

MORPHOLOGICAL AWARENESS IN READERS OF ISIXHOSA

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SIÂN ANGHARAD REES

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Abstract

This study focuses particularly on the development of four Morphological Awareness reading tests in isiXhosa and on the relationship of Morphological Awareness to reading success among 74 Grade 3 isiXhosa-speaking foundation-phase learners from three peri-urban schools. It explores in-depth why not all previously established Morphological Awareness tests for other languages suit the morphology of isiXhosa and how these tests have been revised in order to do so. Conventionally, the focus of Morphological Awareness literature has been on derivational morphology and reading comprehension. This study did not find significant correlations with comprehension, but rather with the children's ability to decode. Fluency and Morphological Awareness have not been given as much attention in the literature, but Morphological Awareness could be important for processing the agglutinating structure of the language in reading. This study also argues that it is not a specific awareness of derivational morphology over inflectional morphology, but rather a general awareness of one's language structure that is more important at this stage in their literacy development; specifically a general awareness of prefixes and suffixes. In addition, it was found that an explicit awareness of the morphological structure of the language related more to fluency and tests that accessed an innate and implicit Morphological Awareness had the strongest correlations overall with comprehension. The findings from this report have implications regarding how future curriculum developments for morphologically rich languages like isiXhosa should be approached. The positive and practical implications of including different types of Morphological Awareness tutoring in curricula is argued for, especially when teaching younger readers how to approach morphologically complex words in texts.

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Table of Contents

Abstract.....	ii
Acknowledgements.....	iii
Table of Contents.....	iv
List of tables	vii
List of figures and diagrams	vii
Morpheme Glossary.....	viii
Chapter 1: Introduction.....	1
1.1 The South African linguistic context	2
1.2 The literacy crisis.....	5
1.2.1 Curriculum and Assessment Policy Statement (CAPS).....	5
1.2.2 Annual National Assessments (ANAs).....	9
1.2.3 Progress in International Reading Standards assessment (PIRLS)	12
1.3 Influencing factors	13
1.3.1 Reason 1: Socio-economic reasons.....	13
1.3.2 Reason 2: The switch to English in Grade 4	14
1.3.3 Reason 3: Myths about bilingual education	15
1.3.4 Reason 4: Teacher training, especially for the multilingual situation.....	17
1.3.5 Reason 5: Linguistic reasons.....	17
1.4 Research goals and questions	19
1.4.1 Aims and limitations of this thesis.....	20
1.5 Conclusion	20
Chapter 2: Theoretical overview.....	22
2.1 What is Morphological Awareness?.....	22
2.2 Morphological Awareness and reading	23
2.2.1 Fluency.....	25
2.2.1.1 Psycholinguistic Grain Size Theory (PGST)	25
2.2.1.2 Orthographic Depth Hypothesis (ODH)	27
2.2.2 Comprehension	30
2.2.2.1 Direct and indirect contributions to comprehension	30
2.2.2.2 Word decomposition.....	31
2.2.2.3 Connectionist models.....	32
2.3 MA and reading conclusions	34

2.4 The traditional types of MA and testing	34
2.4.1 Inflectional morphology	35
2.4.2 Derivational morphology	36
2.4.2.1 Derivational morphemes	36
2.4.2.2 Compound morphology	39
2.4.3 Inflectional and derivational morphology conclusions	40
2.5 Alternative types of MA tests	42
2.5.1 Manipulation of pseudo versus real words.....	42
2.5.2 Static and dynamic MA tests	44
2.5.3 Basic and refined MA tests	46
2.5.4 Implicit and explicit MA tests.....	49
2.5.5 Alternative MA test conclusions.....	50
2.6 MA tests selected for the current study.....	51
2.6.1 Test A: Inflectional morphology on pseudo-nouns.....	51
2.6.1.1 Iimbabule/ Wugs in the Bantu languages.....	53
2.6.2 Test B: Sentence Analogy	56
2.6.2.1 Morphological decomposition tests	56
2.6.2.2 Morphological production tests.....	60
2.6.2.3 Sentence Analogy tests	62
2.6.3 Test C: Morphological Structure Awareness tests.....	64
2.6.3.1 Revised Morphological Structure test/ Word Building test	65
2.6.4 Test D: The Morpheme Identification tests	67
2.6.4.1 Revised Morpheme Identification test	68
2.7 Conclusion	68
Chapter 3: Methodology	70
3.1 Participants	70
3.2 Procedure	71
3.3 Reading success measures	71
3.3.1 Fluency.....	72
3.3.2 Comprehension	75
3.3.3 General reading success	75
3.3.4 Reading measures conclusion	76
3.4 IsiXhosa MA tests.....	76

3.4.1 Test A: Iimbabule/Wugs	76
3.4.1.1 Breakdown and scoring of the Iimbabule/Wugs test	78
3.4.2 Test B: Sentence Analogy	80
3.4.2.1 Breakdown and scoring of the Analogy test	81
3.4.3 Test C: Revised Morphological Structure test/ Word Building	85
3.4.3.1 Breakdown of the Word Building test	87
3.4.3.2 Scoring in the Word Building test.....	88
3.4.4 Test D: Revised Morphological Identification test	89
3.4.4.1 Breakdown of the Revised Identification test	91
3.4.4.2 Scoring the Identification test	93
3.5 Conclusion	96
Chapter 4: Results and Analysis	97
4.1 Total MA and reading success	97
4.1.1 Total MA score and fluency and comprehension	97
4.2 Individual MA tests and fluency	99
4.3 Individual MA tests and comprehension	99
4.4 Qualitative discussion of the individual MA tests	100
4.4.1 Iimbabule/Wugs test	100
4.4.2 Sentence Analogy	102
4.4.3 Word Building.....	103
4.4.4 Identification	104
4.5 Summary of correlations.....	107
4.6 Different types of MA and reading success	108
4.6.1 Traditional: Inflectional/Derivational awareness.....	109
4.6.2 Alternative test types	111
4.6.2.1 General language structure: Prefixes/Suffixes	111
4.6.2.2 Implicit/Explicit and reading success.....	115
4.6.3 Summary of different types of MA correlations.....	116
4.7 Morphological Awareness and gender.....	117
4.8 Summary of all MA correlations within reading	117
Chapter 5: Conclusion	120
Bibliography	126

List of tables

Table 1: Proposed subjects offered to learners in Grade 1-3	4
Table 2: Proposed words to be read per minute in an African language	18
Table 3: Results from phonology and morphology's contribution to word reading in English and Arabic	28
Table 4: Examples of pseudo morphemes in Basque.....	44
Table 5: Percentage of correct inflectional morphemes on pseudo nouns (Wugs).....	52
Table 6: IsiXhosa Noun Classes 1-10.....	54
Table 7: Examples of roots supplied to children in the Word Building test	87
Table 8: Breakdown of different approaches that can be taken in the Identification test	95
Table 9: Correlation between total MA scores and fluency and comprehension.....	98
Table 10: Correlations between different MA scores and fluency (mcpm).....	99
Table 11: Correlations between different MA scores and comprehension	99
Table 12: Percentage of correct inflectional morphemes on pseudo nouns (Iimbabule).....	101
Table 13: Total Number of nouns and verbs built in Word Building test.....	103
Table 14: Percentage of negative versus past tense morphemes identified	105
Table 15: Schematic summary of individual MA test correlations with fluency and comprehension	107
Table 16: Inflectional versus derivational scores in Analogy test	110
Table 17: Total prefix composite versus total suffix composite	111
Table 18: Schematic summary of different types of MA.....	116
Table 19: Summary of different MA results' <i>r</i> correlations with reading success.....	118
Table 20: Summary of different MA results' <i>r</i> correlations with reading success (repeated for reader's convenience).....	121

List of figures and diagrams

Figure 1: Averages of home language learners across different grades.....	11
Figure 2: Schematic depiction of the PGST.....	26
Figure 3: The relationships between MA, lexical inferencing, vocabulary knowledge and reading comprehension	31
Figure 4: Role of morphology in the identification of complex orthographic word forms.....	32
Figure 5: Connectionist model of an English word	33
Figure 6: Connectionist model proposed for isiXhosa words.....	33
Figure 7: Allomorphs of /s/ depending on the different phonetic environments	52
Figure 8: Examples from original Wugs test	76
Figure 9: Example of current isiXhosa Iimbabule/Wugs.....	78
Figure 10: Current study's Word Building test	85
Figure 11: Example of a learner's responses on the current Identification test sheet.....	91
Figure 12: Pie chart showing distribution of the approaches taken by Grade 3 isiXhosa children in identifying morphemes within words	106
Figure 13: Morphological decomposition of an isiXhosa sentence	114

Morpheme Glossary

Adv	<i>Adverb</i>
FV	<i>Final Vowel</i>
Inf	<i>Infinitive</i>
N	<i>Noun</i>
NC	<i>Noun Class</i>
OM	<i>Object Marker</i>
Prep	<i>Preposition</i>
Prn	<i>Pronoun</i>
Poss	<i>Possession</i>
SM	<i>Subject Marker</i>
V	<i>Verb</i>

Chapter 1: Introduction

"I love you" is a simple, three-word sentence in English that a young child would have fairly little difficulty reading. The semantic equivalent for a young isiXhosa reader is "ndiyakuthanda" [ndijakuthanda]. Immediately, one can see that even though the word is pronounced as it is spelt (unlike nontransparent words such as 'you' [ju:] or 'love' [lʌv] in English), reading lucidity is affected by the length of the words in isiXhosa (de Vos, van der Merwe, & van der Mescht 2014). IsiXhosa is a "primarily agglutinative [language], with morphology accumulating on the verb stem. There are nine positions on the verb into which a grammatical morpheme might slot, and they include markers that agree with both the subject and object noun class" (Gxilishe, Smouse, Xhalisa, & de Villiers 2009: 47, Du Plessis 1997). This kind of information density can work against a reader (Yan, Tian, Bai, & Rayner 2006). If children were taught to recognise smaller units of meaning, otherwise known as morphemes, within these dense information words, such as "ndi-ya-ku-thanda", it would help with reading fluency of words and more importantly, reading long words with comprehension. It seems beneficial to teaching literacy in isiXhosa to include explicit instruction of these more complex morpho-syntactic aspects of isiXhosa words, yet this vital characteristic of the language has been largely neglected in teaching guides. This could be because the contribution of Morphological Awareness (MA) to reading in isiXhosa has not been researched extensively. Rather, previous Bantu language research tends to focus on the contribution of phonological awareness to reading (Diemer, van der Merwe, & de Vos 2015 for isiXhosa; Malda, Nel, & van de Vijver 2014 for Setswana; De Sousa, Greenop, & Fry 2010 for isiZulu; Pretorius & Mokhwesana 2009 for Northern Sotho). There is also a focus on the more macro-linguistic aspects of education like languages used in the classroom, the social or cognitive benefits of literacy, or whether literacy expectations at school match the literacy practices at home (de Vos, van der Merwe, & van der Mescht 2014; Prinsloo & Stein 2004; Barkhuizen & Gough 1996). Though there has been much work on the linguistic aspects of Bantu languages, there has been very little done in attempt to develop Morphological Awareness literacy measures for first language speakers based on these formal descriptions (Ortner 2013 for isiXhosa; Land 2015 for eye-tracking to measure silent reading in isiZulu). International research on Morphological Awareness and Morphological Awareness tasks have

concentrated mostly on English, Chinese, the Deaf and bilinguals, and have not paved the way for appropriately assessing first language Morphological Awareness and how it relates to reading success in agglutinating languages like isiXhosa.

This research falls within the field of psycholinguistics, and more specifically, the linguistics of literacy in isiXhosa, in South Africa. This study formed part of a larger literacy project¹ that investigated MA, PA and orthographic awareness in the same group of isiXhosa speaking children. The aim of this study is to assess first language speakers of isiXhosa's Morphological Awareness, or in other words, their "conscious awareness of the morphemic structure of words and their ability to reflect on and manipulate that structure" (Carlisle 1995: 194). The various types of MA will be compared against the children's reading success at this stage of their literacy acquisition. MA is known to make its biggest contributions to reading through spelling, word reading, complex word reading, word recognition, vocabulary development and reading comprehension (Deacon, Kirby, & Casselman-Bell 2009; Wolter, Wood, & D'zatko 2009; Saiegh-Haddad & Geva 2007; McBride-Chang, Tardif, Cho, Shu, Fletcher, Stokes, Wong, Leung 2008; Acha, Laka, & Perea 2010; Kirby, Deacon, Bowers, Izenberg, Wade-Woolley, Parrila 2011). MA has also been found to be an indirect contributor to vocabulary growth (Zhang & Koda 2011) and, in turn, vocabulary knowledge has been accredited to have a direct impact on learning to read (Bialystok, Luk, & Kwan 2005). Once developed, pertinent skills such as Morphological Awareness, an orthographic awareness of the writing system of the language, Phonological Awareness (PA) of the sounds of the language, and a good oral vocabulary jointly account for almost 70% of all the variances in reading abilities; those who have mastered these skills are more successful readers (Reed 2008: 39).

1.1 The South African linguistic context

I shall begin with the broader context of South Africa, before providing an overview of morphology and literacy. After the end of the apartheid regime in 1994, South Africa democratically progressed from having two official languages; Afrikaans and English, to 11 official languages: isiZulu, isiXhosa, Northern Sotho, Southern Sotho, Setswana, Xitsonga, siSwati, Tshivenda, isiNdebele, English and Afrikaans. In addition to these official languages, other languages from South African Sign Language (SASL) to Portuguese can be included as home languages, making South Africa an incredibly diverse and multi-lingual country. For the

¹ Made possible by funding from the Sandisa Imbewu Strategic Literacy Imperative Project

majority of South Africans, community life often takes place in African languages², whereas business and education is predominantly in English (IIAL 2013: 6). School Governing Bodies (SGBs) will decide on which languages are taught as subjects in different schools. This can be based on various factors such as the predominant language use of the specific area, adequate materials available for teaching in a specific language in specific grades, what languages parents prefer their children to learn in, as well as the South African education policy (Constitution of the Republic of SA 1996, DoE 1997).

The Language in Education Policy only requires that "the language(s) of learning and teaching (LoLT) in a public school ... be (an) official language(s)" (DoE 1997: 2). It is the government's opinion that South Africa's "cultural diversity is a valuable national asset and hence is tasked... to promote multilingualism" (1997: 1). Therefore, a second language is introduced at the end of the Foundation Phase. To follow is an outline of the policy of languages as subjects (DoE 1997: 2):

- All learners shall be offered at least one approved language as a subject in Grade 1 and Grade 2.
- From Grade 3 onwards, all learners shall be offered their LoLT and at least one additional approved language as subjects.
- All language subjects shall receive equitable time and resource allocation.
- In Grade 1 to Grade 4, promotion [to the following academic grade] is based on performance in one language and Mathematics.
- From Grade 5 onwards, one language must be passed.
- From Grade 10 to Grade 12, two languages must be passed; one on first language level, and the other on at least second language level. At least one of these languages must be an official language.

For learners learning in a Bantu first language, the second language is generally English or Afrikaans. In Grade 4, there is a switch, and this second language usually becomes many of the learners' LoLT for all subjects, illogically with their home language subsequently taught at a level of a second language subject.

Despite the switch to, or addition of, another language, both languages should ideally "receive equitable time and resource allocation" (DoE 1997: 2). Literacy and language programs

² African languages refers a term used as a geographic classification of languages spoken on the African continent rather than linguistic classification. Bantu languages refer to a linguistic grouping of languages that canonically use the noun class system.

that have been developed to guide educators through teaching learners how to read in the Foundation Phase suggest up to 2 hours per day/ 10 hours per week time allocation for literacy (DBE 2008: 2). The core elements of literacy focused on are 1. reading and writing 2. listening and speaking 3. writing/handwriting and 4. additional languages (DBE 2008). In the Foundation Phase (Grade 1-3), the focus is on literacy and in the Intermediate phase (Grade 4-6), the focus is more on language learning (DBE 2008: 5).

Within the last three years, introducing a third language at Foundation Phase level has been proposed. The Incremental Introduction of African Language (IIAL) draft policy (2013) further aims to promote multilingualism and the use of African languages by having them taught at a First Additional Language (FAL) level. The proposed provisioning for Foundation Phase is now as follows (DBE 2013: 9):

Currently	Proposed provisioning (IIAL)
<i>Four subjects:</i>	<i>Five Subjects:</i>
1. Home Language	1. Home Language
2. First Additional Language	2. First Additional Language
3. Mathematics	3. First Additional Language
4. Life Skills	4. Mathematics
	5. Life Skills

Table 1: Proposed subjects offered to learners in Grade 1-3

This proposal is to ensure that at least one African language will be taught at a FAL level. School hours will be increased to accommodate for the extra learning time needed for the additional subject. The draft policy only mentions teacher training and resource distribution, rather than the need for any additional materials to be developed. This is because the Department of Basic Education's (DBE) Curriculum and Assessment Policy Statements (CAPS) and the DBE workbooks are available for both the Home languages and the FALs for all official languages (DBE 2013: 13). The CAPS language documents are teachers' guides "stipulating the aim, scope, content and assessment for each subject" (2013: 3).

1.2 The literacy crisis

Though teaching guides such as the CAPS documents exist and are available for the different languages, South Africa still finds its learners in a state of a literacy crisis (Spaull 2013b). By the end of the Foundation Phase, many children have not learnt the basics of literacy in their home language before making the switch between learning to read and reading to learn. Thus, majority of learners inevitably never become literate by international standards in any language. After the unsuccessful Outcomes-Based Education (OBE) experiment in South African education, "much is expected of CAPS as an improvement on OBE. It is anticipated that CAPS will result in improved standards in our schools" with a deeper approach to teaching and learning (van der Walt 2014). It must be questioned whether the CAPS document is an improvement and whether it is indeed preparing learners for the reading demands of their language. The next section evaluates the usefulness of the isiXhosa CAPS document, followed by the reading success results of South Africa from national (ANAs) and international (PIRLS) reading studies. It is argued that current teaching guides may still be contributing to the literacy crisis.

1.2.1 Curriculum and Assessment Policy Statement (CAPS)

The national CAPS is a "single, comprehensive, and concise policy document, which has replaced the Subject and Learning Area Statements, Learning Program Guidelines and Subject Assessment Guidelines for all the subjects listed in the National Curriculum Statement" for Grades 0 - 12 (DBE 2015). Most South African children are schooled according to a CAPS document which aims to provide clearer specification of what is to be taught and learnt on a term-by-term basis in the 11 different languages.

It is debatable, however, whether reading goals proposed by CAPS are language specific or if pedagogical lessons are being lost in the translation of the document into the Bantu languages (Bikitsha & Katz 2013). Below is one example from the isiXhosa CAPS document which is a direct translation from the English document; "one might choose to teach the letter *c* before *a* and the letter *l* before *h* and *b*" (CAPS-E: 15) is simply submitted as:

- (1) "omnye umntu angakhetha ukufundisa unobumba ongu-'c' phambi kuka-'a',
Another person might-choose to-teach letter known as-"c" before -"a"
- nonobumba u-'l' phambi ko-'h' no-'b"
and—letter -"l" before "h" and-"b" (CAPS-X: 16)

The English version is based simply on the developmental ease of writing the graphemes of the letters; i.e 'l' is easier to write than 'b', and the latter can be built on from the former. However, different languages work with different phonemic inventories and therefore language specific adaptations need to account for some different phoneme-to-grapheme mappings in the other orthography. The example from (CAPS-X: 16) above shows that not having a language specific approach to literacy can be unfavorable. Based on a phonetic point of view of example (1) above, the grapheme /c/ is the more complex click [!] in isiXhosa and the letter /a/ should therefore precede it. The letter "a" may be introduced slowly over many weeks to English children because it is part of a much larger vowel inventory, consisting of about 22 vowel sounds. In contrast, there are only 10 vowels in isiXhosa. The /a/ grapheme/phoneme in isiXhosa would be easier to grasp than the English grapheme /a/ which can be pronounced with several different monophthongs and diphthongs (for example: cat, man, day, car, air). Also, a common isiXhosa digraph /hl/ [h] (as in *-hle*, 'beautiful', *-hlala*, 'sleep') would be avoided guided by this anglicized instruction; certainly the trigraphs, *tsh* [tʃ] (as in *-tsha*, 'new'), or *ngc* [ŋ] (as in *-ngcamla*, 'taste'). These are not complex sounds in isiXhosa, but restricted by the Western alphabet, they tend to be avoided in teaching guides because of their complex representation.

The Zulu Foundation Phase version of the CAPS document is even less language specific, and clearly still based on the English CAPS document, similar to the example (1) above. Below are extracts of the English version, followed by the Zulu version:

- (2) Also bear in mind letter formation so that, for example, one might choose to teach the letter 'c' before 'a' and the letter 'l' before 'h' and 'b'. The CAPS document paces the introduction of phonics so that 1-2 new sounds are introduced each week during the first two terms so that at least eight sounds are taught by the end of the first term and the remainder by the end of the second term. (CAPS-E)
- (3) Khumbula ukuthi ukwakhiwa kohlamvu, njengokuthi kungakusiza ukufundisa ukubhalwa kohlamvu u-b ngaphambi kokufundisa uhlamvu u-h. Okungenani kufundiswe imisindo eyisi-8 ekupheleni kwethemu yokuqala bese kuthi esele yenziwe yonke ukuphela kwethemu lesibili. (CAPS-Z)
- (4) "Remember the construction of the letter, as it can help to teach the writing of the letter 'b' before teaching character 'h'. At least eight sounds are taught by the end of the first term, then do all the remaining at the end of the second term." (CAPS-Z, translation)

The pedagogical point of the orthographic ease of writing 'l' before 'h' and 'b' has been lost in the translation. It is also not clear from the Zulu example in (3) (or even in the English document) which eight sounds should be focused on. Across the Foundation Phase documents, there is an

immense emphasis on phonetics as a major component of teaching reading (CAPS-E 10, 14). This stress on phonemic awareness, especially in the younger grades, is not misguided as the literature shows that a good PA correlates with higher reading success (Goswami 2009). However, the document vaguely instructs across the languages to "teach the more frequently used sounds first in Grade 1", without exploring what those specific sounds might be for each language. This would rely on micro-linguistic data on the most common phonemes in each language. Instead, the examples have been generalized across languages in the teaching guides and this awareness is restricted to one letter phonemes, and not the di-/tri-graphs found more frequently in Bantu languages.

There are more examples of lack of language specificity that can be found in the isiXhosa document. In the lesson plan for teaching children rhyme, the English version uses the examples "bat, cat, hat" (CAPS-E: 47). The example given in the isiXhosa version does not adequately or clearly explain rhyme:

(5) **"silapha, ndilapha, balapha"**

"we-here, I-here, they-here"

(CAPS-X: 48)

Linguistically, these are not true rhyme examples. Instead of rhyming, the entire morpheme {-lapha} is repeated with different prefixes attached. Bikitsha & Katz (2013) found even more examples of the English text losing the element of grading and instead resulting in long and complicated words and phrases once reading books are translated into African languages. The original pedagogic purpose is lost when there is a lack of language specificity, as can be seen by the rhyme example (5) above.

Using solely phonetic approaches to teaching reading is not always ideal even in a transparent orthography like isiXhosa. Even though the words have one-to-one mapping of graphemes to phonemes, the words are long due to the morphological processes of the language. Children who read shallower orthographies can still display problems in fluency because of the lengthy words. Morphology may play a critical role in improving the literacy outcomes of students for whom phonological interventions are insufficient (Casalis, Cole, & Sopo 2004). Hence, direct instruction in morphology has been preferred as a compensatory strategy for older learners and learners with reading or phonological disabilities, such as dyslexia and deafness (Reed 2008; Goldin-Meadow & Mayberry 2001). A synthesis of morphological intervention studies by Reed (2008) and Bowers, Kirby, & Deacon (2010) show that where the contribution

of PA plateaus, MA can continue to grow and foster comprehension and understanding of more complex words, especially when texts get more challenging as reading age (or age) increases. PA simply peaks before MA, thus is given more attention (Marinova-Todd, Siegel, & Mazabel 2013).

The CAPS document attempts to include one instance of morphology as an alternative strategy when recognizing a word. The "five finger strategy" gives children a step-by-step guide to dealing with new challenging words while reading (CAPS-E 12, 15). The idea is that each finger on the child's hand represents a strategy the child can use to systematically figure out how to read an unknown word and deduce its meaning:

The "five finger" strategy (CAPS-E 16)

- *The thumb*: Leave the word out and read to the end of the sentence
- *The first finger*: Look at the picture
- *The second finger*: Look at the word to see if any parts of the word are known
- *The third finger*: Sound the word out
- *The fourth finger*: Ask for help in reading the word or understanding its meaning

Essentially, the second finger is the morphological strategy. This would be the most useful word recognition strategy in an agglutinating language where many of the words are morphologically complex and can be made simpler and more predictable by understanding the meanings of their individual components. An awareness of morphological structure can help children learn new vocabulary, understand new words and aid pronunciation when decoding (Pike 2011: 6). The thumb seems to represent a syntactical approach by looking at the surrounding words to find out an unknown word's meaning. The first finger is a semantic approach that involves looking at the picture and not at the linguistics of the word or sentence. The third finger involves using phonological awareness and matching sounds to a word in one's spoken vocabulary. The fourth finger is teacher intervention or help from a more experienced reader. It is clear from the rest of the CAPS document that explicit morphological and other micro-linguistic strategies, besides phonology, are not given much more attention than this.

