., Stow, C., & Pert, S. (1999). Identification and differential diagnosis of phonological disorder in bilingual children. *Language Testing*, *16*(3), 271 292. doi:10.1177/026553229901600303

Holm, A., Farrier, F., & Dodd, B. (2008). Phonological awareness , reading accuracy and spelling ability of children with inconsistent phonological disorder. *International Journal of Language and Communication Disorders*, *43*(3), 300–322. doi:10.1080/13682820701445032

Holm, A., Stow, C., & Dodd, B. (2005). Bilingual children with phonological disorders. In B. Dodd (Ed.), *Differential Diagnosis and Treatment of Children with Speech Disorder* (Second edi., pp. 275 – 288). Chichester: Whurr Publishers.

Hua, Z., & Dodd, B. (2006). A Multilingual Perspecitive on Phonological Development and Disorders. In Z. Hua & B. Dodd (Eds.), *Phonological Development and Disorders in Children: A Multilingual Perspective* (pp. 3–14). Clevedon: Multilingual Matters.

Hubbard, K. (1995). “Prenasalised consonants” and syllable timing: evidence from Runyambo and Luganda. *Phonology*, *12*(2), 235–256.

Ingram, D. (1986). Explanation and phonological remediation. *Child Language Teaching and Therapy*, *2*, 1–19.

International Association of Logopedics and Phoniatrics. (2006). Recommendations for working with bilingual children. *Folia Phoniatrica et Logopaedica*, *58*(6), 456–464. doi:10.1159/000096570

International Expert Panel on Multilingual Children's Speech. (2012). *Multilingual children with speech sound disorders: position paper*. Retrieved from www.csu.edu.au/research/multilingual-speech/position-paper

Irwin, D. L., Pannbacker, M., & Lass, N. J. (2008). *Clinical Research Methods in Speech Language Pathology and Audiology*. San Diego: Plural Publishing.

Jordaan, H. (2008). Clinical Intervention for Bilingual Children : An International Survey. *Folia Phoniatrica et Logopaedica*, *60*, 97–105. doi:10.1159/000114652

Kamwangamalu, N. M. (2000). Language policy and mother-tongue education in South Africa: The case for a market-oriented approach. In J. E. Alatis, H. E. Hamilton, & A. Tan (Eds.), *Georgetown University Round Table on Languages and Linguistics* (pp. 119–134). Washington: Georgetown University Press.

Katamba, F. (2006). Bantu Nominal Morphology. In M. Van de Velde, D. Nurse, K. Bostoen, & G. Philippson (Eds.), *The Bantu Languages* (pp. 103 – 120). Routledge.

Kathard, H., Pascoe, M., Ramma, L., Jordaan, H., Moonsamy, S., Wium, A.-M., … Khan, N. (2011). How can speech-language therapists and audiologists enhance language and literacy outcomes in South Africa? (And why we urgently need to ). *South African Journal of Communication Disorders*, *58*(2), 59–71.

Kathard, H., & Pillay, M. (2013). Promoting change through political consciousness : A South African speech-language pathology response to the World Report on Disability Promoting change through political consciousness : A South African speech-language pathology response. *International Journal of Speech-Language Pathology*, *15*(1), 84–89. doi:10.3109/17549507.2012.757803

Keating, D., Turrell, G., & Ozanne, A. (2001). Childhood speech disorders : Reported prevalence , comorbidity and socioeconomic profile. *Journal of Paediatrics and Child Health*, *37*, 431–436.

Kehoe, M. (2015). Cross-linguistic interaction : A retrospective and prospective view. In *Proceedings of the International Symposium on Monolingual and Bilingual Speech 2015* (pp. 141–167).

Kent, R. D. (1982). Contextual Facilitation of Correct Sound Production. *Language, Speech and Hearing Services in Schools*, *13*, 66–76.

Kim, J., Ballard, E., & McCann, C. M. (2016). Parent-rated measures of bilingual children ' s speech accuracy : Implications for a universal speech screen. *International Journal of Speech-Language Pathology*, *18*(2), 202–211. doi:10.3109/17549507.2015.1081284

Kim, J.-H. (2015). *Phonological Development in Korean-English Bilingual Children*. Unpublished PhD thesis: University of Auckland.

Kohnert, K. (2008). *Language Disorders in Bilingual Children and Adults*. San Diego, CA: Plural Publishing.

Kohnert, K. (2010). Bilingual children with primary language impairment : Issues , evidence and implications for clinical actions. *Journal of Communication Disorders*, *43*, 456–473. doi:10.1016/j.jcomdis.2010.02.002

Kohnert, K., Yim, D., Nett, K., Kan, P. F., & Duran, L. (2005). Intervention with Linguistically Diverse Preschool Children : A Focus on Developing Home Language(s). *Language, Speech & Hearing Services in Schools*, *36*, 251–264.

Lass, R. (2002). South African English. In R. Mesthrie (Ed.), *Language in South Africa* (pp. 104 – 126). Cambridge: Cambridge University Press.

Lewis, P. W., & Roux, J. C. (1996). A phonological process analysis of the acquisition and loss of clicks in Xhosa. *South African Journal of African Languages*, *16*(1), 1–7. doi:10.1080/02572117.1996.10587110

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

Lousada, M., Jesus, L. M. T., Hall, A., & Joffe, V. (2014). Intelligibility as a clinical outcome measure following intervention with children with phonologically based speech – sound disorders. *International Journal of Language & Communication Disorders*, *49*(5), 584–601. doi:10.1111/1460-6984.12095

Mamdouh, H. (2008). Management of delayed language affecting phonology in a bilingual child. *El Minia Medical Bulletin*, *19*(1), 38–45.