As seen from examples (1) and (3) above, examples in the CAPS documents are often not language specific. The writing system of a particular language (orthography) is a very strong predictor of how quickly and easily a child will learn to read (Seymour, Aro, & Erskine 2003).

Due to the number of sight words and morphological irregularities and exceptions in English, isiXhosa children should not be taught in a way that is so similar to the opaque English orthography. IsiXhosa is not only phonologically easier to read, but it is also morphologically very rich, unlike English. IsiXhosa verbs are conjugated according to number, tense and person; adjectives are conjugated to agree in number; and nouns are conjugated according to number and also relation, such as location. This makes isiXhosa a "highly condensed agglutinating language, with multiple sources of information that need to be derived from the single visual unit of the word", similar to learning to read Arabic or Hebrew (Katzir, Breznitz, Shaul, & Wolf 2004: 745), and these "markedly different morphological process[es] imply different sources of information that individuals [can] draw on as they become morphologically aware" (Saiegh-Haddad & Geva 2007: 496). Yet, there is no mention of or focus on this in the CAPS document. Morphological interventions (Reed 2008; Bowers, Kirby, & Deacon 2010) where children have been tutored in specific affixes have been successful for improving aspects of reading in general, and a more explicit morphological approach to teaching reading might not only be justified for a rich morphological language like isiXhosa, but perhaps also necessary.

The reading norms being developed for Grades 0 to 12 are aligned with the CAPS documents. There needs to be a revision of the Foundation Phase CAPS document in order to be considerate of the individual languages at hand. Currently, the CAPS document is not the "deep approach to teaching and learning" (van der Walt 2014) that it was intended to be. Meta-linguistic aspects like morphology should be given more consideration, not just for the benefit of second or third language speakers but also for home language speakers to have greater access to learning literacy in their first language.

The CAPS documents go hand-in-hand with the Annual National Assessments (ANAs) which measure the extent that the CAPS document has been implemented and assesses South African children's literacy levels, with a particular focus on comprehension in reading. The next section explores the results found in recent years by the ANAs.

1.2.2 Annual National Assessments (ANAs)

The ANAs are annual, standardized, national assessments designed "to gauge the extent to which the basic education system [the CAPS document] is impacting on the critical areas of numeracy and literacy" in South Africa (Motshekga 2014). The ANAs are based on the content of the first three terms of the CAPS for Grades 1 to 6 and Grade 9. Each year, a diagnostic analysis of the

ANA results in literacy and numeracy has been used "to inform and accelerate the language and reading interventions" in teaching documents like CAPS for Grades 0 through to 9 (Motshekga 2014).

The problem with teaching interventions that stem from ANAs is that they are guided by problem areas and results from the previous years. The ANAs provide "reliable information about the current proficiency across the country at regular intervals" but "by replicating a single test every year, the items necessarily only explore a narrow range of the curriculum" (Long 2015). The administration of ANA 2014 was preceded by focused interventions by the DBE following the ANA 2013 results. It was found that learners find difficulty handling aspects of language usage such as the different parts of speech or progression to more complex tenses (Motshekga 2014). A morphological intervention (Reed 2008; Bowers, Kirby, & Deacon 2010) would provide an explicit understanding of how meaning like tense can be expressed through different morphemes attached to words or could explain that certain morphemes only attach themselves to specific parts of speech. However, due to selective literature on phonology informing and influencing both CAPS and ANAs, it is unlikely that these tests measure or promote the teaching of other micro-linguistic features of language like morphology, and certainly not different types of morphology across the different morphologically rich Bantu languages.

The ANAs 2014 were administered to more than 7.3 million learners across Grades 1 to 9 in public schools and all grades were tested in their LoLT. The ANA 2014 national results on the following page are the average performances in each of the grades (DBE 2014: 9).

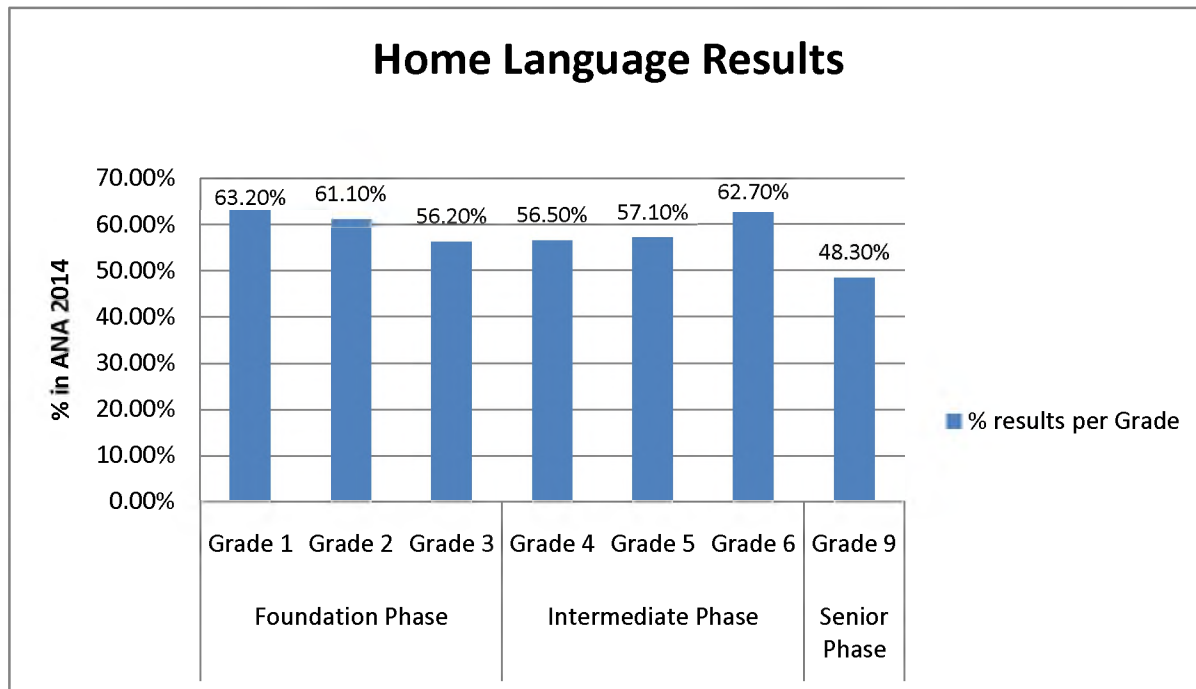


Figure 1: Averages of home language learners across different grades

The graph shows the averages of all the home languages' performances combined up to Grade 3, and then the combined scores of Afrikaans and English from Grade 4 upwards (when children make the switch of LoLT). It is not clear if all the children are tested in their actual home languages in Foundation Phase, or if they were being assessed at home language speaker levels in a LoLT that is their second or third language. Though it is not clear to see specific languages' performances, one can see general declines in averages at the end of Foundation Phase, and between the Intermediate Phase and Senior Phase (Grade 7-9), particularly, as literacy demands increase and become more complex with each grade.

A stronger foundation in the first few grades would make the decline less steep in the subsequent grades (Motshekga 2014). This section looked at the national assessment of South African literacy; on average, Grade 4s and 5s attained 56.8% for their home language achievement. This result is not particularly impressive for first language learners, though it seems not all children were necessarily tested in their home language. In fact, by international standards, these learners are deemed illiterate. The next section explores an international assessment (not based on the CAPS document) of South African literacy in various home languages, compared to the other Grade 4 language readers in the world.

1.2.3 Progress in International Reading Standards assessment (PIRLS)

The Progress in International Reading Standards assessment (PIRLS) 2011 was the third assessment, after PIRLS 2001 and PIRLS 2006, to measure trends in literacy achievement in first language reading at primary school level (Howie, Van Staden, Tshele, Dowse, & Zimmerman 2012). This means the children are assessed in their different home languages, respectively, and these reading and comprehension assessments are also tailored to suit language, socio-economic and cultural differences that exist between learners. It aims to provide an internationally comparable basis of the reading levels of learners across the world. The test is typically administered at Grade 4 level internationally because this is essentially when children must make the switch between learning to read and reading to learn. South Africa's (and Luxembourg's) Grade 5 learners were also tested because of the "challenges of multiple native languages and languages of instruction" (Mullis 2012: 29). There was significant improvement in the South African Grade 5 reading and comprehension results compared to the level of the Grade 4s, but statistics based on the overall results showed that South Africa still had the poorest readers in the world, in both 2006 and 2011.

According to PIRLS 2011, not only were the South African learners the worst readers in the study, but they also failed to reach the lowest international literacy benchmark of 500 points. In 2006, the top performers in South Africa were Grade 5 Afrikaans first language speaking girls with a score of 427, and the best performance in an African language was achieved by Grade 5 Setswana girls with a score of 307. Even the best Afrikaans and English readers in Grade 5 did not reach an acceptable level of achievement in literacy by international standards, but the Bantu languages' results in particular are substantially poorer at this level. IsiXhosa first language readers, the focus of the current study, obtained an average reading achievement below 250 points, singling them out as the least literate group of readers in the international study, which is still the case in subsequent years (Howie, Venter, Van Staden, Zimmerman, Long, & Du Toit 2008: 23).

The previous ANA results (§1.2.2, Fig 1) show that children in Grades 4-5 know between 50-60% of the CAPS document, but if knowing over 50% still makes you illiterate by international standards then it must be questioned if the CAPS documents are preparing children sufficiently for what is required of them as readers. In particular, the performance of isiXhosa and the lack of linguistically-informed specificity that we find for teaching reading in the

language in the CAPS documents could be explanatory for the low results. The next section looks at other factors in South Africa that could contribute to this poor performance.

1.3 Influencing factors

The following section explores the sociolinguistic reasons for the poor results achieved by learners, followed by the linguistic reasons. The five main reasons discussed are the poor socio-economic status of the country, the switch to English as LoLT in Grade 4, the negatively impacting myths regarding the aforementioned bilingual educational system, poor teacher training particularly with regards to bilingualism and reading in African languages, and, lastly, not using language specific pedagogies when teaching reading in the African languages. The socio-economic factors influencing education in the country are, unfortunately, unlikely to be remedied in the immediate future and alternative strategies to improving literacy will need to be explored bearing this in mind.

1.3.1 Reason 1: Socio-economic reasons

It has been well-established that children from lower socio-economic backgrounds and more rural areas perform more poorly at school (Saito 1998; Taylor & Yu 2009). Literacy practices in the home are less intensive, or do not mirror those practiced in the classroom. School, therefore, becomes the primary site where children will be exposed to appropriate literacy practices. However, there are also inadequate resources within the disadvantaged schools, such as lack of books in general, a lack of books written in Bantu languages and derisory or absent libraries in schools (Smith, Constantino, & Krashen 1997; NAEYC 1998; Pretorius & Mokhwesana 2009).

While collecting the data from the current study's participating schools, other issues that were impacting the quality of the education are overcrowded classrooms, lack of basic resources such as water and electricity, and feeding schemes, which are necessary, but also disruptive and often take up learning time. The general learning environment in the classrooms, besides overcrowding, is also not one conducive to learning. The few language and numeracy posters are generally incomplete or suffer from a lack of maintenance and upkeep. There are many socioeconomic problems contributing to the literacy problem but realistically these economic circumstances will be slow to change and the other factors that are influencing the poor results in literacy in the country will need to be remedied first.

1.3.2 Reason 2: The switch to English in Grade 4

Because of the plasticity of a child's brain, additional language learning is usually introduced in the earlier grades, even though later starts have shown no significant differences in the L2, except for accent and attitude towards the L2 (Scovel 2000; Cepik & Sarandi 2012). After Grade 3, the expectancy shifts from learning to read to reading to learn; Grade 3 marks the end of the Foundation Phase and by the next grade, the learners are expected to display higher order skills. This includes making predictions about the text which is based on their exposure to different genres of literacy, for example, a newspaper article versus a friendly letter. This requires the learner to have full comprehension of the text being read. Displaying these higher order skills may be more challenging for children who have made the switch to a second language, especially if they are not confident with the basics of reading in their first language.

There is plentiful evidence of the failure of children who are "plunged too quickly into English without strong support in the school for their home language" (Heugh 2002: 174; de Klerk 2002; Taylor & Coetzee 2012). This can perhaps be seen by the results and statistics that show that many South African learners by Grade 4 are still illiterate by international standards and are not learning, or passing Matric overall (Howie *et al.* 2008; Howie *et al.* 2012). In rural and peri-urban schools, most learners speak the same language and most of the time this is also the learner's home language. On the other hand, the National Education Evaluation and Development Unit³ (NEEDU) reports that there is a high level of non-uniformity in language in urban schools (Taylor 2012: 26). Some children report six to seven languages as a home language. In reality, the different languages spoken by these children may in fact be regional and community dialects; there may not necessarily be six distinct and separate languages being spoken at home but rather variations of one or two languages (Heugh 2002: 187). It is possible that urban children are lacking access to normatively 'proper' English, too (de Klerk & Gough 2002, Mesthrie 2006); however problems in the changeover to English are more pronounced in the rural and peri-urban schools, simply because they are more likely to come from homogeneous language communities with less exposure to other languages and learning English is more like learning a foreign language (Janks 2004: 34). It has also been found that a large number of teachers are not capable of teaching in English and are delivering lessons in a code-mixed fashion in any case, switching between English and their own L1 African language

³An independent evaluation of the school system that reports directly to the Minister of Basic Education.

(Heugh 2002: 182). The fact that the majority of teachers in South Africa are bilingual themselves means children could have access to learning in their first language their whole school career without necessarily having to train teachers to speak different languages. Instead of directing so much of the budget to English resources, particularly in the younger grades, finances could be redirected to more resources in African languages which would be more beneficial than teachers struggling to teach the English curriculum.

In conclusion, South Africa has a weak educational model that does not account for the various levels of bilingualism found amongst South African children. Different teachers and schools will also implement the switch in various ways, with some children making the complete change-over to the new language in Grade 4, while others making a more incremental switch starting from Grade 1. Either way, children do not get enough exposure to the basics in reading in their first language (Heugh 2002), before the switch, and also thereafter. Studies that have argued for the use of English in multilingual schools still encourage this to be done in the later years of primary school, when learners are mature enough to understand why they must learn English and when they have a firm grasp of academic requirements in their home language (Kirkpatrick 2013).

1.3.3 Reason 3: Myths about bilingual education

There are influential myths in South Africa regarding the status of home language education. One view is that if children are reporting six different first languages then it is impossible to teach them in their home language, since technically it is not clear which one of the six should be selected as the LoLT. English is then seen as a lingua franca for multilingual children at school (Kirkpatrick 2013). The multilingualism that children report at home could be variations of only one or two languages but regardless, the multilingual situation in South Africa is no different to other multilingual societies in the world, though it is perceived to be because the indigenous languages are not spoken elsewhere (de Klerk 2002: 239).

There is a "significant disadvantage to receiving instruction in English rather than the home language of the child" (Taylor & Coetzee 2012: 19). A strong bilingual model in schools would allow learners to be taught in their L1 with additional early and frequent exposure to English, eventually with a proportional decrease in L1. The second language needs to be added systematically thereafter. This currently happens at the end of Foundation Phase in South Africa but the poor literacy levels show that receiving education for only three to four years in one's

first language is not the most advantageous system for learners. Theories like Cummins' (2008: 71) on basic interpersonal communicative skills (BICS) and cognitive academic language proficiency (CALP) "draw educators' attention to the timelines and challenges that second language learners encounter as they attempt to catch up to their peers in academic aspects of the school language". If the home language is simply replaced, then, in most cases, "the second language will not be adequately learnt and linguistic proficiency in both languages will be compromised" (Heugh 2002: 174). Amendments to the bilingual model that have been suggested recommend that the second language only becomes the LoLT after the Intermediate Phase, around eight years of home language education (Heugh 2002, Kirkpatrick 2013).

Another great myth in South Africa's context of bilingual education is that there is not enough local research on language education (Heugh 2002). In reality, there is plentiful research on education and macro-linguistic aspects like multilingualism in South Africa; however, there is indeed a lacuna of micro-linguistic research (de Vos, van der Merwe, & van der Mescht 2014). The research that has been done on the micro-linguistics of Bantu languages and their association with reading often focuses on phonological awareness but, as seen from the CAPS documents, these specific language findings still need to be incorporated into the teaching guides.

It is not sufficient to say that only indigenous research will fit our context because multilingual children in South Africa are no different from their international bi-/multi-lingual peers (Heugh 2002: 177). However, this study proves that the international research on micro-linguistics aspects such as morphology, which is mainly based on English or English bilinguals, is not always applicable to languages like isiXhosa.

The extensive resources available in English were "developed as a consequence of the language's dominance" (Janks 2004: 33). However, English is not, and should not be, the only language medium which has the capacity to deliver quality education to learners (Heugh 2002: 185, 190; Ndhlovu 2013). A valid point raised by Ouane & Glanz (2010) is that it is more expensive to develop resources for several different languages, instead of only one, and also the cost of training teachers in the different languages needs to be considered. This kind of financial argument is however only valid if one ignores the long-term financial and human cost of an education system that fails to deliver literate learners at the end of their schooling.

1.3.4 Reason 4: Teacher training, especially for the multilingual situation

The studies on South African learners show that teacher qualifications have either not prepared them to teach literacy or these teachers are not able to "implement strategies they have gleaned from professional training to the most effective level" (Howie *et al.* 2008: 48). The South African situation is always going to be one of learners who have a complex multilingual background. This requires teacher training to provide a thorough theoretical and practical understanding of how educators can attend to the language and literacy needs of second language learners, especially after the change of LoLT in Grade 3.

In addition to the multilingual training context, there is also the concern of lack of knowledge of the area being taught. According to NEEDU (2012) results of tests administered to teachers, the subject knowledge base of most Grade 6 teachers is inadequate to provide learners with a principled understanding of the foundation disciplines. The Mathematics results were even poorer (Taylor 2012: 11).

All educators have free access to CAPS documents which are national and concise guidelines of the subject matter to be covered with learners in their various home languages. However, the NEEDU (2012) report found that in 10 of the 15 districts that were visited, there was poor implementation of the curriculum. Foundation Phase learners hardly ever undertook writing that extended beyond isolated sentences with even lower figures in Grade 1 and Grade 2. The researchers also found "in the two reading lessons observed, there was an emphasis on reading as decoding symbols rather than on reading for understanding" (2012: 9). Teachers do not always see the importance of listening to learners read and in consequence "the most fundamental capacity to be learned, reading with comprehension, is left unmonitored" (Spaull 2013a: 29). There is a need for continuous teacher development, as well as monitoring and evaluating in the schools to make sure the training received is useful, or at least being used (2013a: 3). On the contrary, even if teachers were fully implementing the lessons in class, the CAPS documents, as they stand, may not be the most useful guide for teaching reading as the curriculum is not being continuously updated with new and language specific linguistic research.

1.3.5 Reason 5: Linguistic reasons

There are linguistic factors that will still be contributing negatively to the literacy crisis even if the poverty crisis was suddenly resolved tomorrow. The CAPS documents do not pay sufficient attention to the specific linguistics of the languages they are trying to teach. Other influencing

educational reports are also guilty of not using Bantu language research, or even using research on languages with a orthography closer to that of the Bantu languages in order to inform educators of what Bantu language learners should be achieving at different reading grades.

The following table can be found in the NEEDU (2012) report that reports back to the Minister of Education in South Africa. It contains the proposed reading fluency norms for first language African language readers. It proposes different benchmarks of words read per minute in a story across the grades and across the level of learner; poor readers to good readers (Taylor 2012: 16):

Grade	Level of learner	Reading a story: words per minute	
		End of Term 2	End of Term 4
1	Top	N/A	100
	Middle	N/A	50
	Bottom	N/A	15
2	Top	125	140
	Middle	70	90
	Bottom	20	30
3	Top	145	160
	Middle	95	100
	Bottom	35	50

Table 2: Proposed words to be read per minute in an African language

This report does not specify whether this is oral or silent reading, though it is presumably oral, because it is based on reading a story. What it does specify is that these numbers are based on the fluency norms of American-English readers. Other researchers have established reading rates for English and the optimal number of words to be read per minute in oral reading is Grade 1: 58wpm, Grade 2: 89wpm and Grade 3: 107wpm (Anderson 2008; Hasbrouck & Tindal 2006). This would be the status of a 'middle' achieving reader, according to the previous table. It is unclear why words per minute was based on English and not on an orthography more closely related to the Bantu languages. IsiXhosa is an agglutinating and conjunctive language and the status of the 'word' is problematic as one word could be translated as multi-word sentence in English, for example, "Ndisabaleka", *I am still running*. This means that isiXhosa readers have to deal with typically longer words than their English peers and it is unrealistic to expect the Bantu language learners to be on par with wcpm with American-English readers. This ultimately sets the Bantu language learners up to fail by not having suitable and achievable benchmarks for

them to reach. Characters correctly read per minute (ccpm) is an alternative measurement of fluency reading that has been adopted in other orthographies, like Chinese (Tse, Marton, Ki, & Loh 2007) but so far in the literature, morphemes correctly read per minute has not been explored as a more suitable measurement of fluency for morphologically rich languages.

Misguided literature that is based on the linguistics of another language can be non-beneficial, if not counter-productive, to teaching guides that focus on learning to read. There is a need for normalized data in South Africa regarding the different languages and a need for standardized tests that are language specific (de Vos, van der Merwe, & van der Mescht 2014). Precise difficulties need to be outlined for each language as opposed to focusing, or not focusing, on certain aspects of a language because it is more difficult, or not a feature of the English language. Before morphological interventions can be introduced into teaching guides, it must first be uncovered what the most useful types of MA are for reading in an agglutinating and morphologically rich language.

1.4 Research goals and questions

Drawing on the discussion of the literature following in chapter 2, the research questions to be answered through this research are the following:

1. To what extent does Morphological Awareness correlate with reading success in isiXhosa?
2. What types of Morphological Awarenesses are most useful for acquisition of literacy in isiXhosa and how do they relate to language structure?
 - a. Is awareness of inflectional morphology different to awareness of derivational morphology and how do these correlate with reading?
 - b. To what extent does NC morphology affect Morphological Awareness, and is there a difference with respect to nouns and verbs?
3. How can Morphological Awareness best be measured in isiXhosa and what are the challenges to implementing MA testing?

These questions will be answered using the data collected from the different methods described in detail in the Methodology chapter. After the Methodology, a summary of the results of the tests will be presented and the research questions will be answered based on the strength of the correlations found in the data, along with a data analysis of why certain tests or types of MA

correlate more with certain types of reading successes more than others in this study of young isiXhosa readers.

1.4.1 Aims and limitations of this thesis

This thesis has two main aims. Firstly, I will attempt to develop a battery of measures of Morphological Awareness in isiXhosa. To date there are no equivalent measures in any Bantu language, to my knowledge. This represents a substantial effort and will make a contribution that can be used by future researchers. Secondly, I will use these measures to evaluate the degree to which different Morphological Awarenesses contribute to reading success, specifically reading comprehension and reading fluency.

Personal challenges faced in the research were my not being a first language speaker of isiXhosa, thus having to use informants and research assistants. However, it enabled me to look at the language in an unbiased manner and often meant I had a more explicit understanding of the morphology than the L1 informants who were then used to further clarify my understanding of the language structure or explain why children may have answered in a particular or peculiar way.

Future morphological assessments that stem from the tests developed for this research require the participant to be shown many examples and work with no time constraints on tasks where possible. This is because these Morphological Awareness tests often require children to think about morphemes in an explicit manner and manipulate language structures in a way they may never have thought about before. We know that isiXhosa is morphologically complex and this kind of understanding of the language's make-up is necessary, for both educators and learners.

1.5 Conclusion

Though isiXhosa is the second most spoken language in South Africa, there is very little research done on the literacy practices of its readers and investigating why young isiXhosa readers have the status of least literate in the world (Howie *et al.* 2008: 23). Children are not receiving enough exposure to the basics of reading in their first language. The half-hearted effort to develop language-specific and linguistically informed teaching guides for official Bantu languages speaks volumes about the prestige African languages have in the education sector in South Africa. It must also be questioned whether the language rights of learners are being disregarded by their parents wanting their children to learn in English (de Klerk 2002: 274).