Maphalala, Z. (2012). *Phonological development of first language isiXhosa-speaking children aged 3;0 - 6;0 years: a descriptive cross-sectional study*. Unpublished MSc dissertation: University of Cape Town.

Maphalala, Z., Pascoe, M., & Smouse, M. (2012). Masincokoleni: IsiXhosa Speech Assessment. Unpublished Resource: University of Cape Town.

Maphalala, Z., Pascoe, M., & Smouse, M. (2014). Phonological development of first language isiXhosa-speaking children aged 3;0–6;0 years: A descriptive cross-sectional study. *Clinical Linguistics and Phonetics*, *28*(3), 176–194. doi:10.3109/02699206.2013.840860

Mayr, A. R., Howells, G., & Lewis, R. (2015). Asymmetries in phonological development : The case of word-final cluster acquisition in Welsh- English bilingual children. *Journal of Child Language*, *42*, 146–179. doi:10.1017/S0305000913000603

McIntosh, B., & Dodd, B. (2008). Evaluation of Core Vocabulary intervention for treatment of inconsistent phonological disorder: Three treatment case studies. *Child Language Teaching and Therapy*, *25*(1), 09–29. doi:10.1177/0265659008100811

McKinnon, D., McLeod, S., & Reilly, S. (2007). The Prevalence of Stuttering, Voice, and Speech-Sound Disorders in Primary School Students in Australia. *Language, Speech & Hearing Services in Schools*, *38*, 5–15. doi:10.1044/0161-1461(2007/002)

McLeod, S. (2012). Multilingual Speech Assessment. In S. McLeod & B. Goldstein (Eds.), *Multilingual Aspects of Speech Sound Disorders in Children* (pp. 113–143). Bristol: Multilingual Matters.

McLeod, S. (2014). Resourcing speech-language pathologists to work with multilingual children, *16*(3), 208–218. doi:10.3109/17549507.2013.876666

McLeod, S., & Bleile, K. (2003). Neurological and developmental foundations of speech acquisition. In *American Speech-Language-Hearing Association Convention Invited Speaker Presentation* (pp. 1–12).

McLeod, S., Harrison, L. J., & McCormack, J. (2012a). Intelligibility in Context Scale ( ICS ). Bathurst, NSW, Australia: Charles Sturt University. doi:10.1044/1092

McLeod, S., Harrison, L. J., & McCormack, J. (2012b). The Intelligibility in Context Scale: Validity and

Reliability of a Subjective Rating Measure. *Journal of Speech, Language, and Hearing Research*, *55*(April), 648–656. doi:10.1044/1092-4388(2011/10-0130)

McLeod, S., & Threats, T. T. (2008). The ICF-CY and children with communication disabilities. *International Journal of Speech-Language Pathology*, *10*(1 - 2), 92 – 109. doi:10.1080/17549500701834690

McLeod, S., van Doorn, J., & Reed, V. A. (2001). Normal Acquisition of Consonant Clusters. *American Journal of Speech-Language Pathology*, *10*(2), 99–110. doi:10.1044/1058-0360(2001/011)CITATIONS

McLeod, S., Verdon, S., & Bowen, C. (2013). International aspirations for speech-language pathologists' practice with multilingual children with speech sound disorders: Development of a position paper. *Journal of Communication Disorders*, *46*(4), 375–387. doi:10.1016/j.jcomdis.2013.04.003

McLeod, S., Verdon, S., & International Expert Panel on Multilingual Children's Speech. (n.d.). Tutorial: Speech assessment for multilingual children who do not speak the same language(s) as the speech-language pathologist. *American Journal of Speech Language Pathology*, 1–58.

Mesthrie, R. (2002a). Introduction. In R. Mesthrie (Ed.), *Language in South Africa* (pp. 1–8). Cambridge: Cambridge University Press.

Mesthrie, R. (2002b). South Africa: a sociolinguistic overview. In R. Mesthrie (Ed.), *Language in South Africa* (pp. 11 – 26). Cambridge: Cambridge University Press.

Mowrer, D. E., & Burger, S. (1991). A comparative analysis of phonological acquisition of consonants in the speech of 2;6 to 6 year old Xhosa- and English-speaking children. *Clinical Linguistics and Phonetics*, *5*(2), 139 – 164.

Mwita, L. (2007). Prenasalisation and the IPA. *UCLA Working Papers in Phonetics*, (106), 58–67.

Niesler, T., Louw, P., & Roux, J. C. (2005). Phonetic analysis of Afrikaans, English, Xhosa and Zulu using South African speech databases. *Southern African Linguistics and Applied Language Studies*, *23*(4), 459–474.

O'Brien, T. (2015). *Identifying language impairment in bilingual chool-aged children using one word vocabulary tests*. Unpublished MSc dissertation: University of the Witswatersrand.

Paradis, J. (2001). Do bilingual two-year-olds have separate phonological systems? *International Journal of Bilingualism*, *5*(1), 19–38. doi:10.1177/13670069010050010201

Pascoe, M., Le Roux, J., Mahura, O., Danvers, E., de Jager, A., Esterhuizen, N., … van der Merwe, A. (2015). Three-year-old children acquiring South African English in Cape Town. In E. Babatsouli & D. Ingram (Eds.), *Proceedings of the International Symposium on Monolingual and Bilingual Speech 2015* (pp. 277–287). Chania: Institute of Monolingual and Bilingual Speech, Chania. Retrieved from http://ismbs.eu/publications

Pascoe, M., Maphalala, Z., Ebrahim, A., Hime, D., Mdladla, B., Mohamed, N., & Skinner, M. (2010). Children with speech difficulties: an exploratory survey of clinical practice in the Western Cape. *The South African Journal of Communication Disorders.*, *57*, 66–75.