This section paid close attention to the linguistic aspects of the current literacy problem and how we can begin to remedy the situation by having language specific approaches in teaching guides like the CAPS documents. Alternative reading strategies, besides phonetic awareness, need to be included in teaching guides (Berninger, Abbott, Nagy, & Carlisle 2010), especially for languages like isiXhosa that are phonetically transparent, but have more complex morphological structures. Morphological Awareness in more recent years has been given more attention and has proven to have unique, albeit small, contributions to reading success in various languages, above the contribution of other meta-linguistic factors like phonological awareness or vocabulary knowledge. The next chapter delves into the broad term that is Morphological Awareness and how this kind of awareness of language can contribute towards reading success.

Chapter 2: Theoretical overview

The next chapter explores an alternative measurement of meta-linguistic awareness in reading. A brief overview of Morphological Awareness is given, followed by how MA in general has been found to contribute to different aspects in reading in various languages. After a closer look at the different kinds of Morphological Awarenesses, it is argued that perhaps specifics in Morphological Awareness like inflectional and derivational morphology should not be the only measures as these processes do not work the same way across languages. Rather, more broad types of Morphological Awarenesses are explored before reviewing the four MA tests chosen for the current study investigating isiXhosa MA. These specific tests can make the findings for isiXhosa more comparable cross-linguistically with languages that are less morphologically rich.

2.1 What is Morphological Awareness?

Morphemes are the fundamental building blocks of words within both spoken and written language. Words that contain more than one morpheme can be broken down into these smaller units providing clues for meaning, spelling and pronunciation (Kirby *et al.* 2011; Carlisle 2003). For example, the word *sadness* can be broken down into 'sad', the adjective, and into '-ness', the suffix that changes English adjectives into nouns. The study of these small units and their patterning is called morphology. Morphology may also refer to the set of "tools for descriptions" of the structures of language (Booij 2007: 24).

An early description of using morphological knowledge to decompose complex words into smaller morphemic units and infer meaning of words based on the meanings of these constituents was called "morphological problem solving" by Anglin (1993: 5). In her earlier works, Carlisle associates an awareness of morphology with "meta-linguistic functioning" (1995: 195) before refining the term Morphological Awareness (MA) to refer to the ability to reflect upon and *consciously manipulate* morphemes and the morphological structure of words (Carlisle 2003, *my emphasis*). It is described by other authors as an "awareness of and access to the meaning and structure of morphemes in relation to words" (McBride-Chang, Wagner, Muse, Chow, & Shu 2005: 417). In the literature, there is a division between those who believe MA needs to involve conscious manipulation and those whose awareness definition is based on access to structures of words that does not necessarily entail consciously thinking about the morphemes in isolation.

2.2 Morphological Awareness and reading

Morphological Awareness can affect all facets of reading. MA research is mostly undertaken with children in Grades 1-6 as they begin their literacy journey. It uniquely explains between 2-10% of variances found in a range of reading and writing measures. Though this is a smaller contribution compared to phonological awareness and reading, most of the languages researched have not been as morphologically rich as the Bantu languages. MA can be a unique predictor of different reading skills, such as spelling achievement in English (Nunes, Bryant, & Bindman 2006; Deacon, Kirby, & Casselman-Bell 2009; Wolter, Wood, & D'zatko 2009) and French (Plaza & Cohen 2004) and in L2 English spelling (Marinova-Todd, Siegel, & Mazabel 2013).

MA also uniquely predicts and contributes to Chinese children's character recognition (McBride-Chang, Wat, Shu, Zhou, & Wagner 2003) and English and French children's single word reading and word identification (Carlisle & Nomanbhoy 1993; Deacon, Wade-Woolley, & Kirby 2007; Wolter, Wood, & D'zatko 2009; Ramirez, Chen, Geva, & Luo 2011; Verhoeven & Perfetti 2011). An awareness of morphological structure in an agglutinating language can help with word recognition, too (Acha, Laka, & Perea 2010). This is probably because MA has been proven to contribute significantly to complex derived word reading in general, and words in more morphologically rich languages are automatically more complex (Saiegh-Haddad & Geva 2007).

MA also explains unique variances in vocabulary knowledge in English, as well as in Cantonese, Mandarin and Korean (McBride-Chang *et al.* 2005; McBride-Chang, *et al.* 2008). Vocabulary knowledge is a strong predictor of how successful children are as readers as they need to be able to match words from their established, spoken vocabulary to the print form which aids comprehension of the word (Kieffer & Lesaux 2007). MA seems to develop over time and significantly contributes towards comprehension in Grade 3, and particularly so in Grade 5 (Carlisle 2000). As children get older and reach higher grades, they are exposed to more complex reading texts; at this level, sensitivity to word structure is necessary for successful reading (Mahony 1996: 38). Deacon & Kirby (2004) found that MA played a greater role in building meaning from text than reading of individual words and, thus, their results showed a greater contribution to reading comprehension than single word reading. A later study confirmed this, and established that MA is a significant predictor of word reading, accuracy and speed, pseudo

word reading accuracy, text reading speed and reading comprehension of a passage of text (Kirby *et al.* 2011).

Unlike most of the MA studies, Zhang & Koda (2011) found that MA made the least unique, direct contribution to reading comprehension, but did significantly contribute to reading comprehension indirectly through its direct contribution to vocabulary knowledge. By contrast, Zhang & Koda (2013) later found MA did make a unique and significant contribution to explaining variances in L2 reading comprehension, just like Casalis & Louis-Alexandre (2000) found for French children reading L2 English.

MA has been found to influence many aspects, leading researchers to believe it is a universal for language processing in reading. It has been shown to contribute to reading, after phonological awareness has been controlled for (Nagy, Berninger, & Abbott 2006). Focusing only on phonological awareness is not sufficient for learning to read; "all three kinds of linguistic awareness (phonology, orthography and morphology) need to be coordinated and applied to literacy learning" (Berninger *et al.* 2010). This is true for whether the child is learning to read in a first or second language. A common trend in the literature is to investigate bilingual children where one of the languages is English. This often means that only certain aspects of MA are tested in order to make it comparable to the less morphologically rich English.

This section has looked at how MA skills contribute to literacy development in the primary years (Pike 2011: 5), especially through its contribution to spelling, complex word reading, vocabulary knowledge and comprehension. The next section reviews how MA has not sufficiently been incorporated in various theories and models that explain how words and reading can be approached. In the opaque English orthography, sometimes words are not spelt the same way they are pronounced. For example, the word "magician" could be spelt how it is said for ease of pronunciation, something like "mahgishin". However, by preserving the spelling of the morpheme base, meaning can be accessed more quickly in reading (Nunes, Bryant, & Bindman 2006). Therefore, it seems reasonable that most of the literature on morphology focuses on the relationship between morphology and comprehension, particularly regarding complex word reading. The focus on fluency in reading is phonological decoding but much of our insight about language and reading is based on the irregular English orthography (Katzir *et al.* 2004: 741) and it has been proposed that morphology can also contribute to fluency in more shallow orthographies (Saiegh-Haddad & Geva 2007). Yet, researchers concede that the role of

morphology in fluency and decoding has not been given enough attention (Goswami & Ziegler 2006).

2.2.1 Fluency

This subsection looks at two, prominent reading theories that relates to how children decode words. Fluency leads to comprehension as the more you are able to decode, the more you are able to comprehend. Fluency also relates to the automaticity of reading. The cognitive expenditure of reading letter-by-letter is too great if a reader does not recognise meaningful 'chunks' of text and this leads to a labored reading process with little understanding. The PGST theory that follows explains a top-down process where readers become aware that words are made up of smaller units of sound. It can also describe a bottom-up process of how learners progress in their reading automaticity for comprehension from smaller chunks like letters, to larger units in reading such as whole word recognition. This theory does not account for awareness that words are also made up of morphemes, not just sounds which could be more important in a shallow orthography with complex morphology. The Orthographic Depth Hypothesis discussed afterwards examines whether a morphological approach is indeed adopted naturally in reading if the morphology demands more attention in a language, despite an easier phonological access route.

2.2.1.1 Psycholinguistic Grain Size Theory (PGST)

The well-known Psycholinguistic Grain Size Theory (PGST) seeks to explain how children learn to read fluently across different languages using different levels of PA. The sequential development of phonemic awareness is that children generally master word-level skills before they master syllable-level skills, syllable-level before onset/rime-levels skills, and so on. PA only develops once children start learning to read and write (Ziegler & Goswami 2005: 4). Fluency can be attributed to the size of the 'chunk' or grain the reader can recognise in the ultimate goal of reading for meaning as effortlessly as possible. The fundamental assumption that guides the PGST is that it is extremely important that "the child finds the most efficient grain sizes in a given orthography for achieving fluent reading as quickly as possible" (Goswami & Ziegler 2006: 452).

Different languages with diverse orthographies will choose to read different 'chunks' or grain sizes for fluency in reading; the grain size will meet the requirements of the specific language (Ziegler & Goswami 2005: 20). The grain sizes are based on the most consistently

represented units by spelling and pronunciation. Ideally, the optimal grain size to access in any language is the whole word (Goswami & Ziegler 2006: 452) but this seems unreasonable given the nature of the length of some words in the Bantu languages. It must also be considered whether the grain sizes are necessarily intrinsic linguistic units (like morphemes are) or if the grain sizes are remnants of teaching methods. For example, there is no clear reason why is it taught onset/rime, such as c-at, instead of grouping the onset and nucleus, as in ca-t. Below is a representation of the PGST model (Ziegler & Goswami 2005: 4):

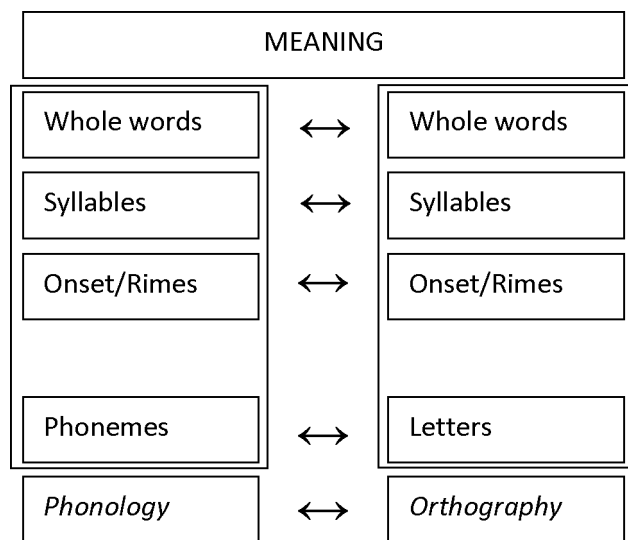


Figure 2: Schematic depiction of the PGST

Morphemes are not given adequate attention as a possible grain size in fluency and decoding in reading (Goswami & Ziegler 2006: 451). Perhaps this is because a morpheme could be one phoneme (like {-e} past tense suffix in isiXhosa) or they could be more than one syllable (like {aba-} noun class marker in isiXhosa), and this does not fit neatly with the model. The consideration of the contribution of morphology helps explain the rapid development of phoneme awareness in children learning Czech and Turkish (Goswami & Ziegler 2006). In a PA study of isiXhosa children, manipulation was easier on the second syllable on pseudo words, and not the first syllable as anticipated by the PA literature (Diemer, van der Merwe, & de Vos 2015). This could be because, in an agglutinating language like isiXhosa, there is morphology prefixed onto verbs and speakers are accustomed to manipulating the front of words for grammatical information like noun classes or subject and object markers. Research like this in other languages has shown that phonological development cannot be considered in isolation from morphology, particularly in agglutinating languages (Goswami & Ziegler 2006: 451).

Cross-linguistically, phonological decoding and phoneme awareness do not necessarily pose the same problems in regular orthographies with one-to-one mapping between phoneme and grapheme. Yet, there are still fluency problems in reading shallower orthographies. Regardless whether the words have consistent mapping between symbol and sound, there are still many cases where readers struggle with automatic and effortless decoding (Holopainen, Ahonen, & Lyytinen 2001). For isiXhosa, the trade-off of easily pronounceable words are lengthy words requiring more decoding. This suggests that strategies other than phonological decoding may need to be adopted in examining how the shallower orthographies learn to read.

MA facilitates the process of "unitizing morphemic orthographic patterns and accelerates the transition from an elementary grapheme-phoneme phonological recoding to an advanced recoding process that makes use of larger orthographic units like morphemes" (Saiegh-Haddad & Geva 2007: 499). The next section explores whether or not children take on a morphological approach when reading a phonologically transparent language that is morphologically dense.

2.2.1.2 Orthographic Depth Hypothesis (ODH)

The writing system of a particular language (orthography) can be 'shallow' (like Finnish), or 'deep' (like English) in which case words are often not spelt as they are pronounced. Shallow or deep status is determined by three main things: the language's syllable complexity (CV or consonant clusters), the orthographic depth of whether there is a 1:1 mapping between letters and phonemes (such as in Finnish), or if there are orthographic inconsistencies or complexities like multi-letter graphemes (for example /hl/ [h] from isiXhosa) and irregularities, and lastly morphological effects (found in languages like French or Danish) (Seymour, Aro, & Erskine 2003: 146). Orthographic depth and complexity is thus a very strong predictor of how quickly and easily a child will learn to read (Seymour, Aro, & Erskine 2003).

When children to learn to read they must become aware of the irregularities, as well as regularities of the language (Acha, Laka, & Perea 2010). Finnish children in Grade 3 are able to read morphologically complex words better and faster than mono-morphemic words (Bertram, Laine, & Virkkala 2000). This suggests that Finnish readers recognize morphemic structure of words in their language through recognition of their constituent stems and morphemes (Bertram, Laine, & Virkkala 2000).

The Orthographic Depth Hypothesis (ODH) (Katz & Frost 1992) theorizes whether readers will access the phonology or the morphology of the language when reading in orthographies that match sound and meaning to graphemes differently. The ODH states that:

"shallow orthographies are more able to support a word recognition process that involves that language's phonology. In contrast, deep orthographies encourage a reader to process printed words by referring to their morphology via the printed word's visual-orthographic structure" (1992: 71)

Using English and Arabic bilinguals, researchers Saiegh-Haddad & Geva (2007) tested the ODH hypothesis against a Morphological Transparency Hypothesis (2007: 482) that proposes that if the morphology is more complex in a language then it should be accessed more when reading in that language, even if the orthography is shallow (one-to-one mapping of phonemes to graphemes). The second hypothesis tested was if reading a morphologically transparent language would have positive transfer effects on reading in another morphological language. Both hypotheses were proved incorrect.

The following results from their study show that if a second language is more morphologically complex but easier phonologically, readers will use the phonological route to access words (Saiegh-Haddad & Geva 2007: 481):

	Word reading in L1Eng	Word reading in L2Arabic
L1 English Phonology	☺	☺
L1 English Morphology	☺	X
L2 Arabic Phonology	☺	☺
L2 Arabic Morphology	☺	X

Table 3: Results from phonology and morphology's contribution to word reading in English and Arabic

PA in both languages correlated with each other, therefore a phonological awareness of an opaque sound structure can transfer to phonological awareness of a shallow sound structure. MA did not correlate cross-linguistically and Morphological Awareness of shallow word structures cannot transfer to Morphological Awareness of opaque structures. In other words, knowledge of

sounds in English correlates with knowing the sounds in Arabic. However, knowing English morphology does not necessarily transfer over to knowing the more complex morphology of Arabic. This is probably due to the dissimilarity between the kinds of morphological processes that each language uses. Arabic morphology uses infixes which is a process rarely found in English (Saiegh-Haddad & Geva 2007: 481).

Perhaps L2 Morphological Awareness did not correlate with L2 reading because of a) the already easier to access phonological route or b) because the children's morphological knowledge of their L2 is generally poorer than of their first. It must be questioned whether the researchers would have had different results if the morphologically opaque language (Arabic) was the children's L1 and they had a more implicit knowledge of the morphological structures to tap into while reading, like the Finnish children mentioned before.

The same reasoning may account for the lack of transfer between the morphologically transparent language (English) to the morphologically opaque (Arabic); perhaps if the morphologically opaque and more complex language was the readers' L1 there would have been more positive transfer effects of Morphological Awareness on reading in a L2. Marinova-Todd, Siegel, & Mazabel (2013: 2) confirmed these findings and state that English L2 learning will be influenced by L1 morphology so long as the morphology in the L1 is also transparent. Different languages use morphology very differently thus it is hard to expect transfer. However, a more morphologically rich language can at least prepare readers for decomposing morphemes in a less morphologically complex language.

It was found that L2 opaque MA did contribute to complex word reading in L1 and L2, therefore it seems there can still be transfer between morphologically complex language structures (Saiegh-Haddad & Geva 2007). L1 MA explained an additional 5% of word reading variance. L2 Arabic MA did not explain any additional variances (Saiegh-Haddad & Geva 2007: 494) but complex word reading revealed a heavier reliance on morphological processes in both languages explaining around 15% of variances in complex word reading in both languages, whereas PA did not explain any additional variances. So being able to decompose the root is good for complex word reading based on the tests that were used. It is still unclear what a non-complex word in Arabic would be.

The researchers acknowledge methodological concerns that could have affected the results. The morphological decomposition test used for their study is easy in English, but very

difficult in Arabic (see 'morphological decomposition test' in §2.6.2.1) and the unfair task advantage for English may have also contributed to the poor results from Arabic morphology.

English is phonologically opaque but morphologically transparent. The current study is investigating isiXhosa, which is phonologically transparent and morphologically transparent and preserves the semantic association in morpheme roots. By having tests that better suit the agglutinating language, it can be determined whether readers may still access morphology in their L1 reading, and not only for complex word reading.

2.2.2 Comprehension

In shallow orthographies, phonological processes may compete with morphological processes because the transparent structure "does not necessitate reliance on higher order morphological skills" (Saiegh-Haddad & Geva 2007: 486). Comprehension, on the other hand, may require higher order morphological skills to facilitate reading with meaning. This is particularly important for complex word reading. We find MA correlating particularly with complex word reading, even in English. This is because English words are generally mono-morphemic except for the complex words which have been inflected with morphemes. Other languages (like isiXhosa) must always inflect their words, thus MA can be expected to always play a role in typologies that are more reliant on morphology. The next subsection looks at three reading models that attempt to explain morphology's contribution to comprehension in reading.

2.2.2.1 Direct and indirect contributions to comprehension

Contrary to what other researchers have said, Zhang & Koda (2011: 1197) found that MA had the least unique contribution to reading comprehension after controlling for lexical inferencing and vocabulary knowledge. Children's lexical inferencing ability significantly mediated the indirect effect of MA on vocabulary knowledge. The authors uncovered a tangled relationship of direct and indirect contributions to reading comprehension from the "multi-facetness" of MA, lexical inferencing skill and vocabulary knowledge (Zhang & Koda 2011: 1199) that is represented in the model to follow (2011: 1207):

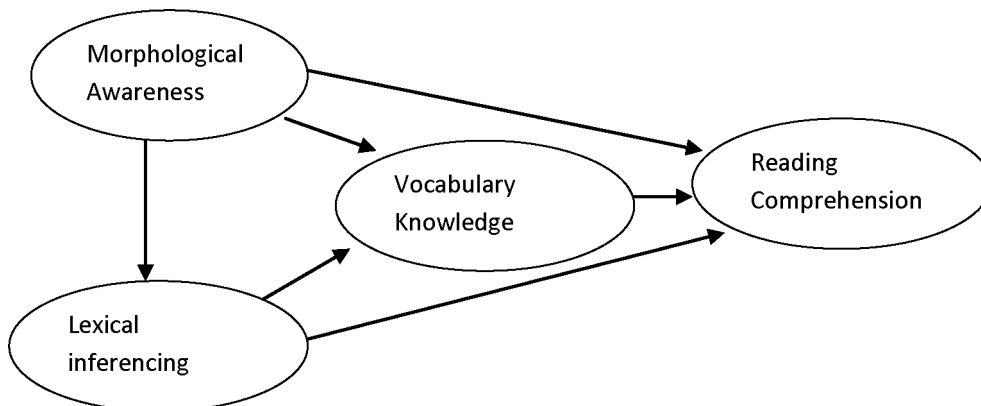


Figure 3: The relationships between MA, lexical inferencing, vocabulary knowledge and reading comprehension

Reading comprehension is predicted by three variables: MA, lexical inferencing ability, and the latent variable of vocabulary knowledge. In addition, vocabulary knowledge was predicted by both MA and lexical inferencing and lexical inferencing was predicted by MA (Zhang & Koda 2011: 1206). These results are based on MA tests that used compounding morphology and their lexical inferencing testing would be typically known as MA in other studies because it relies on "intra-word morphological clues" (2011: 1201) (see §2.5.3 for an example of a lexical inferencing test). Perhaps in a language that uses other more complex morphological structures, there may be a larger direct contribution of morphological awareness to comprehension.

2.2.2.2 Word decomposition

'Full listing' processing is when words are encoded into memory as whole units, regardless of their length or morphemic complexity. These words also include sight words, mono-morphemic words (words consisting of a single morpheme) or free morpheme words (root words without any other morphemes attached). This observation of words does not fully account for how long words in an agglutinating language could be encoded into the lexicon as a whole. The 'decomposition' process involves breaking up a complex word into its meaningful parts or morphemes, because only the smaller parts are encoded in memory, and not the word as a whole (Reed 2008: 36). Verhoeven & Perfetti (2011: 458) refined the word decomposition as follows:

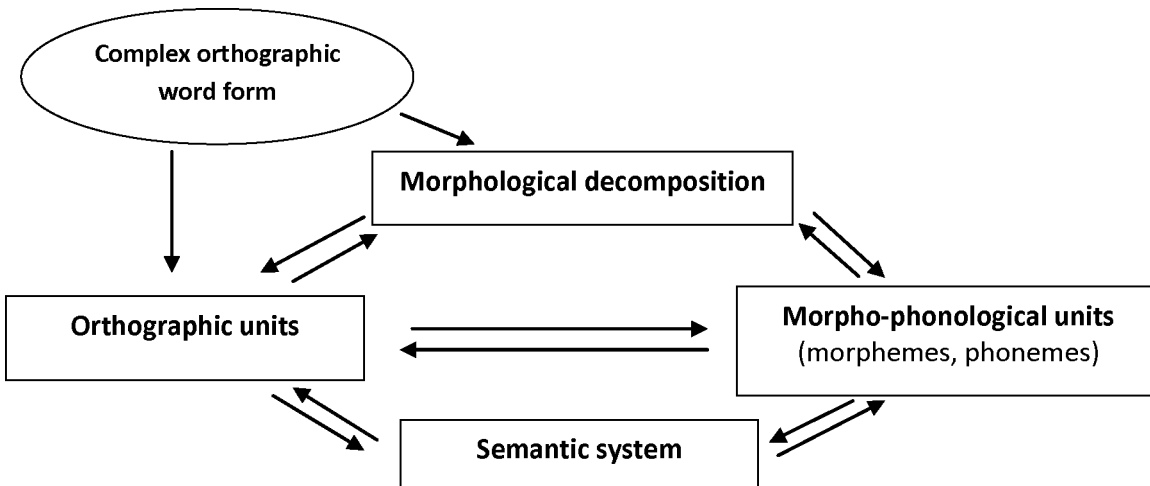


Figure 4: Role of morphology in the identification of complex orthographic word forms

The interactive levels and connections of the model show that decomposition can occur in direct manner from a word form, or indirectly from a phase that extracts the word's orthography. However, this is a very broad model and does not account for differential recognition of word stems and morphemes during word identification. Taft (2004) proposes that the fast recognition of the stem and the morpheme entails {stem + morpheme} representation in the lexicon. This kind of connectionist approach relies on the semantics of the root and is explored in more detail in the next subsection.

2.2.2.3 Connectionist models

The connectionist⁴ approach explores the broad associations among aspects of sound, meaning and orthography (Gonnerman, Seidenberg, & Andersen 2007). The models that take morphology into account up until this point have been very broad and do not necessarily look at specific morphemes. Recognition of morphemes within the words means processing of larger units (morphemes rather than letters) and allows words to be recognized more quickly (Kirby *et al.* 2011: 407). The reader should also be able to identify the prefixes and suffixes and identify how they transform meaning (Marinova-Todd, Siegel, & Mazabel 2013: 3).