Pascoe, M., & Norman, V. (2011). Contextually relevant resources in speech-language therapy and audiology in South Africa--are there any? *The South African Journal of Communication Disorders.*, *58*(October), 2–5. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/22216554

Pascoe, M., Rogers, C., & Norman, V. (2013). Are we there yet ? On a journey towards more contextually relevant resources in speech-language therapy and audiology. *South African Journal of Communication Disorders*, *60*, 2–9. doi:10.7196/SAJCD.256

Pascoe, M., Rossouw, K., Fish, L., Jansen, C., Manley, N., Powell, M., & Rosen, L. (2016). Speech processing and production in two-year-old children acquiring isiXhosa : A tale of two children. *South African Journal of Communication Disorders*, *63*(2).

Pascoe, M., Stackhouse, J., & Wells, B. (2006). *Persisting speech difficulties in children*. West Sussex: Whurr Publishers.

Pearson, B. Z., Fernandez, S., & Oller, D. K. (1993). Lexical development in bilingual infants and toddlers : Comparison to monolingual norms. *Language Learning*, 93–120.

Popich, E., Louw, B., & Eloff, I. (2007). Caregiver Education as a Prevention Strategy for Communication Disorders in South Africa. *Infants and Young Children*, *20*(1), 64–81.

Prezas, R. F. (2008). *An investigation of bilingual preschool children's intelligibility in Spanish and English: Comparing measures of performance with listener ratings in both languages*. Unpublished PhD thesis: Wichita State University.

Prezas, R. F., & Hodson, B. W. (2010). The Cycles Phonological Remediation Approach. In A. L. Williams, S. McLeod, & R. J. McCauley (Eds.), *Interventions for Speech Sound Disorders in Children* (pp. 137 – 158). Maryland: Paul H. Brookes Publishing.

Prezas, R. F., Hodson, B. W., & Schommer-Aikins, M. (2014). Phonological Assessment and Analysis of Bilingual Preschoolers' Spanish and English Word Productions. *American Journal of Speech-Language Pathology*, *23*, 176–185. doi:10.1044/2013

Ramos, E., & Ardila, A. (2011). Speech and language intervention in bilinguals. *Revista de Investigacion En Logopedia*, *1*, 87–104.

Ramos, E., & Mead, J. (2014). Dual language intervention in a case of severe speech sound disorder. *Revista de Investigacion En Logopedia*, 93–111.

Ray, J. (2002). Treating phonological disorders in a multilingual child: A case study. *American Journal of Speech-Language Pathology*, *11*(August), 305–315. doi:10.1044/1058-0360(2002/035)

RCSLT Specific Interest Group in Bilingualism. (2007). Good Practice for Speech and Language Therapists Working With Clients From Linguistic Minority. *The Royal College of Speech and Language Therapists*, (October), 1–25. Retrieved from http://www.rcslt.org/members/publications/publications2/linguistic_minorities

Reid, J., Donaldson, M. L., Howell, J., Dean, C., & Grieve, R. (1996). The effectiveness of therapy for child phonological disorders: the Metaphon Approach. In M. Aldridge (Ed.), *Child Language* (pp. 165 – 175). Clevedon: Multilingual Matters.

Robey, R., & Schultz, M. (1998). A model for conducting clinical-outcome research: an adaptation of the standard protocol for use in aphasiology. *Aphasiology*, *12*(9), 787–810.

Ruscello, D. (2008). *Treating Articulation and Phonological Disorders in Children*. Missouri: Mosby Elsevier.

Rvachew, S., & Nowak, M. (2001). The effect of target-selection strategy on phonological learning. *Journal of Speech Language and Hearing Research*, *44*(June), 610–623. doi:10.1044/1092-4388(2001/050)

Rvachew, S., Nowak, M., & Cloutier, G. (2004). Effect of Phonemic Perception Training on the Speech

Production and Phonological Awareness Skills of Children With Expressive Phonological Delay. *American Journal of Speech-Language Pathology*, *13*, 250–263.

Salameh, E.-K., Nettelbladt, U., & Norlin, K. (2003). Assessing phonologies in bilingual Swedish-Arabic children with and without language impairment. *Child Language Teaching and Therapy*, *19*, 338–364. doi:10.1191/0265659003ct258oa

San, P. H. (2010). *The Phonological Development of Malaysian English Speaking Chinese Children*. Unpublished PhD thesis: University of Canterbury.

Shipley, K. G., & McAfee, J. G. (2009). Child Case History Form. In *Assessment in Speech-Language Pathology: A Resource Manual* (4th Editio., pp. 75 – 81). Clifton Park: Delmar Cengage Learning.

Shriberg, L. D., Fourakis, M., Hall, S. D., Karlsson, H. B., Lohmeier, H. L., McSweeney, J. L., … Wilson, D. L. (2010). Extensions to the Speech Disorders Classification System ( SDCS ). *Clinical Linguistics and Phonetics*, *24*(10), 795–824. doi:10.3109/02699206.2010.503006

Simeonsson, R. (2003). Classification of communication disabilities in children: Contribution of the International Classification on Functioning , Disability and Health. *International Journal of Audiology*, *42*, S2 – S8. doi:10.3109/14992020309074618

Smit, A. B., Hand, L., Freilinger, J. J., Bernthal, J. E., & Bird, A. (1990). The Iowa Articulation Norms Project and its Nebraska replication. *The Journal of Speech and Hearing Disorders*, *55*(November), 779–798.

So, L. K. H., & Dodd, B. (1994). Phonologically disordered Cantonese speaking children. *Clinical Linguistics & Phonetics*, *8*(3), 235 – 255. Retrieved from http://www.assta.org/sst/SST-92/cache/SST-92-SpeechDisorders-p2.pdf

Sosa, A., & Stoel-Gammon, C. (2012). Lexical and Phonological Effects in Early Word Production. *Journal of Speech Language and Hearing Research*, *55*(2), 596–608. doi:10.1044/1092-4388(2011/10-0113).Lexical

Stackhouse, J., & Pascoe, M. (2010). Psycholinguistic Intervention. In A. L. Williams, S. McLeod, & R. J. McCauley (Eds.), *Interventions for Speech Sound Disorders in Children* (pp. 219–246). Maryland: Paul H Brookes Publishing Company.

Stackhouse, J., & Wells, B. (1997). *Children's speech and literacy difficulties 1: A psycholinguistic framework*. London: Whurr Publishers.

Stackhouse, J., Wells, B., Pascoe, M., & Rees, R. (2002). From Phonological Therapy to Phonological Awareness. *Seminars in Speech and Language*, *23*(1), 27–42.

Statistics South Africa. (2012). *Census 2011 Census in brief*. Pretoria. Retrieved from http://www.statssa.gov.za/census2011/Products/Census_2011_Census_in_brief.pdf

Stertzbach, J. (2005). *Parent report as a screening tool of speech disorders in Spanish-speaking preschool children*. MSc Special Project: Portland State University.

Storkel, H. L., & Morrisette, M. L. (2002). The lexicon and phonology : Interactions in language acquisition. *Language, Speech & Hearing Services in Schools*, *33*(1), 24 – 37.

Stow, C., & Dodd, B. (2003). Providing an equitable service to bilingual children in the UK : A review Providing an equitable service to bilingual children in the UK : a review. *International Journal of Language and Communication Disorders*, *38*(4), 351–377. doi:10.1080/1368282031000156888

Tamburelli, M., Sanoudaki, E., Jones, G., & Sowinska, M. (2015). Acceleration in the bilingual acquisisiotn of phonological structure: evidence from Polish-English bilingual children. *Bilingualism: Language and Cognition*, *18*(4), 713–725.

Topbas, S., & Yavas, M. (2006). Phonological Acquisition and Disorders in Turkish. In Z. Hua & B. Dodd (Eds.), *Phonological Development and Disorders in Children: A Multilingual Perspective* (pp. 233–261). Clevedon: Multilingual Matters.

Tuomi, S. K., Gxilishe, S., & Matomela, L. (2001). The acquisition of xhosa phonemes. *Per Linguam*, *17*(1), 14 – 23. doi:http://dx.doi.org/10.5785/17-1-132

Twinky, C. Y. L. (2011). *Interaction in bilingual Cantonese-Putonghua phonological acquisition*. Unpublished BSc dissertation: University of Hong Kong.

Tyler, A., Edwards, M. L., & Saxman, J. H. (1987). Clinical application of two phonologically based treatment procedures. *Journal of Speech and Hearing Disorders*, *52*(November), 393–409.

van der Merwe, A., & le Roux, M. (2014). Idiosyncratic sound systems of the South African Bantu languages: Research and clinical implications for speech-language pathologists and audiologists.

*South African Journal of Communication Disorders*, *61*(1), 1–8. doi:10.4102/sajcd.v61i1.86

van Dulm, O., & Southwood, F. (2013). Child language assessment and intervention in multilingual and multicultural South Africa: Findings of a national survey. *Stellenbosch Papers in Linguistics*, *42*, 55–76. doi:10.5774/42-0-147

Vance, M., & Clegg, J. (2012). Use of single case study research in child speech, language and communication interventions. *Child Language Teaching and Therapy*, *28*(3), 255–258. doi:10.1177/0265659012457766

Vanderstouwe, C. (2009). *A Phonetic and Phonological Report on the Xhosa Language*.

Velleman, S. L., & Vihman, M. M. (2002). Whole-word phonology and templates: Trap, bootstrap, or some of each? *Language, Speech & Hearing Services in Schools (Online)*, *33*(1), 9–23.

Verdon, S., McLeod, S., & Wong, S. (2015). Reconceptualizing practice with multilingual children with speech sound disorders: people, practicalities and policy. *International Journal of Language & Communication Disorders*, *50*(1), 48–62. doi:10.1111/1460-6984.12112

Vihman, M. M. (1982). The acquisition of morphology by a bilingual child : A whole-word approach. *Applied Psycholinguistics*, *3*, 141–160. doi:10.1017/S0142716400006676

Vihman, M. M. (1985). Language differentiation by the bilingual infant. *Journal of Child Language*, *12*(July), 297–324. doi:10.1017/S0305000900006450

Vihman, M. M. (2015). Prosodic structures and templates in bilingual phonological development. *Bilingualism: Language and Cognition*. doi:10.1017/S1366728914000790

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. doi:10.1111/j.1460-6984.2012.00195.x

Wassenaar, D. R. (2006). Ethical issues in social science researcg. In M. Terre Blanche, K. Durrheim, & D. Painter (Eds.), *Research in Practice* (Second edi., pp. 60 – 79). Cape Town: University of Cape Town Press.

Watts Pappas, N., McAllister, L., & McLeod, S. (2015). Parental beliefs and experiences regarding involvement in intervention for their child with speech sound disorder. *Child Language Teaching*

*and Therapy*, *32*(2), 223–239. doi:10.1177/0265659015615925

Webb, V. N. (2002). *Language in South Africa: The Role of Language in National Transformation*. John Benjamins Publishing Company.

Weiner, F. F. (1981). Treatment of phonological disability using the method of meaningful minimal contrast: Two case studies. *Journal of Speech and Hearing Disorders*, *46*, 97–103.

Wells, B., & Stackhouse, J. (2016). *Children's Intonation: A Framework for Practice and Research*. Chichester: John Wiley & Sons.

Williams, L. (2000). Multiple Oppositions: Case Studies of Variables in Phonological Intervention. *American Journal of Speech-Language Pathology*, *9*(4), 289–299.