For example, someone who has developed MA in English is able to recognise that the words *write*, *rewrite*, *writer*, *writing*, *writes*, *wrote* and *co-wrote* are all related to each other by

⁴This view of connectionism is not the same as connectionism as it relates to cognitive linguistics and/or computer network models of cognition.

having the same root 'write' and their meaning is related to the act of writing. This can be represented through a connectionist model:

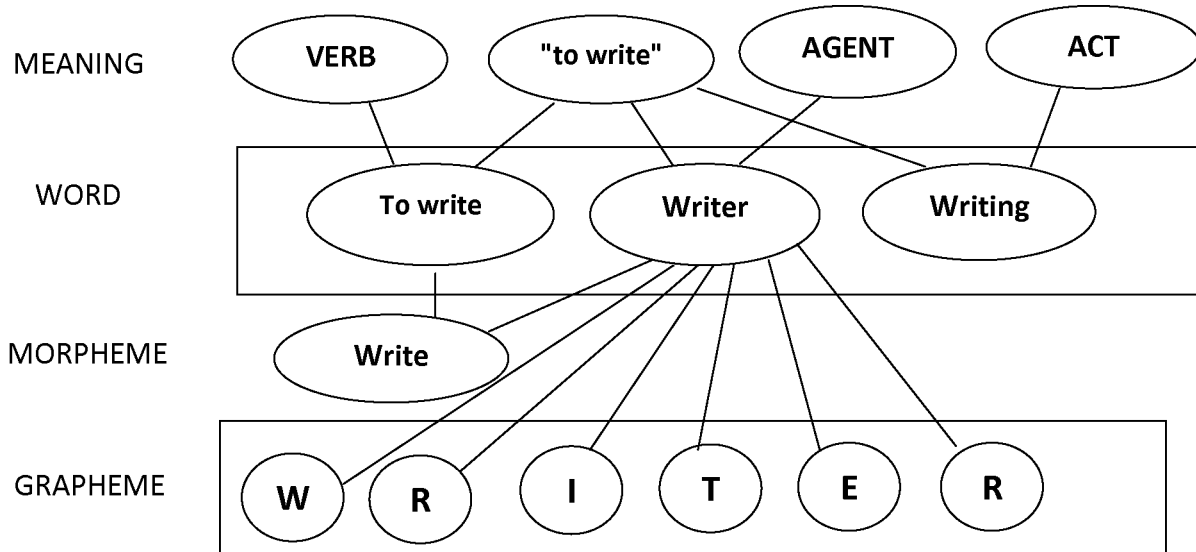


Figure 5: Connectionist model of an English word (original source cannot be located)

This less vague morphological model accounts for the morphological complexity that can be found in words in a language like isiXhosa. For example, in isiXhosa, '*ubhala*' (writes) would also encode an agent because of the {u-} subject marker agreement.

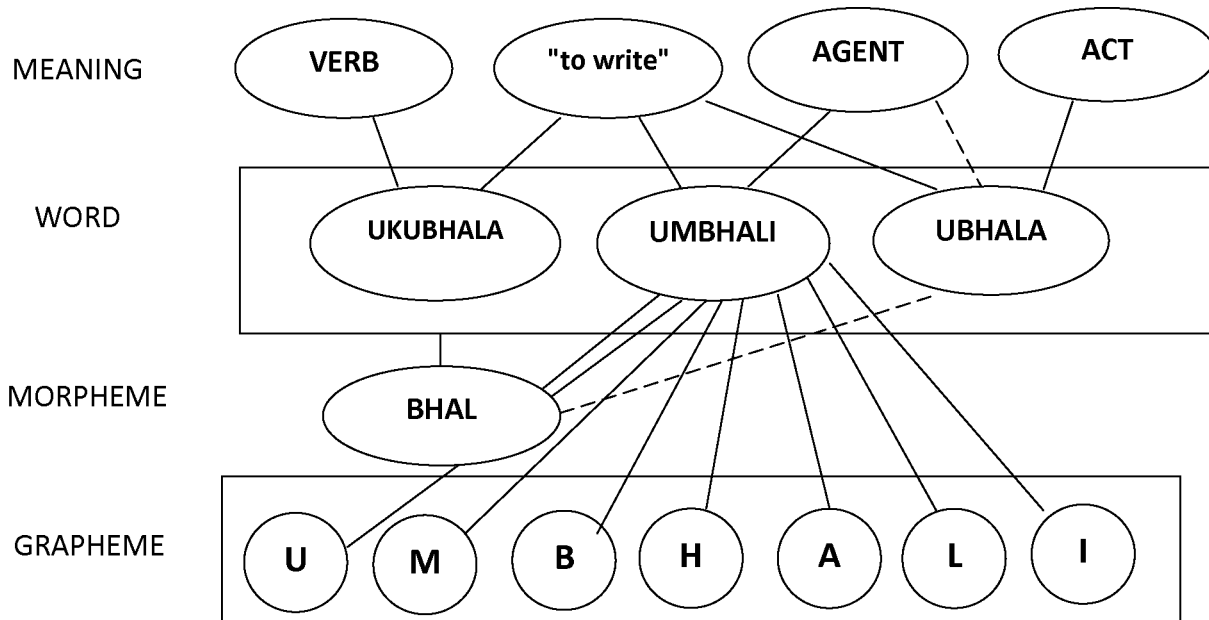


Figure 6: Connectionist model proposed for isiXhosa words

The model can account for the morphological complexity at the level of the word. However, it does not fully account for how important prefixes and suffixes are in an isiXhosa word that can be translated as an entire sentence because of the focus on semantic roots.

2.3 MA and reading conclusions

Because morphemes have to do with meaning, MA has been mainly considered to aid comprehension of words, rather than in the decoding words (Goswami & Ziegler 2006). The contribution to comprehension relies on the development of different aspects of Morphological Awareness that is language specific (Kuo & Anderson 2006; Zhang & Koda 2011). Different tests used to measure MA across readers from different language proficiencies and backgrounds raises the concern of methodological heterogeneity. For example, though Arabic and English MA were both measured through a morphological decomposition test, this task is infinitely harder in Arabic (see §2.6.2.1). When bilingual studies ask children to decompose the root using the same test, the complexity of the different morphologies means an unfair disadvantage and could result in findings that say MA does not contribute to word reading and only complex word reading, for example.

The models reviewed here must be fairly vague in order to account for the fact that different languages make use of different kinds of morphology. Morphology is a broad term and different types of morphology in the previously mentioned studies have known to contribute more than others to reading success. The particular emphasis on morphology and comprehension comes from an awareness of derivational morphology that has been reported on, especially in English. Most models place emphasis on morphological roots and ignore how important inflectional and derivational prefixes and suffixes can be. The next section explores the three different types of MA that vary in use as well as importance in their contribution to reading across languages.

2.4 The traditional types of MA and testing

There are morphemes that are more lexical and semantically transparent such as "cat" or "jump", and there are other morphemes that add grammatical and syntactic information to words and sentences. These morphemes are generally bound and only have meaning in relation to the more lexical morphemes building up the sentence. For example, in English, {-s} could mean plural, such as in "cats" (English does not mark its singular nouns), or it could mark the third person

present singular conjugation of "jumps"; {-s} would never appear in isolation in the sentence and must always be bound to another morpheme. It is important to note that in a language like isiXhosa, the more lexical items like *-kati* (cat) or *-tsib-* (jump) also cannot appear in isolation and always need grammatical morphemes attached, such as noun classes to show number (*ikati*, 'cat') and final vowels to show tense on verbs. There would also usually be a prefix for the subject agreement on verbs (*utsibe*, '(s/he) jumped').

Different languages make more or less use of free and bound morphemes and also of the different kinds of morphology, namely inflectional, derivational and compounding. The next section gives a brief description of each and also how these morphological processes work in isiXhosa.

2.4.1 Inflectional morphology

Inflectional affixes are usually small in number but with a generally high frequency in spoken language. English inflected words are structurally regular, with no or very limited phonological or orthographic shift effects on root morphemes (Zhang & Koda 2013; Kirby *et al.* 2011; Reed 2008). For example:

(6) dance → dances, dancing, danced

The affixation of inflectional morphology does not change the grammatical category of the word, it only alters the grammatical function of a word; in other words, verbs will remain verbs (jumping, jumped) and nouns will remain nouns (cat, cats), etc.

In English, inflectional morphologically built words are usually made up of one free root morpheme, that can stand alone in a sentence, and one suffix denoting the inflection or conjugation of the base, for example: cat+s, jump+ing (Reed 2008). This suffix is bound and must be attached to a root. This may be different for other languages which may not necessarily use a single morpheme or the same morpho-syntactic construction. For example in isiXhosa:

(7) dog = inja

dogs = izinja

Note that the root {-nja} is not free even if there is only one dog; the singular and plural marking is a non-optional prefix, unlike the suffix at the end of the noun in English that is only required to show plurality. Knowledge of inflectional morphology typically becomes well developed upon

entering the elementary/foundation school phase (Kirby *et al.* 2011). Inflectional grammar and spelling stages usually begin from no knowledge of the spelling of the word and with no clear association of its grammatical category, for example: *kist* for *kissed*. It then tends to progress to an overgeneralisation of morphemes across verbs. For example, adding the regular past tense morpheme {-ed} to all verbs (*sleeped* for *slept*). It then develops into a clear understanding of regular versus irregular endings and learning the exceptions to the morphological rules (McBride-Chang *et al.* 2005: 420). Other languages, like isiXhosa, have less exceptions to morphological patterns than English as will be seen in the derivational morphemes section that follows, particularly in examples (10) and (11).

For many Indo-European languages, there is consensus in the literature that inflectional morphemes are produced and developed earlier than derivational morphemes, but derivational knowledge continues to grow through primary school onwards (McBride-Chang *et al.* 2005: 418). Studies on inflectional morphology tend to focus on the early formative years and studies on older readers tend to focus on derivational morphology. Knowledge of inflectional structures in a given language is of particular importance when reading instruction begins and children start to extract the lexical information of inflected words (Acha, Laka, & Perea 2010: 369). However, it is important to test both inflectional and derivational Morphological Awareness in the early formative years because the predictive power of a solely inflectional task might peak early due to ceiling effects, while a task that includes derivations might continue to predict reading as children continue their MA development (Kirby *et al.* 2011: 391).

2.4.2 Derivational morphology

Instead of varying the grammatical meaning of a word, whole new meaningful words can be created through derivational morphology. In English, inflectional morphemes tend to be suffixes and derivational morphology includes prefixes, suffixes and compounding (McBride-Chang *et al.* 2005). The following section looks at derivations through affixation and derived words through compounding and how the derivational morphological processes differ in isiXhosa compared to languages like English.

2.4.2.1 Derivational morphemes

Inflectional morphology focuses primarily on indicating grammatical changes in words whereas derivational morphology creates a new word with a different grammatical category (Booij 2007).

The grammatical category of the word does not necessarily have to change, depending on the derivation, but often does. For example:

(8) love (n) → lovely (adj)

write (v) → writer (n)

Studies on English children show that Grade 1 children can decompose familiar words and compounds into component morphemes but cannot define the words properly yet. By Grade 3, children are likely to provide adequate definitions and extract meaning for morphologically complex words. However, they still have difficulty showing an awareness of the correct use of suffixes that change grammatical roles (Kirby *et al.* 2011). This shows that even though children can break up morphologically complex words for meaning, they are still not necessarily explicitly aware of derivational affixes.

Unlike inflectional morphemes, English has a relatively large number of derivational affixes at a lower frequency (Reed 2008). Derivations in languages involve the generation of a new word from at least one root and one or more affixes. The new word will differ in meaning from the base morpheme and it can also change the part of speech of the original word (Kirby *et al.* 2011; Reed 2008). For example:

(9) -bhala (v) → umbhali (n)

The verb '-bhala' (write) in isiXhosa can be affixed with the derivational noun class prefix {um-} and suffix {-i} to form *umbhali* (writer). The original verb base morpheme {-bhal-} is now a noun. The denotation of the base remains, encoded by the consistent spelling, like in English (magic→magician).

Though the spelling is usually consistent, some derivational morphology causes a pronunciation change in the word, for example *sign*→*signal*, in English. If there is no phonological change then the word is said to be transparent. If the morphology does cause a phonological change then the word is opaque (Pike 2011: 6). Opaque phonological and/or orthographic shifts, as well as a change in meaning of the original word, means derived words pose difficulties to word reading or spelling because they cannot be matched one-to-one to the word in the reader's oral vocabulary. An awareness of the morphemes in these cases can help spelling (Nunes, Bryant, & Bindman 2006; Deacon, Kirby, & Casselman-Bell 2009; Wolter,

Wood, & D'zatko 2009; Plaza & Cohen 2004; Marinova-Todd, Siegel, & Mazabel 2013). In addition to phonological shifts, English also has many exceptions to the morphological rules (inflectional morphology examples: *good*, **gooder*, *better*, **goodest*, *best*; derivational examples: **buildant*, *builder*, **accounter*, *accountant*⁵). Derivations in other languages, however, may not be as opaque or irregular. In isiXhosa, there is likely to be a phonological shift every time derivational morphemes attach to the root morph because of changes in final vowels and noun classes, but morphologically it is more regular and consistent. For example:

(10) -pheka (v: cook) → umpheki (n: cooker , 'chef')

(11) -onga (v: nurse) → umongi (n: nurse)

Basic knowledge and control over derivational structure is acquired early but an understanding of the functions of derivational affixes requires extensive literary experience with derived words and takes a long time to mature (Reed 2008; Zhang & Koda 2013). The frequency of the morphologically related words, the neutrality of the affix and reading age might increase the recognition of derived words (Reed 2008). Pike (2011: 6) in her study on English readers found the majority of derivational morphology development only starts in Grade 3. Results from several other studies seem to confirm that an age-of-acquisition pattern is discernable, at least amongst Grade 4, 6 and 8 readers. The older students were more likely to provide the correct grammatical form of the words, and they were better at using both morphological and contextual information to determine the meanings of untaught words (Reed 2008).

Students with reading difficulties show significantly lower recognition and spelling of derived words than their normal achieving counterparts, hence most of the literature on atypical readers concentrates on derivatives (Reed 2008). MA and derivational knowledge are in a linear relationship with reading age and exposure, rather than chronological age (Reed 2008). The more one reads and the more one is exposed to more challenging texts, the better one's derivational awareness is. Derived words have been focused on in research because they are inherently more complex than compounds and inflectionals (Zhang & Koda 2013). This is an English observation and inflectional and compound morphology may be just as difficult in a language like isiXhosa.

⁵ This is due to the roots being borrowed from different languages, German morphemes must attach to German roots and Latin morphemes attach to Latin roots. Other languages have not borrowed as extensively as English.

2.4.2.2 Compound morphology

The previous section contained a deeper explanation of derivations through the use of affixes; this section looks briefly at compound morphology which is the process of adding a lexical root onto another lexical root in order to form a word (Booij 2007). Compound structure is tested by asking children questions like: Which is a better name for a bee that lives in grass? 'A bee grass' or 'a grass bee'? (expected answer: *grass bee*). The reverse is also asked: Which is a better name for grass where lots of bees live? 'Bee grass' or 'grass bee'? (expected answer: *bee grass*). Compound tests like this can be administered to young children (Zhang & Koda 2013), though, overall, testing MA in very young children (preschool or younger) may be futile (McBride-Chang *et al.* 2005).

Children who are first language speakers of Chinese as well as Deaf readers have been found to develop better compound awareness than derivational awareness due to the characteristics of Chinese and Sign Language morphologies (For Chinese see: Ku & Anderson 2003, Tse *et al.* 2007; for Sign Language see: Goldin-Meadow & Mayberry 2001 and Gaustad 2000). Therefore, compound awareness is important for some languages' word formation and can appear very early in infants, but the degree to which it is used is also language specific. English is another language that makes regular use of lexical compounding to create new words, for example:

$$(12) \quad \text{BED (n) + ROOM (n) = BEDROOM (n)}$$

Compounding technically falls under derivational morphology because both processes change the meanings of words. However, compound morphology typically creates new words by taking two free standing morphemes and conjoining them instead of attaching an affix (Booij 2007). In English, there is hardly any phonological shifts during this process. The example (12) above shows the word/free root morpheme noun "bed" conjoining with the freestanding morpheme "room" to create a compound word. They may appear orthographically as one or more words, but the compound occurs as one lexical entity; "bedroom". The compounding process can be found in isiXhosa:

$$(13) \quad \text{I(nc)-GUMBI (n: room) + LA(poss)+ UKU(inf) + LALA(v: sleep) =}$$
$$\text{IGUMBI LOKULALA (bedroom)}$$

$$(14) \quad \text{IM(nc)-PELA(v: end) + I(nc)-VEKI(n: week) = IMPELAVEKI (weekend)}$$

(15) I(nc)-NGXOWA(n: *bag*) + I(nc)-MALI(n: *money*) = INGXOWA-MALI (funding)

Linguistically, there is more happening in isiXhosa compounds than simply attaching a lexical root to another root, as seen in the English compound example in (12). Based on the isiXhosa examples (13) to (15) above, it is assumed when two nouns are compounded, only the first noun needs to be marked with a noun class prefix. Thus the compound will take the class of the left hand member of the compound, unlike English which relies on the right hand member to determine grammatical category information about the compound. Compounds are particularly easy in English as they contain no phonological shifts. IsiXhosa, in contrast, may need vowel coalescence between the morphemes, as seen with (13) *la + uku = loku*. There is no formal description available of how isiXhosa compounds are formed and specifically how the morphemes must be combined.

Also, due to the nature of isiXhosa roots not being able to stand in isolation, it is questionable whether compounding in this language is just another example of derivation using affixes, as these compounds cannot exist without the grammatical affixes attached. Compounding morphology seems to be more for calque (i.e. a type of loanword) purposes and is not as salient a morphological phenomenon in isiXhosa as it is in other more researched languages. Many of the compounded words are still derived from affixes as well as root morphemes, rather than how compounds are traditionally known to be formed. Judging results from an isiXhosa compound test against an English or Chinese compound test would not be a balanced comparison based on the concerns raised above. Other languages that are not as morphologically dense as isiXhosa test compound morphology awareness because it is prominent in those languages, however, there are more interesting morphological phenomena taking place in isiXhosa inflectional and derivational affixation morphology.

2.4.3 Inflectional and derivational morphology conclusions

Different morphemes either create a new form of a word, such as in "walk→ walking→ walked" or some create whole new meaningful words, such as "happy→ unhappy→ unhappiness". Morphologically complex words are largely formed through development of the inflectional, derivational and compounding morphology. Different languages make more or less use of different kinds of morphology, thus different facets of MA will be more/less important for reading in those languages. For example, inflectional morphology is important in English or Finnish, but is comparatively unimportant in Chinese. By contrast, lexical compounding is far

more common in languages like Cantonese, Korean, Mandarin and German than in English, or in Bantu languages like isiXhosa (McBride-Chang *et al.* 2005: 418; McBride-Chang *et al.* 2008). Inflectional morphology is easier hence it can generally also be tested at a younger age. In English, a unique contribution of derivational awareness to reading comprehension seems reasonable, because MA could help learners unlock meanings of unfamiliar derived words. In English, the insight into suffixes and derivational structure may assist with sentence parsing which would eventually lead to enhanced textual comprehension (Nagy, Berninger, & Abbott 2006; Zhang & Koda 2013: 911). In languages like isiXhosa, prefixes are used equally to suffixes and all the morphological derivations may be through a form of affixation, as opposed to the conventional process of lexical compounding. The concept of MA must be flexible in order to be used and tested successfully cross-linguistically.

Traditionally in MA research, the main morphological task distinction is an awareness of inflectional morphology versus derivational morphology. From the previous section, we know that producing inflectionals are easier in general, but better derivational awareness corresponds more to reading comprehension because it is more complex and less frequent. Even within inflectional morphology, there are different kinds of inflectional morphology awarenesses and some inflectional aspects are more complex than others. The same can be said for levels of difficulty within derivational awareness, and the levels of complexity within these subsets of morphology can differ depending on the language being investigated. It needs to be considered that certain aspects of morphology are easier than others. For example, it is much easier within the realms of inflectional morphology to go between singular and plural, but more difficult to move between present tense and past tense. Many of the MA tests built for testing compound Morphological Awareness cannot necessarily account for the way isiXhosa compounds are formed. Compounding is complex but not a significant part of isiXhosa morphology, therefore testing it would be misrepresentative of an awareness of how the morphemes of the language are used.

The traditional MA tests have not always considered these two internal (difficulties within the types of morphologies) and external language factors (differences between these types of morphologies in different languages) while comparing the inflectional/derivational awareness relationship to literacy. Consequently, performances across previous MA tasks must be looked at in isolation and are not comparable, cross-linguistically.

To ensure methodology homogeneity across languages, MA tasks should not necessarily test such broad distinctions of inflectional and derivational Morphological Awareness because these are so different depending on the language being investigated. The next section explores alternative types of MA distinctions that have been found in the literature.

2.5 Alternative types of MA tests

Languages make use of different phonetics as well as morphological structures thus there is the concern of methodological heterogeneity as different types of MA have been tested within various studies. We need to be able to compare similarities between Chinese to isiXhosa, even though Chinese makes lots of use of compounding morphology and little inflectional morphology, whereas isiXhosa is the opposite and makes use of lots of inflectional morphology and hardly any compounding. More current literature has looked at alternative distinctions to the traditional inflectional/derivational approach to MA testing. The same study should not necessarily have to use the same test for both languages as it may be a fairly straight forward test in English but very difficult in a more morphologically complex language, like Arabic for example. Rather, researchers should ensure that the task demands are equivalent and ask children to work with the morphemes in similar ways, based on the specifics of their language.

The next section explores the broader types of morphological tests which exist for testing MA in general. Some of these tasks still have the capacity to test the specifics within inflectional and derivational morphology, also. These alternative types of testing MA include testing an awareness of manipulating pseudo words over real words, static versus dynamic tests, basic and refined MA tests and, lastly, tests that generally tap into a more implicit awareness of language structure as opposed to an explicit awareness.

2.5.1 Manipulation of pseudo versus real words

McBride-Chang *et al.*(2005) distinguish and measure two broad aspects of MA theoretically; the first being a distinction between inflectional versus derivational morphological *awareness* and the second between the *manipulation* of pseudo words versus real words. Testing morphology on pseudo words has been found useful because children cannot solely rely on knowledge of words they already know; rather, only the morphology must be manipulated in order to suit the pseudo root. The pseudo roots sound as if they could be a word from the language, thus it is possible to inflect real morphemes onto the non-real words using a process of morphological overgeneralisation (Curtiss, Hayes, Hyams, Keating, Koopman, Munro, Sportiche, Stabler,

Steriade, Stowell, Szabolcsi 2000). Applying real morphology to pseudo words means you understand the morpheme's function and have a more conscious and explicit awareness of how the language works because you are essentially correctly able to apply morphological principles to words you have never seen before. It is still, however, a largely a subconscious task where children's initial, spontaneous responses are recorded.

This morphological overgeneralisation is ultimately useful for breaking down words in an unfamiliar text for comprehension in reading. The problem with the manipulation of pseudo words is that it is usually administered through a morphological production test (this test is reviewed in §2.6.2.2) which has its drawbacks because it is not always suitable for the orthography of isiXhosa. Without using this kind test, it is still not clear how one would test morphology on pseudo verbs. By contrast, inflectional morphology on pseudo nouns (see §2.6.1.1) has been found to be successful in isiXhosa (Ortner 2013). Pseudo nouns alone, unfortunately, does not test a wide enough morphological gamut that is possible in isiXhosa and so the distinction between manipulating nonce and real words would be unbalanced if this was the sole distinction in the current research's MA tests.

Generally, it is the lexical root in the test that is a nonsense word. However, in a different study by Acha, Laka, & Perea (2010), the researchers timed how long children and adults would take to notice 'pseudo morphemes' on real lexical roots by changing one letter of the morphemic inflection. The premise was if children can discriminate real inflections from the pseudo ones, reading times will be shorter on the correctly inflected words than the incorrectly inflected words. If they are decoding using mapping of a one-to-one strategy, the reading time between correctly inflected and incorrectly inflected words will be the same (Acha, Laka, & Perea 2010). The children and adults had to read the words as fast and carefully as possible then decide if the word was correct or incorrect. To follow are examples of the test items based on the Basque root word '*etxe*' (house):

<i>Real morph inflections</i>	<i>Pseudo morph inflections</i>
etxea (the house)	etxen
etxeari (to the house)	etxeami
etxearen (of the house)	etxeafen
etxearentzat (for the house)	etxealentzat

Table 4: Examples of pseudo morphemes in Basque

However, by changing only one letter in the morpheme, this test seems to be more of a spelling test than a Morphological Awareness task. The current study has only looked at manipulation of pseudo words and not morphemes, and more specifically the manipulation of pseudo nouns over verbs in isiXhosa. This is tested through an inflectional morphology on pseudo nouns test, detailed in section 2.6.1. It is up to future research to design a morphological production test that suits the agglutinating nature of isiXhosa in order to create a pseudo verb manipulation distinction.