Wong, P. C. M., Perrachione, T. K., Gunasekera, G., & Chandrasekaran, B. (2009). Communication Disorders in Speakers of Tone Languages : Etiological Bases and Clinical Considerations. *Seminars in Speech and Language*, *30*(3), 162–173. doi:10.1055/s-0029-1225953.

World Medical Association. (2013). World Medical Association Declaration of Helsinki. Ethical principles for medical research involving human subjects. *Journal of the American Medical Association*, 2191 – 2194. doi:10.1001/jama.2013.281053

Yavas, M. (1995). Phonological Selectivity in the First Fifty Words of a Bilingual Child. *Language and Speech*, *38*(2), 189 – 202. Retrieved from http://web.b.ebscohost.com.ezproxy.uct.ac.za/ehost/pdfviewer/pdfviewer?vid=2&sid=e6b1d64f-78c5-42e8-a275-f58e7e71e0de@sessionmgr115&hid=105

Yavas, M., & Goldstein, B. (1998). Phonological Assessment and Treatment of Bilingual Speakers. *American Journal of Speech-Language Pathology*, *7*(2), 49–60.

Zerbian, S., & Barnard, E. (2008). Phonetics of intonation in South African Bantu languages. *Southern African Linguistics and Applied Language Studies*, *26*(2), 235–254. doi:10.2989/SALALS.2008.26.2.5.569

# Appendices

## Appendix A

IsiXhosa phonemes (adapted from Finlayson et al. (1994); Maphalala et al. (2014); and Vanderstouwe, (2009)).

| | | Place | | | | | |
|---|---|---|---|---|---|---|---|
| **Manner** | Bilabial | Dental-Labial | Alveolar | Prepalatal | Palatal | Velar | Glottal |
| **Plosives** | | | | | | | |
| Ejective | pʼ | | tʼ | | cʼ | kʼ | |
| Aspirated | $p^h$ | | $t^h$ | | $c^h$ | $k^h$ | |
| Voiced | b | | d | | ɟ | g | |
| **Implosive** | | | | | | | |
| Voiced | ɓ | | | | | | |
| **Nasal** | | | | | | | |
| Voiced | m | | n | ɲ | | ŋ | |
| **Fricative** | | | | | | | |
| Unvoiced | | f | s | | ʃ | x | h |
| Voiced | | v | z | | | ɣ | |
| Aspirated lateral | | | ɬ | | | | |
| Voiced lateral | | | ɮ | | | | |
| **Approximant** | | | | | | | |
| Lateral | | | l | | | | |
| Voiced glides | w | | j | | | | |
| **Trill** | | | | | | | |
| Voiced | | | r | | | | |
| **Affricate** | | | | | | | |
| Ejective | | | tsʼ | tʃʼ | | kxʼ | |
| Aspirated | | | $ts^h$ | $tʃ^h$ | | | |
| Voiced | | | dz | dʒ | | | |
| Voiceless | | | tɬ | | | | |

Clicks:

| | **Basic Click** | **Aspirated** | **Nasal** | **Glottal nasal** | **Voiced** |
|---|---|---|---|---|---|
| **Dental** | ǀ | $ǀ^h$ | ŋǀ | ŋkǀ | ǀg |
| **Alveolar** | ǃ | $ǃ^h$ | ŋǃ | | ǃg |
| **Lateral** | ǁ | $ǁ^h$ | ŋǁ | | ǁg |

**Appendix B**

Case history form (based on Shipley and McAfee (2009b) and Goldstein and Fabiano (2007))

| | | | |
|---|---|---|---|
| Name | | Date of Birth | |
| Address | | | |
| Mother's name | | Father's name | |
| Contact number (mother) | | Contact number (father) | |
| Siblings | | | |
| Who lives at home? | | | |
| | | | |
| **Language history:** | | | |
| What languages does your child speak? | | | |
| | | | |
| When and where does your child use the languages spoken? | | | |
| | | | |
| When did your child first start learning each language? | | | |
| | | | |
| How many hours per week does your child hear each language? | | | |
| | | | |
| How many hours per week does your child use each language? | | | |
| | | | |
| What language do you speak to your child? | | | |
| | | | |
| With whom does your child spend most of their time? | | | |
| | | | |
| **Speech** | | | |

| |
|---|
| Do you think your child has a speech difficulty? If so, describe. |
| |
| How does your child normally communicate? (gestures, words, phrases, sentences) |
| |
| When did you first notice the problem? |
| |
| Has the problem changed since then? |
| |
| Is your child aware of their speech difficulty? If so, how do they feel about it? |
| |
| Has your child been seen by any other professionals? (e.g. occupational therapist, physiotherapist, psychologist)<br>If yes, who and when? |
| |
| Are there any speech, language of hearing problems in your family? If so, please describe. |
| |
| **Prenatal and birth history** |

| | | | |
|---|---|---|---|
| Length of pregnancy | | Birth weight | |
| Type of delivery | | | |

| |
|---|
| Mother's general health during pregnancy? |
| |
| Were there any unusual conditions that may have affected the pregnancy or birth? |
| |