2.5.2 Static and dynamic MA tests

The real word awareness versus the pseudo word manipulation may not be the best test for the orthography of isiXhosa, therefore other broader divisions in the current MA tests will have to be used. Pike (2011) calls all the measures of MA across the literature 'static' tests, whereas her own test is an adapted 'dynamic' MA test. This is building on the dynamic assessment test developed by Larsen and Nippold (2007) which was produced as a word learning strategy. Her dynamic assessment test yields a wider range of performance which may result in more sensitivity to the varying MA abilities of English children in Grade 3. It involves defining morphologically complex words using scaffolding prompts. These prompts are actually a series of what she would describe as static tests, but all performed on one word. By using the prompts, researchers and/or clinicians could understand precisely where the participants find difficulty in morphologically analyzing words, depending on how many prompts are needed to define the complex word. This may ultimately help to better determine child deficits in MA which could be related to literacy abilities (Pike 2011: 22). On the following page is an example of her test (2011: 34):

LEVELS PROMPTS FOR DYNAMIC MORPHOLOGICAL AWARENESS ASSESSMENT

Prompt #1: "Tell me what the word ____ means?"

- A Correct response: Examiner goes to prompt #2
- B No response/ Incorrect response: Examiner goes to prompt #3

Prompt #2: "How did you know that?"

- A Explanation refers to individual morphemes: Examiner goes to next word
- B Explanation does not refer to individual morphemes: Examiner goes to prompt #3

Prompt #3: "Does the word _____ have any smaller part?" (YES/NO)

"What are those parts? _____"

- A Correct response: Examiner asks: "Now can you tell me what the word means?"
- B No response/ Incorrect response: Examiner goes to prompt #4

There are 6 prompts in total. Prompt 4 goes on to explicitly tell the child what smaller morphemes are in the word and then asks for a definition. Prompt 5 asks the child to listen to the word in a sentence and then try give the meaning and in the last prompt, the examiner provides three definition choices and asks the child which one represents the meaning of the word. Instead of children only being given one opportunity to answer an MA question (as in static tests), children may need prompting or morphological coaching through a complex word. This task essentially aims to make the child more explicitly aware of the morpheme structures building up words, but only to the children who are not already sensitive to this. Children who are more morphologically aware could move onto the next word after prompt #2 and receive a higher score for this test, rather than a simple pass or fail view of Morphological Awareness.

Pike (2011) compared the results of her dynamic test against total MA static test results. The standard deviation of both trials of the MA dynamic assessment test ($SD= 10.12$) were much higher than the standard deviation of the total of the static MA tests ($SD= 1.83$) (Pike 2011: 19). This meant the dynamic test was more sensitive to the different levels of Morphological Awareness. It must be remembered, however, that the different studies she included to form her

static score "included various modes of MA assessment and thus results may be conflicting" (Pike 2011: 14).

This approach to MA does reveal that some morphologically complex words are easier or harder to define and that children may need more than one attempt at defining a word, and they may only be able to do so after some morphological prompting. Most MA tasks do not always reveal what the children really know about morphology because they are only given one chance to answer and may not have understood what was required of them in a complex MA task. MA tasks should be more dynamic to test the more realistic, gradual sensitivity towards MA. Static tests ask for a snapshot of morphological knowledge that may be influenced by semantic knowledge or other linguistic awarenesses. The dynamic test asks children to consciously and explicitly think about how the word is built up out of morphemes (Pike 2011). The current study does not use this test but adapts the scoring method used where test answers are not simply correct or incorrect, but rather there can be varying levels of correctness in MA. For example:

- (16) Ndiyabona → Ndibonile ... Uyadlala → Udlalile (correct response)
I see → I saw ... We play → *We played*
- (17) Ndiyabona → Ndibonile ... Uyadlala → Ndidlalile (partially correct response)
I see → I saw ... We play → *I played*

The above example is taken from the isiXhosa Sentence Analogy test (English version explained in §2.6.2.3, and isiXhosa version explained in detail in §3.4.2). One can see in the partially correct response that the main MA aspect being tested, namely changing the suffix into past tense has been achieved, but the new prefix was not paid attention to. The results from the tests used in the current study are based on a continuous continuum of correctness, rather than simply right or wrong. Children are awarded marks for what they do understand regarding the morphological structures of their language.

2.5.3 Basic and refined MA tests

Based on the fact that some MA tasks are more complex than others, regardless of whether it is inflectional or derivational morphology being tested, researchers have recently proposed a different distinction between MA tests: MA tests and lexical inferencing tests (Zhang & Koda 2011). In their earlier research, Zhang & Koda (2011: 1199) explicitly separate MA from lexical inference and vocabulary knowledge. MA is "the ability to analyze multi-morphemic ... words appropriately into morphological units and correctly identify the root", whereas lexical inference is a particular facet of MA that makes "appropriate predictions of meanings for unknown

morphologically complex words based on intra-word morphological cues and information" (2011: 1201). Successful meaning inferences are based on the functions and meanings of the affixes. The MA tasks tested the ability to segment unfamiliar English derived words into morphological constituents and identify the base forms of the target words (Zhang & Koda 2011: 1213) (see *reforestation* example in morphological decomposition §2.6.2.1). This test relies on orthographically and phonetically similar words and is relatively simple in English. The test designed to test lexical inferencing (Zhang & Koda 2011) on the other hand looks challenging, though this is probably because it was designed to test university students. L1 Chinese students had to give the definitions of complex, derived, English words whose meaning explanations were constructed focusing mainly on the suffixes of the target word (Zhang & Koda 2011). For example, the given word is *meritorious*, followed by four definition choices: 1. to reward, 2. people with outstanding contributions, 3. praiseworthy 4. outstanding contributions. "Praiseworthy" is the correct answer because the participants must know that the {-ous} suffix in English also makes it an adjective, the same part of speech as the target word.

It must be remembered from Saiegh-Haddad & Geva's Arabic and English study (2007: 499) that task demands may have a stronger impact on children's processing strategies than the language's degree of morphological transparency. In a later study on younger participants, Zhang & Koda (2013) had to create more age appropriate MA tests and lexical inferencing tests. Instead of testing explicitly for lexical inference and MA, they split MA into two facets: basic and refined Morphological Awareness. 'Basic' MA is the "learner's sensitivity to the structure of multi-morphemic words such as the ability to segment words into constituent morphemes" and being able to identify affixes (Zhang & Koda, 2013: 906). The compound structure test (see *grass bee* or *bee grass* example for compound morphology in §2.4.2.2) was used to assess whether children are aware of the structural relations between constituent morphemes, but this is for compound words. Younger children fare better in tasks that tap into basic awareness of MA and particularly in inflectional morphology tasks (Zhang & Koda 2013; Carlisle 1995). 'Refined' MA refers to the facets of MA that relate to knowledge of the function of affixes (which was the researchers' (2011) original lexical inference definition) and the competence to discriminate meanings of roots in compounds (Zhang & Koda 2013). An example of a refined test is the morpheme discrimination test (see *classroom*, *bedroom*, *mushroom* example in §2.6.4). The

basic and refined tests significantly explained an additional 2.3% of variance in reading comprehension in L2 (Zhang & Koda 2013: 909).

Once again, there is heavy focus on compound morphological tests. Compounding and distinguishing meanings in homophones may be a "particularly important skill in Chinese which has an enormous number of homophones" (McBride-Chang *et al.* 2003, 2005: 429, 2008); however, not all languages make such extensive use of compounding structure. IsiXhosa may make use of compounds but it does not have as many lexical homophones to test as is the case with Chinese and English. If we omit the compounding aspect, we are left with the following definition (Zhang & Koda 2013: 906):

- A. **Basic MA** is the learner's sensitivity to the structure of multi-morphemic words and being able to identify affixes.
- B. **Refined MA** refers to the facets of MA that relate to knowledge of the function of affixes.

This is the start of a better, broader distinction between kinds of Morphological Awarenesses, besides being limited to inflectional and derivational morphology, which are not always comparable cross-linguistically. This asks whether children can decompose a word and break it up into smaller units, and if it can be taken a step further by explicitly knowing the function of those affixes and being able to use them. There is a distinction here between being aware of structures in a basic, more easy way that allows you to manipulate morphemes in a way you may not be able to explain, as opposed to refined knowledge that seems more explicit and conscious.

But this distinction is still not complete because both the tests used compound morphology as affixes which is not as applicable to other languages. In addition, the refined test did not rely on the knowledge of an affix only but rather the semantic knowledge of the word could be used too, and so it is questionable whether it was solely measuring Morphological Awareness, let alone a refined aspect of it. In the MA tests used in the current study, the Revised Morpheme Identification test (see §2.6.4.1) relies on children being able to identify affixes but this is based on their more refined knowledge of the function of those affixes, therefore it is a more refined task overall. The Word Building test (see §2.6.3.1) also relies on knowledge of function of affixes in order to build words. It seems the distinction here is not necessarily one of basic versus refined, but echoes McBride-Chang *et al.*'s (2005) distinction of Morphological

Awareness of a general, innate *awareness* versus an explicit *manipulation* of the morphological structure.

2.5.4 Implicit and explicit MA tests

Bowers, Kirby, & Deacon (2010: 145) separate Morphological Awareness from morphological processing which is a "less conscious or implicit processing of morphological information". First language speakers automatically acquire a complex knowledge of the structure of their language, yet "paradoxically they cannot describe this knowledge" (Ellis 2008: 1). Explicit awareness generally refers to explicit rules and usually the way adults would learn, whereas implicit language knowledge are features of language that children would know. The acquisition of L1 grammar is implicit and extracted from experience rather than from explicit rules. Simple exposure to normal linguistic input suffices and no explicit instruction is needed (Ellis 2008).

Implicit language education makes use of the natural, communicative approach. This often means the implicit tasks can be presented orally. In explicit language learning, perception and awareness is necessary and is usually aided by reading print. It is harder to teach the intuitive aspects and the implicit/explicit distinction has generally been one between implicit L1 knowledge and explicit second language learning (Ellis 2008). Second language learning also often relies on explicit memory rather than implicit knowledge of the language.

Bowers, Kirby, & Deacon (2010) and Reed (2008) have proven that there can also be explicit instruction in L1 MA through morphological interventions which tutor the meaning of affixes, which can also be developed from an intuitive knowledge of the use of these morphological processes. "Explicit teaching of ... morphology would aid the ongoing development of syntactic and Morphological Awareness experienced by students" and aid their reading (Marinova-Todd, Siegel, & Mazabel 2013: 25).

Because different languages make use of different kinds of morphology (inflectional versus derivational), in order to be comparable cross-linguistically, the types of Morphological Awareness tests must be the same. Regardless of whether children are manipulating inflectional, derivational or compounding morphology, the task should ask the children to manipulate or identify the morphemes in similar ways across languages. For example, if the test is a segmenting task to separate morphemes, the morphemes should be able to be segmented in a word in another language, even if they are not compound morphemes. The MA test divisions should be based on what the researcher has asked the participant to do with the morphemes:

whether they need only an awareness of the structure and can use implicit knowledge to complete the task or whether they need to explicitly show an understanding of the functions of different affixes, either through manipulation or identification. Future directions should acknowledge the different types of implicit and explicit knowledge of language and these must be "properly represented in batteries of outcome measures in studies of different learning or instructional regimes" (Ellis 2008: 11).

2.5.5 Alternative MA test conclusions

Task equivalence is a prevailing problem of cross-linguistic research (Saiegh-Haddad & Geva 2007: 501). What is easy in English is not necessarily easy in other languages' morphologies. The dynamic assessment test by Pike (2011) uncovers that children may know more about the morphological structures of their language, but may need explicit prompting to guide them to a morphological analysis of words. The more morphologically complex languages may need more prompting and examples in MA tests, as roots are not always as easily distinguishable as in English. There has also been major emphasis on root identification and manipulation of compounds as Morphological Awareness, but an awareness of prefixes and suffixes and general language structure awareness should also be included in MA tests.

The use of pseudo words still relies on intuitive knowledge rather than a conscious manipulation, whereas asking children the specific meaning of an affix would cause them to move from an implicit knowledge to an explicit knowledge. The alternative to traditional MA testing is not to have the distinction with pseudo words and real words, but only the distinction of awareness versus manipulation, and whether this is implicit or explicit.

Tests (a) and (b) described in the next section (§2.6.1 and §2.6.2.3) are kinds of implicit tasks that do not require the reader to have any literacy experience, whereas tests (c) and (d) (§2.6.3.1 and §2.6.4.1) require the children to access a more explicit Morphological Awareness by working with the morphemes within printed words. The tests mentioned in this section that are not used in the current study are pseudo morphemes, pseudo verb manipulation, dynamic test, lexical inferencing test and basic versus refined tests. These are mostly not used because these tend to focus on compounding morphology and can be solved semantically, but the methodological insights provided from each of these are considered along with the more frequently used MA tests which are reviewed next. These all helped determine the four tests that ultimately would be used in the current study.

2.6 MA tests selected for the current study

<i>Main MA tests from the literature</i>		<i>MA tests used in current study</i>
Inflectional morphology on pseudo nouns	→	(a) limbabule/Wugs test
Morphological decomposition tests	→	(b) Sentence Analogy test
Morphological production tests	→	
Morphological Structure test	→	(c) Revised Morphological Structure test/ Word Building test
Morphological Identification test	→	(d) Revised Morphological Identification test

After a close review of various Morphological Awareness tasks available, there are four main tests which will be used in the current study. These are (a) an inflectional morphology on pseudo nouns test, (b) a Sentence Analogy test, (c) a Morphological Structure test and (d) a Morphological Identification test.

Both the original task forms of (a) and (b) can accommodate for the morphological complexity of isiXhosa. Therefore, only minor adaptations were made, but the same principles and the same type of MA of the original tests are used for the new language being tested. By contrast, tests (c) and (d) had to be revised for this particular research due to the morphology and orthography of the isiXhosa language. The same morphological dexterity is maintained but a different method of the test is needed. An in-depth discussion about the specifics of the test adaptations and revisions made for isiXhosa is found in the Methodology section to follow. The current section mainly justifies why some of the original tests are unsuitable for the current study. This validation is based on preliminary findings of a pilot study conducted with 3 isiXhosa adults and 10 isiXhosa children, and it is detailed why those particular MA tasks do not work with the linguistic make-up of isiXhosa. Some previously established tests also have a stronger focus on semantics or syntax knowledge rather than testing purely MA. Though there is overlap between these three linguistic processes, tests were chosen based on whether they adhered to the definitions detailed in section 4.6.

2.6.1 Test A: Inflectional morphology on pseudo-nouns

Using overgeneralisation of morphological structures on pseudo root words has been a successful way to test MA in young readers. The pioneering study using this methodology is Berko's (1958) inflectional manipulation of pseudo nouns. The test assessed 4 year old children's ability to produce singular and plural forms of pseudo nouns. In English orthography, plurality on nouns is typically marked with an {-s} at the end of the noun. There are three main allomorphs of the /-s/

plural morpheme that are determined by the phonology of the last sound of the root noun. The /-s/ at the end of "cats" is pronounced with the voiceless [s] because of the voiceless final sound of the root "cat", but the /-s/ at the end of "dogs" is pronounced with voiced [z] because of the voiced final sound of the root "dog". The end of a word like "glasses" is pronounced [ɪz] when the final sound of the noun is a sibilant or affricate.

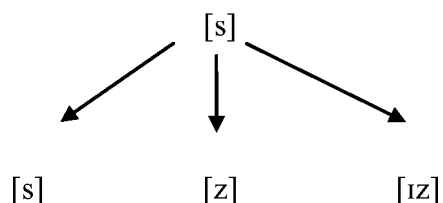


Figure 7: Allomorphs of /s/ depending on the different phonetic environments

The pseudo words, which are orally presented to the children, followed the phonological constraints of the language. The children had to supply the plural form of a word using the correct allomorph, based on the phonetic properties of the pseudo root. It was found that children could successfully produce the plural form of a pseudo word. The *wug* → *wugs* plural change was the most successfully answered with 97% of the children correctly producing the [z] allomorph. It subsequently was nicknamed the 'Wugs' test. However, the participants were less successful in producing other trickier phonological pseudo plurals such as "tasses"/[ɪz], but there was improvement with age (Berko 1958):

Allomorph	Nonsense word	Pre-schoolers %	First graders %
/s/	heafs	79	80
/z/	wugs	76	97
	luns	68	92
	tors	73	90
	cras	58	86
/ɪz/	tasses	28	38
	gutches	28	38
	kashes	25	36
	nizzes	14	33

Table 5: Percentage of correct inflectional morphemes on pseudo nouns (Wugs)

Children appear to do better, as well as show greater improvement, in the [z] over [ɪz] allomorph, and very well with regards to [s]. Though it is now a dated study, it gives clear evidence that young children have developing knowledge regarding this morphological process, but the knowledge of all the allomorphs is incomplete (Kirby *et al.* 2011: 390). A study of this nature shows that children have acquired some morphological insights quickly and early from spoken language acquisition and this insight requires limited print exposure (Zhang & Koda 2013). This means you do not have to be a good reader, or even literate, in order to complete this test. This test falls under an 'implicit' kind of MA task due to the innate ability of participants to complete the test without needing to know how to read.

The 'Wugs' results were not originally compared against children's reading speed or comprehension, mainly because the children were very young. Subsequent use of the 'Wugs' test has been used in bilingualism studies and to assess morphological proficiency in second language learning research, as well as assessing phonological awareness in first language speakers (recently Kawahara (2013) for Japanese). The current study administered an isiXhosa version of the 'Wugs' test to slightly older participants in Grade 3, so it is possible that their morphological knowledge of allomorphs is more complete. Because the test is more complex in the Bantu languages, it is suspected that there will be a relationship between the Morphological Awareness tested in this task and general reading success in the isiXhosa language.

2.6.1.1 Iimbabule/ Wugs in the Bantu languages

Number in isiXhosa is not associated with a single morpheme, like {-s} in English; instead the form of the plural changes by noun class, which in turn forms agreement with the rest of the sentence (Gxilishe *et al.* 2009). This manipulation test of inflectional morphology on nouns was therefore adapted and repeated with Grade 3 isiXhosa children because of this distinction in their language.

Many European languages make use of marked 'genders' on their nouns such as feminine, masculine and neutral. Bantu languages have many more markings on their nouns; so many so that they are not referred to as genders, but rather as classes (Guthrie 1971).

Singular NCs	Plural NCs
1. <i>um</i> umntu (person)	2. <i>aba</i> abantu (people)
1a. <i>u</i> umama (mother)	2a. <i>oo</i> oomama (mothers)
3. <i>um</i> umthi (tree)	4. <i>imi</i> imithi (trees)
5. <i>ili/i</i> ilitye / isele (stone/frog)	6. <i>ama</i> amatye / amasele (stones/frogs)
7. <i>isi</i> isitya (plate)	8. <i>izi</i> izitya (plates)
9. <i>i</i> intaka (bird)	10. <i>ii</i> iintaka (birds)

Table 6: IsiXhosa Noun Classes 1-10

A language is canonically a Bantu language if it makes use of a noun class system. Instead of the division between masculine and feminine, the main feature of the noun classes in Bantu languages is number. Each singular noun falls into a different noun class; the odd numbered classes. Each odd numbered noun class has a specific pairing with a plural marker in an even noun class. Consequently, nouns in NC1, like *um-ntu* (NC1.person), take their plural in the even class NC2, *aba-ntu* (NC2.person). The root {-ntu} (person) remains the same and the prefix attached to the beginning of the root marks whether the noun is singular or plural. NC3 takes its plural prefix from NC4; NC5 forms its plurals with the prefix from NC6; and so on. [+HUMAN] nouns are often grouped in the first noun class pairing, NC1 and 2, and words which mainly indicate place or space appear lower, such as in the locative classes NC16, 17 and 18 in isiXhosa. No one class strictly depicts only one type of noun in isiXhosa, but certain noun classes have become more representative of certain semantic entities over other classes. In some languages NC1/2 is only for humans and this seems to have become the case for isiXhosa, too.

The importance of the class prefixes is not only to indicate to which noun class the different nouns belong. The structure of Bantu languages is governed by the noun that dominates

the sentence. The other words in the sentence must agree with the noun in person, number, gender or case (Guthrie 1971). This concordial agreement is achieved by adding prefixes to word stems. These concords are employed in linking the noun to other words in the sentence (Saule & Gxilishe 1991). The concords on noun modifiers must agree with the noun class prefixes. The same adjective, for example, used on three different nouns, could yield three different realizations once noun class agreement with the adjective takes place. The following example shows the phenomenon in some Setswana singular noun classes. This demonstrates how different the realization for the same word could be, once the different noun class agreement markers are attached, in this case to the adjective "bad":

(18) *ngwana yômme*
 NC¹.child NC¹.bad
 "A bad child"

selô sêsebe
 NC⁷.thing NC⁷.bad
 "A bad thing"

ntsa êmpe
 NC⁹.dog NC⁹.bad
 "A bad dog"

(Setswana data from Cole 1955: 138)

Not only are the concords derived from the class prefixes, but also the pronouns. The prefixes are used to refer to a noun without actually naming the noun, thus the pronoun derived from the prefix is used in place of the referent noun with the same syntactic functions. This is similar to the English pronoun 'it'. Only when different prefixes are added to the verb stem is a proper verb formed; the verb root does not stand by itself⁶ (Saule & Gxilishe 1991: 373).

IsiXhosa is morphologically more interesting than English because there are simply more options to test. It also relies more on morphological knowledge than phonological knowledge, unlike the original test, though some phonological awareness is needed to select the correct allomorph within a noun class. This then depends on specific phonetic properties of the root noun, such as the number of syllables or a bilabial onset of the root noun influencing whether the prefix should be mono- or poly-syllabic, or contain a nasal. The task is easily understood by children and the amusing accompanying pictures make this suitable for testing this kind of Morphological Awareness even in isiXhosa children younger than Grade 3. Readers also need an understanding of how important noun classes are to building words and sentences in their

⁶ Except in commands, for example "Thetha!" (Speak!)

language and so the results will be correlated against their general reading fluency and comprehension.

The 'Wugs' were presented by Ortner (2013) to Grade 4 isiXhosa learners and it was found that the task is easily understood and successfully completed by the children. Ortner's results also showed a relationship with reading success. The current study administered this test to slightly younger isiXhosa participants in Grade 3 to see if they are still as successful and to further see if the results still correlate with reading fluency and/or comprehension in younger participants. The most successfully answered test item from the current study was the conversion from NC10→NC9, inspiring the isiXhosa version of the Wugs test to be named 'Imbabule', which it will be referred to as from now on.

2.6.2 Test B: Sentence Analogy

The Analogy test is a combination of a morphological decomposition test and a morphological production test. Before the Sentence Analogy test can be discussed, both the decomposition and production tests must be separately discussed to see why alone they are not suitable for testing MA in isiXhosa. Regardless, the combination of the two tests has found to be a better measurement of MA in the literature (Nunes, Bryant, & Bindman 2006; Carlisle 2003) and was also able to accommodate the morpho-syntax of isiXhosa, whereas in isolation, the morphological production and decomposition tests could not. Decomposition tests and production tests can be presented in various ways under a range of different names. In the following section the different morphological decomposition and production tests are grouped according to whether they are testing the same kind of Morphological Awareness.

2.6.2.1 Morphological decomposition tests

Most morphological decomposition tasks rely on participants being able to find the root morpheme, which holds much of the semantics needed to answer the question. A root identification test is an MA test used to test the learner's ability to analyze multi-morphemic English words and correctly identify the root on which the meaning of each target word is based (Zhang & Koda 2011). An example of this kind of test is giving the participant a target derivational word, such as *reforestation*. This word is followed by three words: *station*, *forest* and *rest*. In order to display their MA, learners would have to choose the option "forest" (Zhang & Koda 2011). Often MA tests such as this root identification rely on orthographically similar words or homonyms, which other languages may not have in their orthographies.

Instead of providing multiple choices to find the root, in a morphological decomposition test, a prompt word already inflected with affixes is presented within a sentence and the participant must either decompose the word to find the root, or decompose and produce an inflected form of the root to suit the syntactic requirements of the language, and not necessarily consciously manipulating morphemes. For example:

(19) *Runner*. How fast can she ____? (expected answer: *run*).

(20) *Runner*. She ____ fast. (expected answer: *runs/ran*).

Another version of this morphological decomposition test is asking the children whether a word can be broken into smaller parts, or the "comes from" test. This can also be referred to as a morphological relatedness/segmentation test. In this type of test, children distinguish morphologically related words from phonologically/orthographically related words (Zhang & Koda 2013; Saiegh-Haddad & Geva 2007). This test is further known as a judgment test because the participant must make a decision, but need not manipulate the word structure by applying morphological principles (Kirby *et al.* 2011: 391). For example:

(21) Is there a little word in *teacher* that means something like *teacher*?

(22) Does the word *butter* come from the word *but*?

The first answer (21) should be judged as yes, whereas the "er" in 'butter' is not a morpheme; the {-er} morpheme can only attach to verbs to make them nouns in English, such as in *teach* → *teacher*.