| | | | |
|---|---|---|---|
| | | | |
| Medical history: Has your child suffered from the following? If so – when? | | | |
| Asthma | | Croup | |
| Ear infections | | Headaches | |
| mastoiditis | | Mumps | |
| Sinusitis | | Chicken Pox | |
| Dizziness | | Encephalitis | |
| High fever | | Measles | |
| Pneumonia | | Tinnitus | |
| Colds | | Draining ear | |
| German Measles | | Influenza | |
| Meningitis | | Seizures | |
| Tonsillitis | | Other | |
| | | | |
| Has your child had any surgeries? If so, what type and when? | | | |
| | | | |
| Describe any major hospitalisations or accidents. | | | |
| | | | |
| Is your child taking any medication? | | | |
| | | | |
| Do you have any concerns about your child's hearing? | | | |
| | | | |
| Has your child's hearing been screened or assessed? If so, when, and what were the results? | | | |
| | | | |
| **Developmental History** | | | |
| Please provide the approximate age at which your child began doing the following: | | | |
| Crawl | | Sit | |
| Stand | | Walk | |
| Feed self | | Dress self | |
| Use toilet | | Use single words | |
| Combine words | | Name simple objects | |
| Use simple questions | | Engage in | |

| | | | |
|---|---|---|---|
| | | conversation | |
| Does your child have difficulty walking, running or engaging in other activities that require movement? | | | |
| | | | |
| Are there or have there ever been any feeding problems? | | | |
| | | | |
| Do you have any concerns about your child's ability to concentrate on activities, compared to their peers? | | | |
| | | | |
| | | | |
| **Educational history** | | | |
| School | | Class | |
| Teacher | | | |
| How is your child doing at school? | | | |
| | | | |
| Does your child's teacher have any concerns? | | | |
| | | | |
| How does your child interact with other children at school? | | | |
| | | | |

**Appendix C**

Information letter for schools


# UNIVERSITY OF CAPE TOWN

## Faculty of Health Sciences

### Department of Health and Rehabilitation Sciences

Divisions of Communication Sciences and Disorders, Nursing and Midwifery, Occupational Therapy, Physiotherapy

F45 Old Main Building, Groote Schuur Hospital
Observatory, Cape Town, W Cape, 7925
Tel: +27 (0) 21 406 6628/ 6428/ 6534
Fax: +27 (0) 21 406 6323
www.dhrs.uct.ac.za


---

**RE: Information about a research study and invitation for children from your school to participate – Intervention for bilingual children with speech sound disorders.**

I am a Master's student in the Division of Communication Sciences and Disorders at the University of Cape Town. In order to obtain my Master's degree in Speech Language Pathology (SLP) I need to do a research project. I am interested in researching how bilingual children with speech sound disorders respond to therapy. If a child has a speech sound disorder, it means they cannot produce some of the sounds in their home language, or cannot produce sounds correctly, or do not use sounds correctly in words.

There is very little information about how bilingual children with speech sound disorders respond to different approaches to therapy, as well as how the language used in therapy affects the results. This information is important for SLPs as it will allow them to provide therapy that is appropriate and effective for bilingual children.

I would like to invite children from your school to take part in this study because they are bilingual (isiXhosa – English), and potentially have difficulties with their speech. This study requires 3 children who speak isiXhosa as a home language and English as a second language, and who present with speech difficulties. Many of these children were identified through a previous study for an honours research study. The previous study screened the children's speech, and if the results of the screener suggested the child may have a speech sound disorder, they were referred to a SLP. Many of these children may now be on waiting lists for therapy. Offering them therapy at their school will be of benefit to them.

I am asking for your permission to include children from your school in the research study. If you agree, I would then provide information to the children's parents, and obtain their consent before I will start the study. The study will include an individual assessment of the child's speech and language skills. This would require a quiet space at your school, where I could assess the children in an environment they are familiar with. The assessment will

consider the child's ability to understand English and isiXhosa, as well as their speech in both languages. In addition, the movements of their oral structures used for speech will be evaluated by a non-invasive observation of movements of the structures (e.g. lips, tongue). Parents/caregivers and teachers will be asked to complete a form evaluating how easy it is to understand the child's speech in different contexts. The assessment should take no longer than two or three sessions (2 – 3 hours in total), depending on the child's concentration and other interruptions. This would take place on a normal school day, at a time that is most convenient for you and that will make sure the child does not miss anything important in class.

Following assessment, a therapy plan will be developed specifically for each child based on their difficulties. Each child will be required to attend 16 sessions of speech therapy, twice a week for 8 weeks. These sessions will be 30 – 45 minutes each. This will also require the use of a quiet space at your school, where the child can participate in therapy with as few distractions as possible. This will take place at a time that is convenient for you and the child's teacher, to ensure as few disruptions to the daily schedule as possible. Following the intervention, the child's speech will be re-assessed in order to identify any changes that occurred during the intervention. The findings will be analysed and used to complete a report. If you agree, the assessment and intervention sessions will take place at your school.

Participation in this study is voluntary. The children are under no obligation to agree to participating in this study. If the parents/caregivers, or the child wish to withdraw from the study at any time they may do so without having to provide a reason. To ensure confidentiality, any identifying information (e.g. the child's name, address) will only be known by the researcher, and will not be used in the report or any presentations or discussions that arise from the study. Each participant will be given a coded name in order to ensure anonymity.

There are no risks in taking part in this study. There will be no rewards, however the child may benefit from receiving intervention targeting speech sound disorders identified during the assessment. In addition, the child may enjoy attending the intervention sessions, as games are included in order to encourage participation and learning. No payment will be offered for taking part in the study, and the child will not be required to pay for the intervention.

You will receive feedback once the study has been completed. If the child requires further intervention following the completion of the study, they will be referred to a SLP. If the child requires referrals to other health professionals (e.g. occupational therapist, psychologist) these referrals will be made as they are needed.

I request permission to conduct this study with children from your school. Thank you for considering this request. Should you have any concerns or questions please feel free to contact me or my supervisor (details below). This study has approval from the University of Cape Town Faculty of Health Sciences Human Research Ethics Committee (Reference number: ). The UCT FHS Human Research Ethics Committee can be contacted on 021 406 6338 in case participants have any questions regarding their rights and welfare as research subjects on the study.