In all these decomposition tests, basic familiarity with a lexical item stem can be used to identify morphemic boundaries (Saiegh-Haddad & Geva 2007: 496). Nonetheless, this test relies on phonetically or orthographically similar words and can be solved semantically, thus it is questionable whether it is necessarily only testing an awareness of derivational morphology and not vocabulary or semantic knowledge. Though isiXhosa has very regular derivational processes, such as verbs being derived into nouns, identifying morphemic boundaries within words is not as straightforward:

- (23) *ukutshixa* → *isitshixo*
 INF.lock → NC⁵.lock/key
 "to lock" (v) → "lock/key" (n)

The infinitive {uku-} is dropped from the verb root and replaced with a noun class prefix which nominalizes the root. The Final Vowel (FV) suffix on the verb root must also change from an {-a} into an {-o} to derive the noun. Things/objects receive the {-o} suffix but if it were a derivation to make a human noun, the same linguistic process would happen but a different noun class prefix would be used and the FV suffix would be {-i} instead of {-o}, as in:

- (24) *ukulwa* → *umlwi*
 INF.fight → NC¹.fight
 "to fight" (v) → "fighter" (n)

The following example (25) is from the pilot study with isiXhosa speaking adults. The same linguistic process from above (23, 24) is being demonstrated. The {uku-} infinitive is dropped and replaced with the noun class prefix {i-}. The FV suffix is then changed to an {-o} because it is not a human noun but rather an object/thing. Therefore, it is safe to assume the below answer would be affirmative:

- (25) Does the word "iculo" (*song*) come from the word "ukucula" (*to sing*)?

However, when asking adult informants a question like the one above (25), they said no. The link is only semantic in the English translation and not a systematic morphological change like it is in isiXhosa, but semantically nor morphologically, adult isiXhosa informants said *song* and *sing* were not related.

- (26) Does the word "isiphelo" (*the end/finish*) come from the word "-phelisa" (*cause to finish*)?

This is the same derivational process of changing a noun into a verb except there is an {-is-} morpheme that is attached to the verb {phel-}. The {-is-} suffix inserted between the root verb and the FV and means "cause to". When making this word into a noun, the {-is-} causative

morpheme is deleted, leaving a root morpheme *phela*, meaning "finish". The FV suffix is changed to an {-o} because "the end" is not a human noun but rather an object/thing. With the noun class and change of the FV, such as in the previous examples, the result is a meaning similar to "the finish" or "the end". In the pilot study, the verbs were presented in two ways; the verb with the infinitive prefix {uku-}, and without the prefix and instead only the root verb with the FV suffix, "phelisa". Neither presentation made a difference. Adult informants said that there were no links between a list of words built up in this morphological fashion.

The adult informants that answered these questions found this task very difficult with an unclear link between the two words, despite semantic connections. They could not identify that it was the same root in both words. They advised that the task was too difficult for children even though English children have fared well in this frequently used MA test (Kirby *et al.* 2011). The problem with the inherent nature of the English orthography tests is that they can be solved semantically and is not necessarily testing an explicit, manipulative Morphological Awareness. In isiXhosa, the morphology is very systematic but it often creates phonological shifts which are known to be harder to manipulate in English (Kirby *et al.* 2011: 406). The single syllable semantic root in isiXhosa like {phel} or {cul} may be hard to identify. Future studies could try present the question differently such as "can you make 'this word' out of 'this word'?". It is up to future research to be able to explain the requirements of this task to children, perhaps with explicit and interactive examples that highlights how systematic isiXhosa morphology is.

In isiXhosa morpho-syntax, it is uncommon to find the root in isolation and instead of producing a simple root word like "sing" as in English, isiXhosa would demand a more complex morphological form of the verb root (it must at least be marked with FV for tense) hence one may not be administering the same kind of morphological test as the English version. The L2 Arabic readers in Saiegh-Haddad & Geva's (2007) study also did not do well in this kind of morphological decomposition test. Arabic uses a non-concatenative morphological structure of a consonant skeletal tier for morphemic roots. Vowels and consonants can be infixes to create various meanings. For example, the root morpheme *k-t-b* (write) would never appear in isolation. Various forms of the root morpheme would appear such as *katab* (write), *kattab* (cause to write) or *kitaab* (book). These examples reflect that typological differences of the language place different demands on morphological skills. This kind of test may be much harder in morphologically complex languages like Arabic and isiXhosa and this could be why this kind of

MA did not predict a larger variance in word reading in Saiegh-Haddad & Geva's (2007: 496) study testing the Morphological Transparency Hypothesis (see §2.2.1.2).

The root identification test should be revised to suit the agglutinating nature of a language (rather than relying on orthographically similar words) and it still has not been tested if children can identify the lexical root morpheme in a long and morphologically complex word. This study looks at whether the children are able to identify and manipulate the grammatical morphemes, as explained in tests (c) and (d) to follow.

2.6.2.2 Morphological production tests

In most of the morphological decomposition tests, the morphologically complex form is given and the participant must find the root. The reverse happens in an affix choice test which moves beyond recognition of morphemes and tests children's ability to produce words by applying morphological rules and affixes to the roots (Kirby *et al.* 2011). Children are asked to complete the sentence by choosing the correctly inflected form of the word, for example (27). This kind of test can also test morphological inflection on pseudo nouns and verbs without using the 'Wugs' test, as can be seen from example (28). This section explains why the production test is not suitable for isiXhosa.

(27) My uncle is a ____ (farming, farmer, farms) (expected response: *farmer*)

(28) He ____ the crops everyday (wubber, wubbest, wubbs) (expected response: *wubbs*)

This knowledge of affix choice test is sometimes called a morphological production test, or sentence completion test in other MA studies (Carlisle 2000; Pike 2011: 8; Kirby *et al.* 2011). Instead of providing the multiple choice grammatical category options which makes the test easier, the root can be given as a prompt, and the children must independently produce the correct morphologically complex form of the given word in order to meaningfully complete a sentence. For example:

(29) *Farm.* My uncle is a _____ (expected response: *farmer*)

(30) *Warm.* Her jacket provides _____ (expected response: *warmth*)

The negative aspects of this test is that it may access intuitive, syntactic knowledge rather than an awareness of morphology even though the focus is directed to manipulating the individual

word (Pike 2011: 8). It also only provides a glimpse of what children really know (Pike 2011: 22). Testing with pseudo words in English was a way to overcome this problem. However, from pilot studies of this research, it is clear that another downside to this kind of morphological production test is that it does not work for the orthographies of all languages, regardless of whether pseudo or real words are used. In example (29) above, the orthography of English means that the copular verb "is" is a separate word. The determiner "a" is also a syntactic clue as to the kind of category of word that must follow because determiners are typically followed by nouns in English. An adaptation for isiXhosa could be translated as follows:

- (31) *-bhal-*. Umalume wam ngumbhali
write. NC.uncle my is.NC.writer
"write. My uncle is a writer."

IsiXhosa does not use determiners like in English and the agglutinating nature means that the copular {ng-} morpheme does not appear as a separate word but rather is attached to the noun stem *umbhali* in (31) above. It is also not often that one would encounter a root such as {-bhal-} in isolation; in isiXhosa, roots always appear with affixes. Having the FV {-a} as in '-bhala' means something like *writes* and the infinitive form would be 'ukubhala' meaning *to write*. For this study, roots in isolation, roots with FV, and infinitive forms of verbs were all tested in case certain inflections prompted certain responses. Regardless, in the pilot study, adults and children provided the following answer to this test item:

- (32) *-bhal-*. Umalume wam uyabhala
write. NC.uncle my SM.writing
"write. My uncle is writing"

It is not necessarily incorrect to say 'writing' instead of 'writer' because syntactically, semantically and orthographically, both answers would fit. However, if the child answers with "writing", do they get an inflectional mark instead of a derivational mark? Is it technically an incorrect answer if testing derivations of verbs to nouns? This test is left up to future research to be modified to be more language specific for an agglutinating orthography like isiXhosa without having to make the answers multiple choice like in the affix choice test (27) described earlier.

Both the production and the decomposition tests rarely test compounds and are useful for systematically testing both inflectional and derivational morphology. Another benefit is that these tests can be administered orally and capture the fact that young children, as well as poor readers, are capable of independently producing morphological knowledge (Pike 2011: 8). However, in English, the tests could be solved like a kind of 'cloze' test (O'Malley & Valdez-Pierce 1996: 114), that determines a "reader's ability to use [syntactic] context to predict missing words from a text". This kind of test can be solved semantically or syntactically, and consequently it is questionable if these tests solely measure MA. Both the decomposition and production tests in isolation could not be easily adapted to suit isiXhosa because of the language's morphological and syntactic ambiguity (Cohen & Smith 2007). A more popular methodology used is a combination of production and decomposition task requirements, also called a Sentence Analogy test which is described next.

2.6.2.3 Sentence Analogy tests

Currently, some of the English methodological task requirements are not easily transferred cross-linguistically. On their own, each of the decomposition and production tests have methodological drawbacks in that they may be solved using other linguistic competences besides morphology. Alternatively, both morphological decomposition and production processes are involved when MA is tested through Sentence Analogy tests (Nunes, Bryant, & Bindman 2006). Integration of decomposition and production requires a more explicit level of MA patterns than judgment or production tests require on their own. Although analogical reasoning adds cognitive complexity to this measure, pre-school children are capable of analogical reasoning (Kirby *et al.* 2011: 392). An English example of this kind of test would be one that requires the completion of a pattern such as:

(33) I cry → I cried... I draw → ____?

The answer is "drew" because, in this case, the grammatical process to be decomposed or deciphered in the prompt was that of a change of tense; now past tense morphology must be applied to the target word. This is also good for testing exceptions or irregular morphological patterns, i.e. "drew" and not the morphological overgeneralisation "drawed". One can also see if children are simply repeating the phonology instead of applying the morphology if they gave a response like "dried" instead of "drew". The Word/Sentence Analogy test has the capacity to test

specifics within inflectional morphology such as tense, and aspects such as negation or derivations through affixations (for example verbs to nouns, or adverbs to adjectives).

This kind of Analogy test was administered to Grade 1, 2 and 3 L1 English/L2 French bilinguals where past tense/*passé composé* and present tense were tested, though this is quite a limited test of the rich French morphology. L1 English MA made a contribution of 10% to English reading at each grade. However, L1 English MA contribution went down in Grade 3 reading measures to a point where it was non-significant, whereas in French the contribution increased by Grade 3 to 16%. In English there are "strong contributions of earlier measures [of MA] and negligible contributions of later measures" (Deacon, Wade-Woolley, & Kirby 2007: 739), but it seems in a more morphologically rich language, MA is more strongly linked to reading in the later measures (in Grade 3) than the earlier measures (in Grade 1 and 2) (2007: 738). The contribution of Morphological Awareness, as tested by the Analogy task, seems to need more time to increase and develop in a more morphologically rich language. Unfortunately, the results for other languages' performance, besides English, on this test are with L2 bilinguals and there is a lack of research on how L1 speakers of a morphological complex language perform.

A statistical difference was found by Kirby *et al.* (2011: 402) between the items that could be solved phonetically and those that had a phonetic shift and therefore had to be solved morphologically. When there are phonological shifts, then the pattern must be solved morphologically. There is a potential risk of skewed scores in a test like this due to the relative ease of phonologically manipulated items compared to items that could only be solved morphologically, especially prior to Grade 3 (Kirby *et al.* 2011: 406). By contrast, due to the complex morphology of isiXhosa, even on singular and plural markings on nouns, all the items involved phonological shifts and will have to be answered using a morphological manipulation.

A Word/Sentence Analogy test will make it possible to see patterns in a measurement of children's Morphological Awareness in inflectional and derivational morphology respectively. In an earlier study by Deacon & Kirby (2004), the MA results from their Analogy test made between 1 and 5% contribution to reading comprehension. They also noted that the MA contribution was greater for reading comprehension and building meaning in a text than for isolated single word reading (Deacon & Kirby 2004: 235). The adaptation of this test for

isiXhosa is elaborated on in detail in the Methodology section. The results are then compared to a reading comprehension test instead of a single word reading test.

2.6.3 Test C: Morphological Structure Awareness tests

The following two tests, the Morphological Structure and the Morphological Identification, are both from McBride *et al.* (2005). The two tests had to be revised, rather than simply adapted for isiXhosa. Different languages have diverse structures that build up meanings and words, making more or less use out of the various types of morphology, i.e. inflectional, derivational and compounding. As mentioned, many MA tests suit languages like English or Chinese that make use of extensive compounding, which is not a key morphological process in isiXhosa. However this research wishes to still preserve the underlying type of Morphological Awareness (explicit) even though it does not necessarily preserve the traditional type of compound morphological testing.

The original Morphological Structure Awareness test is another type of compound MA test used by McBride-Chang *et al.* (2005: 421). This test encourages children to combine morphemes in new ways. If children notice similarities across words, the concept of morphological overgeneralisation (Curtiss *et al.* 2000: 360), then they should be able to build on this knowledge, making it more efficient to learn new vocabulary, both orally and in print (McBride-Chang *et al.* 2005: 429). The following is an example of a derivational compounding aspect of the structure test:

(34) *treetop* is the highest point. Now make a new term that means the lowest point.

The expected answer is something like *treebottom*. According to McBride-Chang *et al.* (2005), this demonstrated an awareness of morphological structure. This test, together with McBride-Chang *et al.*'s (2005) Morpheme Identification test (see §2.6.4) accounted for 10% additional and unique variance in vocabulary knowledge in English (McBride-Chang *et al.* 2005: 416). Vocabulary knowledge, in addition to phonological processing skills and working memory, is a key component in learning to read and MA directly and indirectly contributes (McBride-Chang *et al.* 2005).

Morphological Structure tests, and the compound structure test mentioned before, are popular for being able to test MA in children. From as early as two and a half years old, English speaking children will use words in their limited vocabularies to invent compound words in order

to fill semantic gaps in meaning expression (Zhang & Koda 2013). However, compounding is also not constructed the same way across all languages. The tests chosen for this test are revised to be more aligned with the morphological complexity of isiXhosa. Another drawback within this test is that in McBride *et al.*'s (2005: 419) attempt to have "flexible" MA tasks that work cross-linguistically, it is not clearly established "the extent to which the items used in the Morphological Structure task tapped into similar or different types of linguistic knowledge" (2005: 430) or if it tapped into morphological knowledge over semantic knowledge.

McBride-Chang *et al.* (2008: 446) repeated their Morphological Structure test on Cantonese, Mandarin and Korean speaking children. A translated example of their test would be:

(35) When a refrigerator keeps Kimchi⁷ in it, then we call it Kimchi refrigerator. If a refrigerator keeps a flower in it, what would we call it? (expected response: *flower refrigerator*)

This test explained between 2 and 9% of unique variance in vocabulary knowledge, on top of the autoregressive effects of previous vocabulary knowledge itself (McBride-Chang *et al.* 2008: 458). The researchers suggest their test exploring inflectional and derivational morphology, but do not offer a suggestion of how this could be approached, especially for pre-school children. Another factor they point out for future research is the focus on compounding morphology as an important predictor, opposed to the traditional inflectional or derivational morphology across languages. They do hypothesize that "inflectional morphology may be more predictive in languages that require greater use of it... Future research should strive to distinguish various types of MA and vocabulary knowledge across languages" (McBride-Chang *et al.* 2008: 456). This highlights the fact that it does not matter whether inflectional or compounding morphology is being tested, it only matters that the MA tests have focused on the specific morphological structures found in the specific language being investigated.

2.6.3.1 Revised Morphological Structure test/ Word Building test

The outcome of the Morphological Structure test is the "ability to construct new meanings by making use of knowledge of familiar or previously learned morphemes" (McBride-Chang *et al.* 2005: 421) and the ability "to manipulate familiar morphemes to create novel ... words" (McBride-Chang *et al.* 2008: 437). This can be done with inflectional morphology, as well as

⁷ A traditional fermented Korean side dish made of vegetables with a variety of seasoning

derivations through compounding, and affixes (McBride-Chang *et al.* 2005: 421). A Revised Morphological Structure test needs to use more morphological affixes and not only lexemes to build new words to suit the language of isiXhosa. The current research used a Word/Sentence Building game which utilizes morpheme flashcards. The children are encouraged to build long agglutinating words, phrases or sentences, using inflectional or derivational morphological processes on the roots of nouns and verbs. A Word Building test explicitly forces children to create words with morphemes, which is more linked with the rich morphology of isiXhosa. The revised version of the test cannot be solved semantically and it gives insight into the length and complexity of multi-morphemic words that children are comfortable building at this level. Instead of being classified as inflectional or derivational building (though this could be measured if desired), it is a task to see how comfortable children are at manipulating language structures in general; manipulating the prefixes in their language in comparison to the suffixes, and more specifically nouns as opposed to verbs. Another benefit is that it can still be administered to children, and even adults. One would be able to measure the developmental trend in Word Building from children to adults of number of words built and complexity of the words built.

The revised version of the Structure test was previously used in Ortner's isiXhosa study (2013). She found that children struggled to use the word they had built in a sentence, therefore in the current test, children were encouraged to build sentences from the beginning. Ortner (2013) did not have cue cards with which to build and rather children had to point to morphemes on a page. This meant that if the morphemes were positioned in front of the verb, then they were used as a prefix, and those affixes positioned on the right hand side of the verb root on the page were likely to be used as suffixes. This primes the children to only use the affix in its fixed position in relation to the verb on the page. Thus, if the morph {A} appeared on the page in a list of suffixes as a final vowel, it would then never be used as a negative prefix in Ortner's study. By allowing free moving morpheme cards to build the words, children have infinitely more options to build and it also encourages the morphemic length of the words/sentences built in the test to be much longer. The current test did not test whether the isiXhosa children's MA score's could predict their vocabulary knowledge but now that more suitable MA tasks have been established for the language, this is a possible step further in this research.

2.6.4 Test D: The Morpheme Identification tests

Like the original Morphological Structure tests, the Morpheme Identification tests also rely heavily on compound morphology and arguably do not measure MA at all. The Morpheme Identification test used by McBride *et al.* (2005: 420) requires the ability to distinguish different meanings across homophones, because the same sounding words can have different meanings, a skill that is particularly important for Chinese. An English equivalent of the test was administered to English pre-school children. Two different pictures are presented simultaneously to the child. The pictures are labeled orally for the child by the researcher and then the child is given a word or phrase containing the target morpheme. The child is then asked to choose between the two pictures which one best corresponded to the meaning of that morpheme. For example, the child was asked to select from the two pictures showing *the colour blue* and *he blew out some air*. The child is asked to choose the picture that contains the meaning of the morpheme [blu:] in *blueberries*. MA involves understanding that different meanings can simultaneously be attributable to phonologically identical words. According to the researchers, being able to distinguish among meanings of syllables with identical sounds, facilitates language analysis. Vocabulary growth and this Morpheme Identification test together with the Morphological Structure test by McBride *et al.* (2005) mentioned prior accounted for 10% of variances in vocabulary knowledge. This is important because growing vocabulary knowledge is a major factor in learning to read and this test shows that MA is, at least indirectly, contributing towards reading (McBride-Chang *et al.* 2005; McBride-Chang *et al.* 2008; Zhang & Koda 2011).

A problem with the Morpheme Identification test is the pictures prompt a semantic association rather than the common morpheme. However, the researchers felt strongly that the pictures were necessary in order to administer the test to young children (McBride-Chang *et al.* 2005: 423). As previously mentioned, while there is a large number of homophones in a language like Chinese, there are relatively few homophones in English, and even less in isiXhosa, and thus this is not an adaptable test.

Still based on compound morphology, a morpheme discrimination test measured children's understanding that a word part shared by different words may vary in the meaning in these words (Zhang & Koda 2013). For example, children are asked which word in the group of words does not belong: *bedroom, classroom, mushroom*. "Mushroom" is not made up of the morphemes "mush" and "room", thus it is the odd one out. However, this MA test is similar to

the Morpheme Identification test with the homophones by McBride-Chang *et al.* (2005), and can also be solved semantically and not necessarily on the meaning of the constituent morphemes.

2.6.4.1 Revised Morpheme Identification test

A reversed morphological version of the test, albeit more cognitively demanding, would be to test allomorphs which show children that different sounds can have the same meaning; different phonetic/orthographic representations can share the same morpheme. For example, the {a-} and {-i} affixes and the {aka-} and {-anga} affixes on verbs in isiXhosa both represent negative morphemes, they all have the same meaning of negative, but are represented differently in different morphological contexts. This kind of Morpheme Identification test would require the participant to have a clear knowledge and understanding of the function of an affix.

The Revised Morpheme Identification test was adjusted for this research using inflectional morphology in isiXhosa. The reader must make the meaning inferences of the words/sentences based on functions and meanings of the affixes. By this description, the Revised Morpheme Identification test in this study is much like the MA lexical inference test (see §2.5.3). Children will be required to identify the smallest, meaningful morphemic units within words. A breakdown of this isiXhosa test and the other three MA tests used can be found in the Methodology section (§3.4) after the research goals of the current study are stated.

2.7 Conclusion

The tests that had to be revised were mainly those that could be solved semantically and not solely using morphology, thus those tests for which it was questionable whether they were measuring a Morphological Awareness. There are links between semantics and morphology but most of the time it is whole word semantics and lexical root identification, and the more minor aspects of morphology like inflectional and derivational affixes are less explored. This could be due to many researchers looking for morphological transfer across orthographies, thus only exploring a narrow range of MA. The tests selected for the current study test a wider spectrum of morphological phenomena.

The four tests that piloted well with the morphology of isiXhosa and consequently used in this study are (a) the inflectional morphology of pseudo nouns/limbabule test, (b) the Word/Sentence Analogy test, (c) a Revised Morpheme Structure test and (d) a Revised Morpheme Identification test. More than one MA test is needed because each of these tasks test various morphological aspects and together combine into one holistic MA score. The

limbabule/Wugs look at the manipulation of pseudo words and the Sentence Analogy test looks at the manipulation of real words, but ultimately, both of these tap into an implicit awareness of the underlying 'rules' and understanding of the grammar of the isiXhosa language. The Sentence Analogy test also has the ability to test the difference between inflectional and derivational morphology. The Word Building and Identification test explicitly ask children to think consciously about morphs and manipulate and build with morphemes, which is a different, more explicit aspect of Morphological Awareness. It will then be possible to see what kind(s) of MA are most useful for literacy acquisition by comparing the results of these tests with fluency and comprehension tests. These kinds of MA tasks have been known to correlate with reading comprehension but their relationship with fluency is less explored in the literature.

Chapter 3: Methodology

In addition to a fluency test and a comprehension in reading test, four MA tests were administered to 76 participants over two days. From the literature, it is clear that not all morphological tasks work equally well cross-linguistically, which would be the sign of a good linguistic test. Previous MA tests have been pre-dominantly focused on English and Chinese which are not as morphologically complex as some other languages. The morphological tests revised for isiXhosa in this study can be adapted for testing other agglutinating language morphologies because the tests now have a wider morphological spectrum to explore than previously established MA tests.

The two reading success assessments looked at in the current study are a measure of Oral Reading Fluency (ORF), and a comprehension-in-reading test, the latter consisting of 5 questions based on the one-minute story read for the fluency measure test. The four MA tests chosen and adapted for this study are the (a) manipulation of pseudo noun morphology, also referred short-handedly as the Iimbabule/Wugs test; (b) a combined morphological decomposition and production test, also known as the "Analogy" test; (c) a Revised Morphological Structure test in the form of a Word Building test and, lastly, (d) a Revised Morphological Identification test, which involves the identification of specific morphemes.

The following chapter explains how and why the tests were built and administered as they were, based on the morphology of isiXhosa. The results from the tests used in this study are explored afterwards and the research questions are answered based on the findings of the Results section in §5.

3.1 Participants

All participants were attending isiXhosa medium schools in the Eastern Cape province of South Africa. The mean age of the children was 9.94 years. Prior to testing, consent forms were sent home to parents assuring anonymity and that children would not be forced to participate in any tests should they decide not to at the time of testing. Only children who returned signed consent forms were tested. Full MA data sets were collected from 81 isiXhosa home language speakers from three different schools. However, due to a discrepancy in the data for the reading comprehension section, subsequently 5 children's data sets had to be removed, as there were no reading comprehension scores to compare against their MA scores. This left a total of 39 female

participants and 37 male participants ($N = 76$) whose MA scores were analysed against their general reading abilities, namely their fluency and comprehension in reading. The testing was administered in August, in the third term of Grade 3. At this stage in their schooling, all the children who had an African language as their LoLT should have a firm foundation of reading in their first language before having to make the switch to reading and learning in English, in January of the following year. All three schools were situated within peri-urban townships and most of the children could not communicate in English at the time.

3.2 Procedure

All the tests were administered to the children in isiXhosa by first language isiXhosa speaking research assistants. Each participant was seen twice on two consecutive days for the different MA tests, resulting in four MA tests being completed, on top of two reading assessments. In order to cause as little disruption in the classroom as possible, as well as not to result in fatigue or boredom, three children were taken at a time from class to another quiet classroom for a maximum of 25 minutes per day. In addition to testing the learners' MA, the children were simultaneously being rotated around to other testing stations of my colleagues; at these stations, children's PA, Rapid Automatic Naming (RAN), Silent Reading Fluency (SRF) and orthographic awareness were also tested.

Before each MA test, the children were coached through three examples to ensure they understood what was required of them from the test. Each test had a time limit; the (a) Iimbabule/Wugs and (c) Word Building had a maximum of five minutes each and the (b) Sentence Analogy and (d) Identification tests were given a maximum of ten minutes each. The different MA tests ended if the participant made four consecutive errors, or if their time per test ended. No feedback about their performance was given to the children during or after each of the MA tests. To encourage participation, each test was presented as a word game, rather than a face-threatening test with right and wrong answers. Regardless of how the learners performed in the tests, colourful stickers were awarded after completing a test at each of the testing stations.

3.3 Reading success measures

In order to determine a base reading level of all of the children, their ability to read for the current study was judged on their ability to read an unseen text aloud and accurately, and then answer questions. The participants were given a minute to read the story as fast and as fluently as

possible and then, immediately afterwards, were asked comprehension questions based on the aforementioned text. It is important to have this controlled measure as opposed to obtaining a reading mark from the teacher. This removes any subjectivity from the teacher and it ensures that all the children's reading success measurements are comparable because they are based on the same text being read.

3.3.1 Fluency

Fluency in reading in the current test was measured by an Oral Reading Fluency test as opposed to reading lists of words in isolation. Due to the morphological complexity of isiXhosa, it is proposed that morphemes correctly read per minute (mcpm) should be the unit of fluency measurement for the language as opposed to the less appropriate words read per minute.

3.3.1.1 Oral Reading Fluency (ORF) test

Fluency in this study is defined as accuracy as well as speed in decoding written text. For measuring oral word reading fluency, the participants were presented with an isiXhosa story entitled *uSikihitshana somLingo* (The Magical Boat) designed by Diemer (2015); an extract follows:

uSikihitshana somLingo

Kudaladala, kwaye kukho ixhegwazana elisisilumko nelinobubele kakhulu.

Lalihlala kwisiqithi esasiphakathi kulambokazi iNciba.

Xa abantu belali ekufutshane nendawo elihlala kuyo belamba, belibaphathela iintlanzi.

Bebelibulela kakhulu baze balimeme ukuba lize kutya nabo.

Kodwa lona belisala. Inkosi yelali leo yayinomona kwaye izidla.

"Ungubani na wena?" imnkqanigise yatsho.

This text was deemed appropriate for the level of a Grade 3 reader by an isiXhosa Foundation Phase teacher. Children were instructed to read the story out loud, beginning at the title and following their progression with their index finger. A research assistant timed each child for one minute then stopped him or her and noted how far they read in the text. The children were also recorded and these recordings were later listened to in order to hear any errors that may have been produced during reading. Self-corrections were marked as reading the word correctly but if

the child required any assistance with the word then the error was noted and counted as an incorrectly read word.

Other studies (Carlisle & Nomanbhoy 1993; Deacon, Wade-Woolley, & Kirby 2007; Wolter, Wood, & D'zatko 2009; Acha, Laka, & Perea 2010; Ramirez *et al.* 2011; Verhoeven & Perfetti 2011) that have looked at MA tests and reading ability have mostly tested children reading isolated words from a list. Comprehension is then based on the meaning of individual words. However, these words are isolated and thus de-contextualized. The further benefit of using an ORF test, instead of a word list, is that the reading test is more aligned with the reading practices children need to master at school. Children need to be able to understand what they have read in context and also be able to summarize and surmise the gist of a whole text in order to read to learn.

3.3.1.1.1 Words per minute

Most of the literature tends to count oral reading accuracy by words correctly read per minute and it seems no exceptions have been made for agglutinating languages like Turkish or Basque. In Diemer's (2015) PA research with the same participants from this study, fluency is measured with words correctly read per minute (wcpm) and Probert's (2015) orthographic influence research looks at characters correctly read per minute (ccpm) in isiXhosa and Setswana. As established, isiXhosa morphology is complex and wcpm may not be the most appropriate measure of reading fluency. One, long orthographic isiXhosa word could be translated as many smaller orthographic words in English, though the meaning is essentially the same. This is because isiXhosa creates words by attaching morpheme affixes to a root morpheme. For this reason, fluency was measured by wcpm, as well as by morphemes correctly read per minute (mcpm) and were both considered in the current study. Wcpm was calculated using the following formula:

$$WCPM = \text{TOTALATTEMPTED WORDS} - \text{INCORRECTLYREAD WORDS}$$

3.3.1.1.2 Morphemes per minute

The alternative in the literature is characters correctly read per minute (ccpm) instead of words per minute. This suits logo-graphic orthographies like Mandarin more than an inappropriate word count measure. Processing a Chinese character takes about the same time as it takes an

English reader to recognize a word, therefore Chinese and English readers read at roughly the same speed when taking comprehension into account.

Thus far, morphemes correctly read per minute (mcpm) has not been suggested as another alternative to the words per minute measure of fluency. This could be due to MA research only gaining more attention in the more recent years with languages other than English. IsiXhosa uses a rich morphological system to create words and sentences as can be seen from an example of the text given to the children:

(36) *Bebelibulela kakhulu baze balimeme ukuba lize kutya nabo.*

(37)	Be-be-li-bulel-a	ka-khulu	ba-z-e	ba-li-mem-e
	sm-prn-om-THANK-fv(pres)	adv-A LOT	sm.WILL.fv(past)	sm.om.INVITE.fv(past)
	uku-b-a	li-z-e	ku-ty-a	na-bo.
	inf-BE-fv(pres)	sm.WILL.fv(past)	inf-EAT-fv(pres)	prep.THEM

(38) "They would thank her very much and would invite her to eat with them"

The isiXhosa sentence is 8 orthographic words that can be broken up into 25 morphemes. The longest word within the sentence is "bebelibulela" which is 5 morphemes and 12 characters long, compared to the length of the longest word "invite" in the English translation, which consists of 1 morpheme and 6 characters. The words in isiXhosa will have to be decoded into smaller units for comprehension because they are not as mono-morphemic as in English. Lengthy words can be trickier on the eye, especially for beginner readers (Land 2015), but the syllabic structure in isiXhosa generally follows a transparent (V)CVCV pattern, which should be easier to read than the more opaque English.

The abundance of prefixes is mainly the subject and object markers as well as pronouns that need to attach to the verb to show agreement and syntactic roles of the participants in the story. The morphology is very systematic, and omitting a morpheme during reading, or switching positions of affixes, would essentially change the meaning, or make the word ungrammatical. It is for this reason that mcpm is the unit of measurement used for fluency in the current study.

In mcpm, the specific error within the word was looked at and the morphemes that were correctly read within the word were still counted. For example, the first word of the story

Kudaladala, meaning *long ago*, consists of three morphemes, ku-dala-dala. If the child read "kubalabala" then under wcpm they receive 0 for the first word, however, under mcpm they would receive a score of 1 out of 3. The errors made while reading were looked at specifically, and instead of counting the entire word as wrong, only the incorrectly read morphemes were subtracted from the total morphemes the participant attempted to read:

$$\text{MCPM} = \text{TOTALATTEMPTED MORPHEMES} - \text{INCORRECTLYREAD MORPHEMES}$$

3.3.2 Comprehension

The five comprehension questions presented to the children were based on the previous one-minute oral reading they had just completed. If the child only read to the end of the first sentence, then they would only be able to answer the first comprehension question; if they read up until the second sentence, they could answer up until the second comprehension question; and so on. One must be careful with this task to measure comprehension without a fluency effect. For example, the child cannot be marked out of all five questions if s/he only read until the end of the first sentence, and thus could only have the knowledge to answer Question 1. There is a need to test if the children are able to understand only what they have been able to decode. The raw comprehension scores were also too low to find any correlations. Therefore, the individual participant's comprehension scores used in this study was the number of questions correctly answered over the number of sentences read for a percentage score of what was understood while reading:

$$\text{COMPREHENSION \%} = \frac{\text{Questions correctly answered}}{\text{Total sentences attempted}} \times 100$$

3.3.3 General reading success

Fluency and comprehension cannot simply be added together for a general reading success score. It must be a ratio representing how much is understood compared to how much is read. Generally there were 3 sentences read and 1 comprehension question answered; so about a third of what was read was understood. Individuals' different totals of comprehension and fluency scores were added together to form a general comprehension score and a general fluency score. General reading success was a ratio of the amount understood over how much was read. The following formula was used to calculate the general reading success level of this study's isiXhosa participants. It was then correlated against a total composite score of the MA tests entailing different aspects of Morphological Awareness:

$$\text{GENERAL READING SUCCESS} = \frac{\left(\frac{\text{Questions correctly answered}}{\text{Total sentences attempted}} \right)}{\text{MCPM}}$$

3.3.4 Reading measures conclusion

Reading is comprised of two broad aspects in this study, fluency and comprehension. Traditional MA tests have looked at the link between morphology and comprehension, but there has been less research into how morphology in a first language contributes to fluency, particularly in more shallow orthographies (Saiegh-Haddad & Geva 2007). Fluency in this study did measure words correctly read per minute (wcpm) but will refer to morphemes correctly read (mcpm) unless stated otherwise.

The fluency results are expressed as a raw score as there is no limit on the number of words the participant could read. The comprehension test had a maximum achievable score out of 5. This can be represented as a percentage of what was understood over everything that was read. Fluency and comprehension are two separate measures that must be looked at separately throughout the study, though a general reading success score is entertained before returning to looking at the correlations of fluency and comprehension and MA separately.

3.4 IsiXhosa MA tests

In the Results chapter to follow, mcpm and comprehension are individually correlated against a holistic MA score. This composite morphological score consists of different results from within the different MA tests. The four MA tests for isiXhosa are described in detail next.

3.4.1 Test A: limbabule/Wugs



Photo courtesy of Jean Berko Gleason

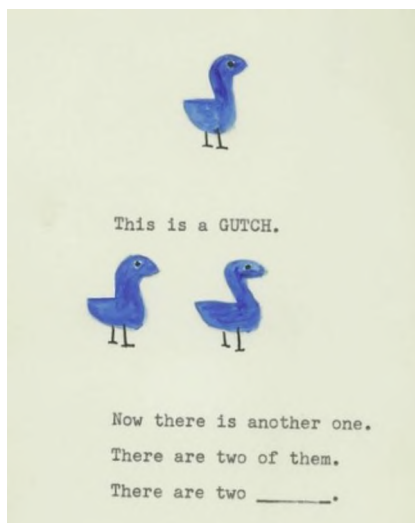


Figure 8: Examples from original Wugs test (courtesy of Jean Berko Gleason)

Berko's (1958) '*Wugs*' test in English is an inflectional morphology on pseudo nouns test. It proved that young children acquire language rules in a productive and analytical way rather than in a rote fashion. It showed that children have generalized morphological patterns rather than memorizing the plural form of words, and they can apply these generalizations to word stems they have never heard before. In the test, children are shown a picture of a funny looking creature with a pseudo name that is still in accordance with the language's orthography and phonology, such as the pseudo words "wug" or "gutch" for English. These are words that do not exist in English, but they could, and they can be pronounced and read by any literate English speaker even though they are nonsense words. Orthographically in English, the formation of plural is generally written as -(e)s, with slight phonetic variances. Depending on the phonology of the ending of the pseudo word, children had to supply one of the English plural allomorphs [s], [z] or [ɪz]. The children were told to complete a sentence, e.g., "Here is one wug. Now there are two of them. We say there are two _____?" The correct answer is "wugs" with the allomorph /-s/ on the end of the root noun pronounced as [z]. More than one "gutch" would be pronounced with [ɪz]. This test has proven successful in English children as young as kindergarten (Berko 1958) as well being very successful with Grade 4 isiXhosa learners (Ortner 2013) despite the more complex morphology found on isiXhosa nouns.

Number in isiXhosa is not associated with a single morpheme, like {-s} in English, but instead the form of the plural changes by noun class (Gxilishe *et al.* 2009). The isiXhosa version of the *Wug* test is therefore interesting because the singular to plural conversion can be explored in more depth simply because of the Bantu languages' extensive noun class systems. In the English plural marking system, there are three main allomorphs of the plural that are determined by the phonology of the last sound of the root noun. In isiXhosa there are at least five easily testable noun classes and thus more interesting because these rely on morphology and not only phonological environments like the English version. The Iimbabule/*Wugs* test in isiXhosa does rely on some phonological awareness for selecting the correct allomorph within a noun class. This depends on specific phonetic properties of the root noun, such as number of syllables or a bilabial onset of the root noun, but otherwise it is a more morphological test than its English equivalent. This is proved by the fact that an English written version of the test would not reveal anything as orthographically the allomorphs are generally written as /-s/

whereas in isiXhosa, the noun classes and allomorphs are orthographically different, as well as phonologically different.

It is important to be familiar with the noun classes in the isiXhosa language as they also appear as agreement on noun modifiers, like adjectives, as well as verb agreement with the subject. A good awareness of these noun classes and their agreement may help approach reading new words. The following subsection gives a detailed breakdown of the *Wug* test designed for isiXhosa.

3.4.1.1 Breakdown and scoring of the limbabule/Wugs test



Figure 9: Example of current isiXhosa limbabule/Wugs

"Nantsi imbabule...."

"Ngoku zinizi...imbabule"

The same pictures that were used for Ortner's (2013) study were used in the current test. Participants must orally respond with the correct form of the word, depending on whether they are shown one or many creatures first. The main point of the task is to convert nouns between their singular and plural form using specific morphemes. The purpose of the test is to see whether the children are morphologically aware of noun classes, even at a subconscious, implicit level. If the child fails to produce some kind of plural morpheme prefix when presented with a singular noun class prefix, or vice versa, then they have not understood the main requirement of the test, or they found the test too challenging. The child must then be aware that different nouns

get different prefixes, or in other words belong to different noun classes. The plural or singular prefix to be given by the child depends on the noun class of the prompt pseudo word. A child may recognize the singular/plural distinction in the pictures but, for example, uses {um-} for all singulars and {ama-} for all plurals. In that case, the child only receives a score for converting between singular and plural correctly, but if they are not faithful to the expected noun classes, then they are not awarded the Morphological Awareness points for the test.

It is also possible that children supply a prefix that phonologically suits the pseudo root environment for nasals or number of syllables, yet the prefix is not appropriate for the expected noun class. In these cases, it is possible to see if a child is phonologically aware but not necessarily morphologically aware. To be morphologically sensitive is to understand the phonological and morphological processes are in concert with each other, especially with allomorphs, and even though the form may be different, the meaning is essentially the same.

The test responses were scored for correctly moving between the singular and plural forms of the pseudo noun, as well as providing the correct noun class on the pseudo noun. Marks were also awarded for adhering to the phonetic environments that conditioned some of the allomorphs within the noun classes. Below are some examples from the Imbabule/Wugs test administered in the current study:

- (39) amabada → **_i_bada** (plural → singular, polysyllabic root : NC6 → NC5)
- (40) isipuka → **_izi_puka** (singular → plural : NC7 → NC8)
- (41) umqo → **_imi_qo** (singular → plural, monosyllabic root : NC3 → NC4)
- (42) → **_aba_qo** (singular → plural, monosyllabic root : NC1 → NC2)

In example (39), there is a conversion required between NC6 into NC5. It is an even numbered NC going to an odd numbered NC which means it is plural changing into the singular form of the pseudo noun root, '*-bada*'. A mark would be granted for producing a singular morpheme, another would be awarded for producing the morphologically correct NC5 prefix morpheme. A third point can be earned for producing the single syllable allomorph of NC5, '*i-bada*' instead of '*ili-bada*'. This is because the root is polysyllabic and thus requires the shorter form of the prefix.

Some noun classes do not necessarily have a short and long form of their prefix, such as NC7 and NC8 in example (40). This is a straight forward change between singular and plural,

providing the root was interpreted as '-puka'. Each answer has to be looked at carefully in order to see if the child did not give the expected answer, but the answer is not necessarily wrong. The child may have identified different boundaries for the pseudo root noun, or it is ambiguous which noun class the noun is in, despite the prefix.

For example, the pseudo root '-qo' in example (41) consists of the NC {um-}. {Um-} depicts that '-qo' belongs to NC3 and therefore takes NC4 prefix to signal the plural form. The expected answer is therefore 'imiqo', however, {um-} is also the prefix for NC1. Therefore, it is also correct for the child to give the response 'abaqo', where {aba-} is the NC2 plural of NC1, {um-}. Both {imi-} or {aba-} are acceptable responses because of the mono-syllabic pseudo root requiring the prefix to be poly-syllabic. All phonetic variations and allomorphs as well as correct alternative noun class answers were considered when scoring this test.

This test has been successful in English and is one of the only MA tests to already be successfully administered to isiXhosa children (Berko 1958, Ortner 2013). The current study will see if even younger isiXhosa children (Grade 3) have generalized morphological patterns in noun class pairings rather than memorizing the plural form of nouns. This task tests whether the children can apply these generalizations to stems they have never heard before. Like the Morpheme Identification test from McBride-Chang *et al.* (2005: 423), the researchers feel the pictures were necessary in order to administer the test to young children. Though the pictures may prompt a kind of semantic approach in the current test too, this semantic effect is only present in the noun classes traditionally reserved for humans. This also tests to what extent NC morphology affects MA in young readers, and begins to test whether there is a difference with respect to morphology on nouns and the morphology found on verbs. A pseudo verb version of the task must still be developed.

3.4.2 Test B: Sentence Analogy

In this combined morphological decomposition and production test, also known as a Word/Sentence Analogy test, the participants must provide a missing word based on a pattern from a set of words. This test captures "the broad construct that is MA" (Kirby *et al.* 2011: 392) because of its ability to test all avenues of the language's morphology, including broad aspects like inflectional versus derivational morphology, but also has the power to test specifics within the morphological facets of tense, aspect, noun classes, negation, adjectives and much more. This test could be presented as a written task but in the current study it is administered orally.

Kirby *et al.* (2011: 402) found a statistical difference between the items that could be solved phonetically (Phonologically Manipulated (PM) items) and those that had a phonetic shift and therefore had to be solved morphologically (Morphologically Manipulated (MM) items). An example of a PM item in the Word Analogy would be: "*doll* → *dolls*... *sneaker* →?" (expected answer: *sneakers*). The participant could simply copy the phoneme [z] onto the new word, and thus have solved it phonologically. When there are phonological shifts, the pattern must be solved morphologically, and, in English, this is generally to test the exceptions to morphological rules in language (Kirby *et al.* 2011: 406). For example, "*hot* → *hotter*... *good* →?" (expected answer: *better*). There is a potential risk of skewed scores in a test like this due to the relative ease of PM items compared to items that could only be solved morphologically, especially prior to Grade 3 (2011: 406). By testing the exceptions to morphological patterns in English, it is also questionable whether it is solely Morphological Awareness being tested or whether this taps into a knowledge about exceptions to grammatical rules. Fortunately, due to the regular but rich morphology of isiXhosa, all the items involve phonological shifts and will have to be answered using morphological manipulation and not reliance on phonology. This manipulation of the morpheme is innate and the responses will often be "what sounds right", based on the child's existing oral vocabulary.

In the morphological Analogy test, the pattern is decomposed in the first half and needs to be applied to the second half in order to produce the answer. Another English example of this kind of test would be:

(43) I walked → I walk... He jumped → He ____?

The answer is "jumps" because the grammatical process to be decomposed is moving between past tense and present tense, and now present tense morphology must be applied to the next given word. In addition to removing the {-ed} past tense suffix, the third person singular present tense {-s} morpheme must be added to the verb so as to agree with the third person singular pronoun, "he". English has limited morphological agreement and the same kind of concord is not needed for first person pronouns and verbs in the present tense, as can be seen by "walk" having no inflections.

3.4.2.1 Breakdown and scoring of the Analogy test

Each question alternates between an inflectional test item and a derivational test item, allowing the broad morphological distinction of inflectional versus derivational morphology to be

explored. Because inflectional morphology only changes the word form and not the meaning of the word, it is easier than derivational morphology. Being able to make new meaningful words with derivational morphology and understand complex derived words correlates the most with reading success in the literature (Carlisle 1995). A prefix/suffix distinction will also be made when scoring the test which will form part of a larger prefix/suffix composite score to see if it is the specific placement of the morpheme being manipulated that affects whether children are unable to complete the test or not. In the next subsection are the test items presented to the children, as well as an explanation of the isiXhosa morphology being tested in each question:

3.4.2.1.1 *Part (a): Inflectional morphology*

- (44) Ndiyabona → Ndibonile ... Uyadlala → Udlalile
I see → I saw ... We play → *We played*

If a child produced the answer 'Ndidlalile' (I played), then they have understood the decomposition into the past tense, but did not understand the requirement of the task to use the prefix with the verb root from the new word, and only the past tense morphology from the first pair of words. This is an issue that would not arise in English because the pronoun would be orthographically separate from the verb and participants would only have to focus on producing the correct form of the verb. IsiXhosa's agglutinating nature adds an additional level of complexity to this test. In this case, children are given a suffix score but not full marks for the test item if the correct prefix was not used.

The correct answer to (44) is '*udlalile*' where the verb root '*-dlala*' has moved into past tense by removing the present tense FV *{-a}* and replacing it with the past tense *{-ile}* morpheme. The *{-ya-}* morpheme signaling that there is no object after the verb in the present tense is not a requirement when the verb is in past tense and therefore the *{-ya-}* needs to be dropped.

- (45) Anithethi → Anithethanga ... Akufiki → Akufikanga
You (pl) are not speaking → You (pl) were not speaking ... You (sg) are not arriving → *You (sg) were not arriving*

IsiXhosa uses a different morpheme when the sentence is in the past tense but is also negative. Instead of {-ile} past tense morpheme, such as in (44), the {-anga} suffix is used in conjunction with the negative prefix {a-} on the verb to form *akufikanga* as can be seen in test item (45).

- (46) Ndiza kutya isonka ngomso → Ndiyacitya isonka ... Umama uza kubhaka ikeki ngomso →
 Umama *ubhaka* ikeki
 I will eat the bread tomorrow → I eat the bread ... Mother will bake the cake tomorrow →
 Mother *bakes* the cake

Question (46) requires a move from future tense into present tense. English does not have a grammatical future tense like the morpheme {za} and the modified infinitive {ku} on the verb, as we see in isiXhosa. The {u-} in *ubhaka* represents subject agreement in the sentence, thus it is not enough to simply provide only the verb and the FV for present tense, '*bhaka*'. Besides present tense third person singular (as demonstrated in the English *jumps* example (43)), subject agreement is a morphological process of which English does not make as extensive use, compared to a language like isiXhosa.

- (47) UThandile uza kuya esikolweni → UThandile akazo kuya esikolweni ... Ndiza kutshata →
Andizo kutshata
 Thandile will go to school → Thandile will not go to school ... I will get married → *I will not* get
 married

Negatives are formed in various ways in isiXhosa depending on the tenses. Negative morphemes of the future tense require the future tense {za} morpheme to be changed. In the future tense negation, the negative prefix is the usual {a-} morpheme, which is attached to the pronoun adjacent to the verb. The final vowel on the {-z-} morpheme needs to become an {-i}. *Andizo* is the contracted form of *andizi* and either form can be used in this construction in (47).

- (48) Siyathetha → Asithethi ... Ndiyafika → *Andifiki*
 We are speaking → We are not speaking ... I am arriving → *I am not arriving*

The last inflectional question (48) is very similar to one of the examples provided to the children before commencing the test. It involves moving from present tense into the negative equivalent of the sentence. Like in (44), the {-ya-} prefix needs to be deleted, then the typical negative {a-} prefix and {-i} suffix are used to form the negative of the verb, *andifiki*.

3.4.2.1.2

Part (b): Derivational morphology

- (49) Ukambula → Ukambatha ... Ukuvula → Ukuvala
To take off clothes → To put on clothes ... To open → to shut

In (49) there is a phonetic change in order for a meaning change. The /u/ in the root verb changes to an /a/ in order to achieve the semantic opposite meaning of the word. A similar process can be found in other Bantu languages, such as Setswana (*apola* 'take off clothes'; *apara* 'put on clothes'). The priming clue is actually a phonetic exception and thus '*ukambatha*' and not '*ukambala*', therefore one would need a native understanding of isiXhosa to know that the answer should be '*ukuvala*' and not '*ukuvatha*'.