Yours Faithfully,

Kate Pratt
(Researcher)
0824184401
Prtkat005@myuct.ac.za

Michelle Pascoe
(Research Supervisor)
0214066043
michelle.pascoe@uct.ac.za

**Appendix D**

Parent/Care-giver Consent form


# UNIVERSITY OF CAPE TOWN

## Faculty of Health Sciences

### Department of Health and Rehabilitation Sciences

Divisions of Communication Sciences and Disorders,
Nursing and Midwifery, Occupational Therapy,
Physiotherapy

F45 Old Main Building, Groote Schuur Hospital
Observatory, Cape Town, W Cape, 7925
Tel: +27 (0) 21 406 6628/ 6428/ 6534
Fax: +27 (0) 21 406 6323
www.dhrs.uct.ac.za


---

Dear Mr and Mrs

**RE: Information about a research study and invitation to provide consent, allowing your child to participate– Intervention for bilingual children with speech sound disorders.**

I am a Master's student in the Division of Communication Sciences and Disorders at the University of Cape Town. In order to obtain my Master's degree in Speech Language Pathology (SLP) I need to do a research project. I am interested finding out about what sort of therapy helps children who speak two languages but have difficulties saying some sounds correctly.

There is not a lot of information about the results of therapy for children who speak two languages but have difficulties saying some sounds correctly. There is also not a lot of information about whether the language used in therapy will change the results. This information is important for SLPs as it will allow them to provide therapy that will help these children the most.

I am inviting your child to take part in this study because he/she speaks both isiXhosa and English. As you know, his/her speech was recently screened by fourth year students and they found that your child might have difficulties with their speech. For this study, I will work with 3 children who speak isiXhosa as a home language and English as a second language, and who have speech difficulties. I will work with your child on his/her own.

I am asking for your permission to assess your child's speech and language skills and then provide them with therapy. Before the assessment, I will ask you to fill out a form asking some questions about your child's birth,

medical history, developmental history, educational history and language history. The assessment will take place at school, during a normal school day. I will speak to your child's teacher to make sure they do not miss anything important in class and that they do not miss daily activities such as snack time or nap time. The assessment will look at how your child can understand English and isiXhosa, as well as their speech in both languages (the sounds they are able to make, and how they use these sounds in words and sentences). I will also look at how they are able to move the parts of the mouth that are needed for speaking, such as their lips, tongue and teeth, to make sure they are not making it more difficult for your child to say different sounds. I will also ask you and your child's teacher to fill out a form that asks how you and others are able to understand your child's speech in different places (e.g. home, school). The assessment should take no longer than two or three sessions, each of between 30 to 60 minutes making a total of 2 to 3 hours, depending on your child's concentration and other interruptions. Your child will be provided with breaks whenever they need them.

After the assessment, a therapy plan will be developed based on your child's specific needs. Your child will be required to attend 16 sessions of speech therapy, twice a week for 8 weeks. These sessions will be 30 – 45 minutes each. They will take place at your child's school in a quiet room. I will speak to your child's teacher to make sure they will not miss anything important in class, other special events like outings or daily activities such as snack time and nap time. You would be able to sit in on any of these sessions, but you do not have to be there. These therapy sessions will include games and activities that teach your child to say sounds correctly in a way that will be fun and that they will enjoy. Following the therapy, your child's speech will be re-assessed and I will see how your child's speech has changed. The findings will be used to complete a report. The assessment and therapy sessions will be audio recorded in order to ensure accurate recording of the changes that occur in your child's speech during therapy. These recordings will only be available to the researcher, and will be kept locked away and destroyed after all the reports from this study have been written.

Participation in this study is voluntary. You and your child do not have to take part in this study. If you, or your child would like to stop taking part in the study at any time you may do so without having to provide a reason. Any identifying information (e.g. your child's name, address) will only be known by the researcher, and will not be used in the report or any presentations or discussions that arise from the study. This information will be destroyed once all the reports from this study have been written. Each participant will be given a coded name in order to ensure anonymity. If you take part in this study, your child will still be allowed to receive speech therapy services by other therapists at the school or elsewhere when it is complete.

Your child will not be harmed when taking part in this study. There will be no physical rewards, however your child's speech may improve as a result of the therapy. In addition, your child may enjoy attending the therapy sessions, as games are included to make the sessions fun and help your child to learn. You or your child will not receive payment for taking part in the study, and you will not be required to pay for the therapy.

You will receive feedback after the first assessment, and once the study has been completed. If your child still needs more therapy after the study, they will be referred to a SLP. If your child needs to be seen by other health professionals (e.g. occupational therapist, psychologist) these referrals will be made as they are needed. I will remain in contact with you while you child is attending therapy.

Thank you for considering this request. Please find the consent form attached. Should you have any questions you would like to ask about the study, or any concerns please feel free to contact me or my supervisor (details below). This study has approval from the University of Cape Town Faculty of Health Sciences Human Research Ethics Committee (Reference number: ). The chair of the UCT FHS Human Research Ethics Committee, Professor Marc

Blockman, can be contacted on 021 406 6338 in case participants have any questions regarding their rights and welfare as research subjects in the study.

Yours Faithfully,

Kate Pratt
(Researcher)
0824184401
Prtkat005@myuct.ac.za

Michelle Pascoe
(Research Supervisor)
0214066043
michelle.pascoe@uct.ac.za

**Title:** Intervention for bilingual children with speech sound disorders.

I _____ have read (or had read to me by _____) the Information Sheet. I understand what is required of me and my child, and I have had all my questions answered. I do not feel that my child and I are forced to take part in this study and my child and I are doing so of my own free will. I know that my child and I can withdraw at any time if my child and I so wish and that it will have no bad consequences for me or my child.

I **do/do not** consent to his/her participation in the study (circle if applicable).

I **do/do not** give permission for all assessment and therapy sessions to be audio recorded (circle if applicable).

Signed:

_____ _____

Parent Date and place

**Appendix E**

Assent from children (to be read – verbal assent)

Hello, my name is Kate. I am a speech therapist. I help children with their talking and listening. I would like you to help me learn more about how to help children. I would like to show you some pictures, talk about the pictures together and play some games. I will come visit you at school twice every week for 8 weeks to play games and practice speaking with you.

I asked your mom and/or dad if you could help me. They said you can if you want to. You can decide if you want to help me or not. If you don't want to, I won't mind, and I also won't be upset or angry. Nothing bad will happen if you say no. If you want to do the games with me, but later decide you don't like it, we can stop at any point. You can just tell me when you want to stop.

Would you like to help me learn more about children and their speech?

**Appendix F**

Assessment Protocol

| Area assessed | Name of test and authors | Rationale | Comments | Pre-intervention | Post-intervention |
|---|---|---|---|---|---|
| **Case history (see Appendix A)** | Based on Shipley and McAfee, (2009b) child case history form, and language history questions suggested by Goldstein and Fabiano (2007) | An accurate case history and language history will allow for a more accurate diagnosis and help planning of appropriate intervention (Shipley & McAfee, 2009), | The case history form will be sent home with the child during the assessment period. Any information not provided on the form will be gathered from the caregivers at a face-to-face interview or if this is not possible, telephonically. | X | |
| **English speech (articulation and phonology)** | *Diagnostic Evaluation of Articulation and Phonology* (*DEAP*)(Dodd, Hua, Crosbie, Holm, & Ozanne, 2002) | The *DEAP* allows for categorization of speech sound disorders according to the diagnostic subgrouping described by Dodd (2005) and being used within this study. It is appropriate for children between the ages of 3;0 – 8;11 years. | This assessment has been normed on a monolingual English population within the United Kingdom. The results will therefore be analysed descriptively, and caution will be taken when interpreting results. | X | X |
| **IsiXhosa Speech** | *Masincokoleni isiXhosa Speech Assessment* (Maphalala et al., 2012) | This is the most recent isiXhosa speech assessment. Preliminary validation has been conducted with children | | X | X |

| | | | | | |
|---|---|---|---|---|---|
| | | between the ages of 3;0 – 6;0 years (Maphalala et al., 2014). | | | |
| **Intelligibility** | *Intelligibility in Context Scale* (*ICS*) (McLeod, Harrison, & McCormack, 2012a) | The *ICS* is a reliable and valid measure for assessing a child's intelligibility using parent and teacher report (McLeod, Harrison, & McCormack, 2012b). | An isiXhosa translation of this scale is available, and can be used for caregivers who would prefer to complete this form in their home language. | X | X |
| **Receptive language – English** | *Peabody Picture Vocabulary Test* (Fourth Edition) (*PPVT-4*) (Dunn & Dunn, 2007) | The *PPVT-4* is an English receptive vocabulary assessment designed for children between the ages of 2;6 upwards. It is therefore an appropriate assessment tool for the population of this study. | The *PPVT-4* has been normed on an English-speaking population from the United States (Dunn & Dunn, 2007). Results will therefore be interpreted with caution. This assessment will provide information regarding the child's language abilities in English. | X | |
| **Receptive language - isiXhosa** | *Peabody Picture Vocabulary Test* (Fourth Edition) (*PPVT-4*) (Dunn & Dunn, 2007) – isiXhosa translation (Dawes et al., 2012) | | As this is a translation, the results will only be analysed descriptively. This assessment will give an indication of the child's language abilities in isiXhosa. | X | |

**Appendix G**

Intervention fidelity rubric – to be tailor-made for each child according to intervention plan

| | | | |
|---|---|---|---|
| PARTICIPANT: | | | |
| SESSION NUMBER: | | DATE: | |
| SUBGROUP: | e.g. Phonological delay/inconsistent phonological disorder | | |
| APPROACH: | e.g. Traditional articulation/minimal pairs/core vocab | | |
| | | YES | NO |
| Targets chosen according to intervention plan: | | | |
| Stimuli chosen are in the language stated in intervention plan: | | | |
| Levels of target are as stated in intervention plan: | | | |
| Session audiorecorded: | | | |
| Activities match intervention approach: | | | |
| | e.g. (if cycles approach) auditory stimulation | | |
| | Play-based activities with picture cards | | |
| | Check stimulability of sounds for next session | | |
| | Included metaphonological awareness activity | | |
| | Repeated auditory stimulation | | |
| | Information/activity sent home | | |
| | | | |
| | e.g. (if core vocab) activities involved target words from core vocab list | | |
| | Drill activities included in session | | |
| | Activities sent home to continue daily drill work | | |
| | Check production of targeted words for consistency | | |
| Outcomes of session recorded in child's notes: | | | |

## Appendix H

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room E52-24 Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6338 • Facsimile [021] 406 6411
Email: shuretta.thomas@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

03 July 2015

**HREC REF: 448/2015**

**Dr M Pascoe**
Health & Rehab
F-Floor, OMB

Dear Dr Pascoe

**PROJECT TITLE: INTERVENTION FOR BILINGUAL CHILDREN WITH SPEECH SOUND DISORDERS: A DESCRIPTION OF THREE ENGLISH/isiXHOSA SPEAKING CHILDREN- (Masters-candidate-Kate Pratt)**

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

**Approval is granted for one year until the 30th July 2016.**

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

**Please quote the HREC REF in all your correspondence.**

***We acknowledge that the student Kate Pratt will also be involved in this study.***

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Yours sincerely

Signed

pp

**PROFESSOR M BLOCKMAN**
**CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE**
Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938
This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH GCP), South African Good Clinical Practice Guidelines (DoH