- (50) Ukuzingela → Umzingeli ... Ukulwa → Umlwi
To hunt → hunter ... To fight → *fighter*
- (51) Ukutshixa → Isitshixo ... Ukubuza → Umbuzo
To lock → key ... To ask → *question*

Being able to derive new words from existing words in one's vocabulary results in a wider vocabulary which has been proven to correlate with one's reading success, especially in the earlier school years (McBride-Chang *et al.* 2008). As with (48), test item (50) is a control because it is similar to the derivational example explained to the children in the beginning of the test. They have therefore been primed for this question. The process of deriving nouns from verbs in isiXhosa is to remove the infinitive marker morpheme {uku-} and put the appropriate noun class on the root. The final vowel of the root verb must also change to an {-i} if the new noun is a human, such as in (50). The same process is happening in (51) except the FV changes to an {-o} if the new noun is an object, such as in *umbuzo*. (51) also relies on native speaker fluency because the word 'key' is in a different noun class to the word 'question', hence the same noun class prefix, {isi-}, cannot be repeated on the new target word; the answer is '*umbuzo*' and not '*isibuzo*'.

- (52) Kalusizi → -Lusizi ... Kakuhle → -hle/-kuhle
Sadly → sad ... Beautifully → beautiful

In (52), an adverb to adjective conversion was tested, though the current project mainly focuses on nouns and verbs. Adverbs, in isiXhosa, appear as free standing words and the process of forming them is relatively simple, i.e. adding the {ka-} prefix, much the same way that English adds an {-ly} suffix to their adjectives to form adverbs. Besides this, English adjectives have very little morphology attached to them. On the other hand, it is unlikely the isiXhosa children will be used to producing adjectival roots in isolation with no affixes attached in such a de-contextualized way, thus this may prove to be a difficult test item. As mentioned earlier, noun modifiers like adjectives must agree with the noun they are describing, thus the adjective would not appear without some kind of subject marker attached. In the pilot study, adverb to adjective as well as adjective to adverb was tested and this did not seem to make a difference to the poor performance on this test item.

- (53) Ukuzisa → Ukuzisa ... Ukuthenga → Ukuthengisa
To come → to bring ... to buy → to sell

(53) is testing the causative morpheme {-is-} in isiXhosa. The morpheme is inserted between the root verb {theng-} and the final vowel and literally means 'to cause to'. 'To cause something to come' can be interpreted as 'to bring something'. 'To cause to buy something' means that 'something is being sold'. It creates a new meaning and a new word, thus falling under the derivational morphology category.

3.4.3 Test C: Revised Morphological Structure test/ Word Building



Figure 10: Current study's Word Building test

The description of the original Morphological Structure test by McBride-Chang *et al.* (2005: 421) is the ability to construct new meanings by making use of knowledge of previously learned or familiar morphemes. It has been previously used for English compounds (See §2.6.3 (34) *treetop vs. treebottom* example) (McBride-Chang *et al.* 2005). Compounding is not a central derivational morphological phenomenon in isiXhosa, unlike in languages like English or Chinese, and thus other derivational and inflectional morphology needs more focus. The ability to construct new meanings can also be done with familiar affixes of inflectional morphology through the use of a kind of 'Wugs' test but this is a more implicit awareness (McBride-Chang *et al.* 2005: 421).

The Revised Morphological Structure test is a Word Building test that explicitly encourages children to create words or sentences with morphemes, which is more reflective of the rich morphology of the isiXhosa language than the original Structure test that focused on compounding. Using small cue cards with different morphs printed on them, the participants are encouraged to build long agglutinating words, phrases or sentences, using inflectional or derivational morphological processes on the roots of nouns and verbs.

Unlike the other MA tests, this test needs a time constraint to ensure that all children had an equal amount of time to build. Children were allocated 5 minutes in total for this task. The first two minutes of the test were spent building sentence examples and familiarizing the child with the different cue cards with the different isiXhosa morphs written on them. This was done by naming the different morphs out loud, such as {-ile} or {aba-} and asking the child to point to the morpheme card to which the research assistant was referring. The children then, on average, spent only 3 minutes building words. When the child is aware of the options available for building, word/sentence trial builds were performed as examples. The research assistant explains how to build sentences such as: a+ndi+sa+balek+i (*andisabaleki*, "we are no longer running"). After the child has been shown the example sentences being built, the child must then chose a root noun or verb (or both) cue card and build onto the root in a morphological manner. The test is presented as a game and for every cue card (morpheme) used to build the word/sentence, a token is awarded. The aim of the game/test is essentially to earn as many tokens as possible, in the three minutes of building. The child is shown in the examples before the commencement of the test that many tokens can be scored more quickly when more morphemes are joined together. Building sentences in the test was encouraged, though most children only built words.

3.4.3.1 Breakdown of the Word Building test

Below are some examples of the lexical root nouns and verbs available to the children:

Nouns	Verbs
(u)-bisi (milk)	bon- (see)
(i/ii)-tapile (potato/es)	sel-(drink)
(isi/izi)-hlangu (shoe/s)	ty- (eat)
(um/aba)-ntu (person/people)	theth- (speak)
(u/oo)-mama (mother/s)	mamel- (listen)

Table 7: Examples of roots supplied to children in the Word Building test

Verbs could be constructed using a verb root and a final vowel suffix to mark tense. The verb root cannot stand alone without the final vowel, as seen in the first example (54) below. Noun root morphemes could be paired with morph cards of noun class prefixes, as root nouns cannot stand alone either, as in the second example (55) below. This could be taken a step further and another morph card showing the same NC prefix that was used on the noun could be repeated and used on a verb as subject agreement in building sentences, as in (56)⁸. For example:

(54)

theth	a
-------	---

(55)

u	mama
---	------

(56)

u ₇	mama
----------------	------

u ₇	ya	theth	a
----------------	----	-------	---

In the example (56) above, the verb 'theth-' is used together with the inflected noun root 'u-mama' to form a sentence. This requirement of subject agreement between the noun and the verb is more difficult than building verbs or nouns in isolation. It is possible to form a sentence using only a root verb, without an accompanying subject noun as an orthographically separate word.

⁸ Verb agreement with subject noun explicitly marked here for the readers convenience

Subject markers on verbs serve as pronouns as well pronoun prefixes such as {ndi-} or {si-} (meaning 'I' or 'we') attached. For example:

(57)

ndi	ya	theth	a
-----	----	-------	---

"I am speaking"

(58)

a	ndi	theth	i
---	-----	-------	---

"I am not speaking"

Building with these grammatical morphemes is slightly more cognitively challenging than simply building sentences with isolated verb roots and nouns. This is because the same morph could mean different things depending on the context. The morph {a} could be the final vowel suffix on a verb {-a}, such as in example (57) above, or it could be the negative prefix {a-} on a verb stem, such as in example (58). The morph {i} could be a noun class prefix on a noun root {i-}, similar to NC1a {u-} in example (55), or it could be the final vowel on a negative verb stem {-i} which accompanies the negative prefix {a-}, as demonstrated in example (58). Children need to decide what grammatical function the ambiguous morph cards will have in their individual word/sentence building based on their explicit knowledge of affixes in their language.

3.4.3.2 Scoring in the Word Building test

The children received one token per morpheme used to build with, regardless if the morphemes were correctly used or not. This was done in order not to discourage the participants from the task if they built incorrectly. The researchers wrote down how the child constructed the words and sentences exactly as they were built. This was very important later when assigning morphological scores. It is necessary to see whether the words were built morphologically or using a phonetic approach, for example, building *u-si-si* phonetically instead of using the noun class and noun root, *u-sisi*. Sentences consisting of more than one orthographic word, for example, a subject noun and a verb, were accepted as two or more correctly built words, provided there was subject concord with the verb and no words are built phonetically.

The morphological score is based on how many morphemes were correctly used rather than a total number of words built in the test which will give more insight to the length and

complexity of multi-morphemic words that children are comfortable building at this level. The revised version of the Morphological Structure test cannot be solved semantically like McBride-Chang *et al.*'s (2005) original version, but can still be administered to children. There is no ceiling effect in a task of this nature and one would be able to see a clear developmental trend of morphemic complexity of words, should the test be administered more than once to the participant. It may also be clearer after the test whether there are any morphological overgeneralisations or tendencies to use a particular morph to represent a general morpheme, for example, using the suffix/morpheme cue card {-e} for all past tense constructions.

3.4.4 Test D: Revised Morphological Identification test

The original Identification test by McBride-Chang *et al.* (2005) asked children to distinguish morpheme meanings across homophones; for example, asking if the 'blue' in 'blueberries' matches the morpheme 'blew' or 'blue' (see §2.6.4 for an overview of this test). There is a strong link between morphology and semantics but a morphological test is not good if it can be solved using semantics only because then it unclear if it is a Morphological Awareness that contributes to reading, or if is semantic knowledge, or vocabulary knowledge only that contributes. The lack of homophones in isiXhosa also makes the original test unsuitable for the current study.

As previously mentioned, the agglutinating language of isiXhosa means a sentence could be translated as one orthographic word, but made up of multiple morphemes. Readers are thus exposed to longer, more complex words that need to be decoded to identify all the grammatical and semantic meanings. The revised version of the Identification test explores whether children can identify the smallest parts within the word (identify the morphemes). This is unlike the previous tests, such as the original Morphological Structure test, original Morpheme Identification tests, and morphological decomposition tests which generally require some kind of lexical root identification (see §2.6 for a review of these tests). The revised test asked children to identify specific inflectional and derivational affixes, namely past tense morphemes and morphemes that indicate negation (negative morphemes) in isiXhosa.

Negative and past tense morphology were chosen because there are a wide range of allomorphs from which to test for both, in isiXhosa, in other words, morphemes that all mean "negative" but manifest themselves under different linguistic environments, for example future tense negative morphemes, past tense negative morphemes, the effect on the morphemes during a presence of a copular etc. In the first half of the Morphological Identification test, the children

were asked to highlight on the word which part(s) means that something did not happen or someone did not do something. The second half is similar but all the sentences are in the past tense and children need to highlight which part(s) of the word, for them, means that the sentence takes place in the past, or long ago.

In the pilot study there were originally 20 test items; half to be identified in the negative morphology section and the other half in the past tense morphology section. For time purposes, this task had to be abridged. The test currently stands at two halves with 6 sentences for each the past tense and the negative morpheme identification sections, resulting in 12 sentences overall. This test requires the conscious decomposition of morphemes which could be cognitively challenging at this age; thus children cannot be rushed for time on this test. Ideally, this test should have no time constraints and have as many examples as needed to complete the whole test with full understanding.

In the pilot study, it was found that without examples, children tend to highlight the entire verb rather than the smallest units of meaning within the word or sentences. Highlighting of the whole verb with all its inflections (instead of only the required affixes) could mean the child recognizes that the verb carries the past tense or negative morphology in isiXhosa. However, it could also mean they did not fully understand the requirements of the test, and/or they have not thought about morphemes in this explicit and formal way before. I predicted a difference between the identification of negative morphemes over past tense morphemes. This is because though there are just as many different allomorphs for past tense as there are for negative, negation is doubly marked in isiXhosa and generally there is always an {a-} negative prefix, even if the suffix for the negative changes for the different allomorphs (see examples 60, 61, 64 in §3.4.4.1.1 to follow). This also led me to believe there will also be a distinction in number of prefixes identified versus number of suffixes identified. The following subsection gives a detailed breakdown of the Identification test as it was designed for isiXhosa.

3.4.4.1 Breakdown of the Revised Identification test

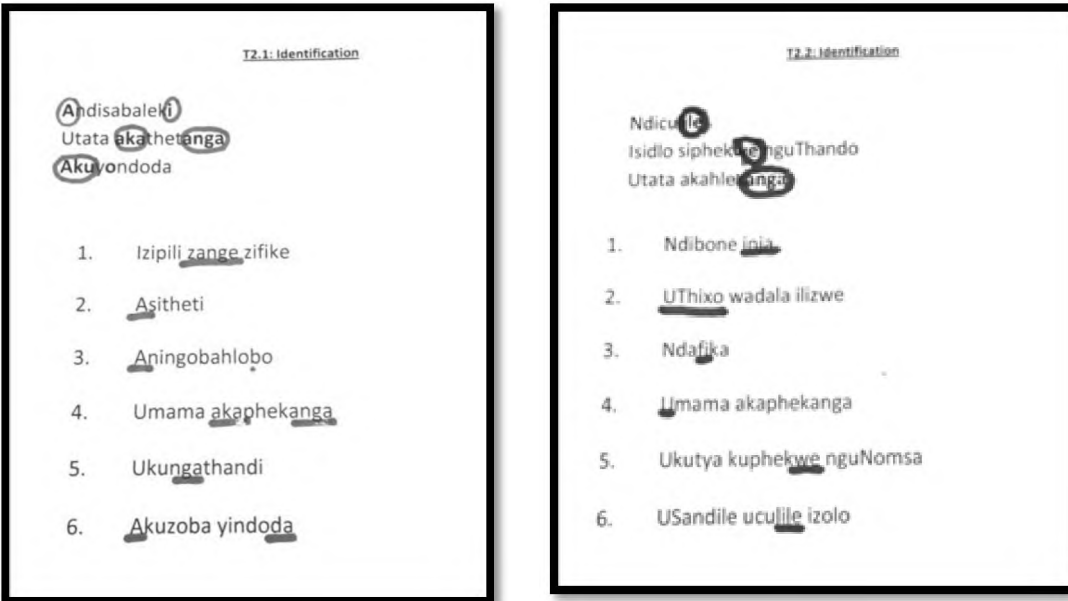


Figure 11: Example of a learner's responses on the current Identification test sheet

Below are the sentences presented to the children for identification, along with an explanation of what specific allomorph is being tested with regards to each sentence. The children were coached through three examples on how to break the word up morphologically and then presented with the negative and past tense sentences (presentation of sentences to learners provided for the reader's convenience in Fig. 11). After the following section outlining the morphemes in the Identification test, there is an explanation of how the test was assessed. This was done according to whether or not the children could identify the smaller negative and past tense morphemes, or whether they adopted a whole word approach.

3.4.4.1.1 Part (a): Negative morphemes

- (59) *Izipili zifikile* → *Izipili **zange** zifike*
The mirrors arrived → The mirrors never arrived
- (60) *Siyathetha* → ***A**sithethi*
We are speaking → We are not speaking
- (61) *Ningabahlobo* → ***A**ningabahlobo*
You(pl) are friends → You(pl) are not friends
- (62) *Umama uphekile* → *Umama **akaphekanga***
Mother cooked → Mother did not cook
- (63) *Ukuthanda* → *U**kungathandi***
To love → Not to love
- (64) *Uza kuba yindoda* → ***A**kuzoba yindoda*
You(sg) will be a man → You(sg) will not be a man

The morphemes bolded in each sentence are the smallest negative morphemes that the children were asked to identify. In the first negative identification sentence (59), though the negative morpheme is technically {nge}, the highlighting of the entire word 'zange' will be accepted as partly morphologically correct instead of as a lexical approach. This is because it is for orthographic reasons that the negative morpheme {nge} is written separately from the main verb in this sentence, unlike the convenient negative lexemes like 'not' or 'never' in English. This is testing one of the more marked negative sentences that would require the morphology not to be attached to the main verb root. Sentence (60) contains the prefix {a-} and the suffix {-i} which are the common morphemes used to produce negation on isiXhosa verbs. (61) and (64) are not doubly marked for negation because the verb is a copular. Though these copula sentences are in different tenses, both use only the negative prefix {a-}. Test item (62) also engages with tense, looking at the negative morphemes when the sentence is in the past tense. The verb in (63) is in the infinitive form so it is not bound to a particular tense or subject noun. Here the infinitive prefix marker {uku-} must precede the negative prefix on the verb.

3.4.4.1.2 *Part (b): Past tense morphemes*

- (65) *Ndibonainja* → *Ndibonginja*
I see the dog → I saw the dog
- (66) *UThixo udala ilizwe* → *UThixo wadala ilizwe*
God creates the world → God created the world
- (67) *Ndifika* → *Ndafika*
I arrive → I arrived
- (68) *Umama akapheki* → *Umama akaphekanga*
Mother does not cook → Mother didn't cook
- (69) *Ukutya kuphekwa nguNomsa* → *Ukutya kuphekwe nguNomsa*
The food is being cooked by Nomsa → The food was cooked by Nomsa
- (70) *USandile uyacula* → *USandile uculile izolo*
Sandile sings → Sandile sang yesterday

Similarly to (59), there is also a lexeme to be identified for past tense in (70). Children can highlight 'izolo', meaning 'yesterday', which is a part of the sentence that means that it happened in the past. However, if they are even more morphologically aware they would also notice the suffix {-ile} on the verb that should also be highlighted to indicate past tense. The proper noun, Sandile, may also look like it is also formed with the {-ile} morpheme but this is not the case and

the children should recognise that it is the morphology on the verb that is creating the past tense meaning.

Past tense morphology usually occurs in the suffix position on the verb but in (67), a prefix is used instead of a suffix like the usual past tense morphemes. In the sentence (66), there is also a prefix that invokes the remote past meaning, which is often used in stories or for historical facts, and should not be too unfamiliar to children. Unlike the syntactically marked English passive voice of 'N was V-ed by N', to form a passive sentence in isiXhosa, the {-w-} suffix is inserted after the verb root and before the final vowel as in (69) and the object of the sentence is fronted. Therefore, in sentence (69) it is still the typical {-e} final vowel that is marking past tense, as is the case with (65).

Sentences (62) and (68) are the exact same sentence except in sentence (62), the child is required to identify the negative morphemes which are both the {aka-} prefix and {-anga} suffix for negative past tense. Technically, the {-anga} suffix is a portmanteau⁹ morph that means negative as well as past tense, whereas the {aka-} prefix only means negative. Therefore, in (68), where the past tense morphology must be highlighted, only the suffix on '*akaphekanga*' should be highlighted.

3.4.4.2 Scoring the Identification test

The previous section looked at the inner workings of allomorphs in negation and past tense morphology in isiXhosa. One can see by the sentences from the test described in the previous section that isiXhosa words are orthographically longer than their English equivalents, but are made up of many morphemes (meanings). This test investigated whether children had an awareness of this kind of word structure in their language.

The literature suggests a broad dual route during the processing of morphemes. Words are either processed by full-listing, decomposition, or a combination of the two (Verhoeven & Perfetti 2011). It seems reasonable that a morphologically rich language like isiXhosa would use a decomposition route to process their long words. This test requires children to identify the formal aspects of the words that create the meanings of negation and past tense. However, it is possible that children are not using a purely morphological decomposition for reading, and rather another processing route, such as phonological decomposition (for example, reading syllable-by-syllable or grapheme-to-phoneme) (Saiegh-Haddad & Geva 2007; Ziegler & Goswami 2005).

⁹A single morph that is analyzed as representing two underlying morphemes.

This test relies on children reading with comprehension and uses cognitive reasoning abilities. Children were tutored to analyze the word morphologically by showing them the morphological changes in the example sentences. This was to show explicitly that only minimal units/morphemes change in order to transform the sentence into negation or past tense. Despite the coaching in the beginning of this test, children may still take the full listing approach and highlight the whole verb. It is also possible for children to decompose the words morphologically, but not identify the morphemes that were requested, which still shows a higher level of Morphological Awareness towards the structure of the words.

Each Identification answer was based on a nominal scale of A-H, depending on the approach each child took for each word/sentence. The approach was determined based on what the child highlighted in the different sentences. On the following page is an explanation of the different symbols for the different task approaches, and an example demonstrating each one.

In addition to this qualitative measurement of children's performance, a numerical score was also noted based on correct identification of morphemes and the incorrect morphemes identified (hits and misses respectively). The overall purpose of the Identification test was to explore the children's ability to break the words/sentences up into smaller, more meaningful units. A conscious, morphological approach such as this could benefit general reading and decoding in the longer structured words of isiXhosa if children were tutored to process words in this way. This test has not been done in other languages due to the focus on root identification tests but it is easily adaptable, especially for languages with more complex morphology than English. Future research looking at the younger grades should perhaps not focus on so many different allomorphs per subsection of the test, and rather see if the child can identify the same morpheme across different sentences, before moving onto the more complex identification of allomorphs.

Decomposition route/ Morphological Approach	A	All morphemes highlighted within the word are correct, i.e. the correct past tense or negative morphemes were highlighted. Negative example: <u>A</u> sithethi Past tense example: Ndibone <u>e</u> inja
	B	There is a combination of one right morpheme highlighted, but also one wrong morpheme highlighted. Despite the wrong morpheme, the child is still approaching the word/sentence with a morphological approach. Negative example: Ukungath <u>handi</u> Past tense example: Nda <u>fika</u>
	D ¹⁰	An incorrect morpheme or more than one incorrect morpheme is highlighted, but the child is still segmenting morphologically. Negative example: <u>Ukungathandi</u> Past tense example: Nda <u>fika</u>
Full-listing route/ Lexical Approach	C	The correct lexical item in the sentence was highlighted, usually the verb which carries the past tense/negative morphemes. However, the child could not decompose the word into smaller morphemes. Negative example: Umama <u>akaphekanga</u> Past tense example: UThixo <u>wadala</u> ilizwe
	E	An incorrect lexical item was highlighted that does not contain the negative or past tense meaning within, for example a noun in the sentence. Negative example: Akuzoba <u>vindoda</u> Past tense example: Ndibone <u>inja</u>
Incorrect Approach	F	Highlighted everything and thus did not understand or complete the requirements of the test. Negative example: <u>Aningobahlobo</u> Past tense example: <u>Ukutva kuphekwe nguNomsa</u>
	G	An attempt at breaking up the word into smaller units is made but it is clearly wrong. For example, highlighting only single letters or highlighting the first and last part of every word/sentence even when it does not make sense. Usually an effect of example priming and the child does not understand the task demands. Negative example: <u>Ukungathandi</u> Past tense example: Ukut <u>va</u> kuphekwe ngu <u>Nomsa</u>
	H	No attempt is made at highlighting anything in the test either because there was not enough time to complete certain sentences, or the child was illiterate or they did not understand what was required of them from the test.

Table 8: Breakdown of different approaches that can be taken in the Identification test

¹⁰ABC are the more correct options to highlight whereas ABD are the morphological approaches to highlighting, even if some of the morphemes are incorrect.

3.5 Conclusion

This section explained the four different MA tests used in the current study and explored the morphological complexity that can be examined within a language like isiXhosa. The current tests have a pseudo word test, an inflectional versus derivational test, as well as tests that require the child to read, which are the more explicit types of MA tasks. Across the tests, a prefix versus suffix distinction was also made to see if children at this age are paying more attention to the beginning or ends of their long agglutinating words.

There is also the oral versus written task distinction. Some of the tests are written and require the children to read by themselves and some are presented orally. The oral tests do not require the participant to know how to read (Iimbabule/Wugs and Analogy). The other two tests (Word Building and Identification) require the children to know how to read, and read for meaning. The two written tests are also the two tests that require explicit manipulation of morphemes and the two oral tests tap into a more intuitive and implicit kind of Morphological Awareness.

The next section are the results for each of these four tests, which is followed by a discussion analyzing how each test and MA in general related to variables like gender, reading fluency and reading comprehension.

Chapter 4: Results and Analysis

Logically, the more you are able to read, the more comprehension questions you are able to answer. However, in the current study, being able to decode words did not necessarily mean the children could understand what they had read. An alpha level of 0.05 was used for all statistical tests. There is a weak to moderate positive relationship ($r(74) = .46^*$, $p < 0.0001$) between fluency and comprehension that is highly significant; but the young readers fared better in fluency than in comprehension, overall.

To follow are the results from a ratio of the two measures of reading success, fluency over comprehension, correlated with a total MA score, devised from the totals of the four different MA tests. This will answer the broad question of whether MA correlates with reading success in general. However, due to the acute differences in fluency and comprehension, the MA results also need to be compared against these two measures independently, in order to judge where MA makes its biggest contribution at this stage.

4.1 Total MA and reading success

The formula for general reading success can be found in the Methodology section (§3.3.3). The Total MA score is a composite score consisting of the main morphological aspects of each MA test: the noun classes correctly used in the Iimbabule/Wugs test, the total number of morphemes identified in the Identification test, the number of prefixes and suffixes used in the Word Building test and the total amount of inflectional and derivational questions answered correctly in the Sentence Analogy test. The result was a weak correlation between general reading success and total MA scores that was not significant $r(74) = .2$, $p = .08$. This is probably a function of the individual tests comprising the composite score and should not be interpreted as showing the MA is not relevant to reading. Rather, this should feed into future research to develop a more representative and effective composite score that focuses on those aspects of MA that *are* implicated in reading.

4.1.1 Total MA score and fluency and comprehension

However, we know from the fluency and comprehension results that fluency and comprehension are not on par with each other with children performing better on decoding than understanding. Even though children perform better in fluency, there is a weak to moderate positive relationship ($r(74) = .46^*$, $p < 0.0001$) between fluency and comprehension that is highly significant.

Although fluency and comprehension were related (this is as expected as text can not be comprehended if it has not been decoded yet), the total MA score was correlated against the separate fluency and comprehension scores, respectively, to see if MA correlates more strongly within a particular facet of reading success measurements. The results below show the total MA score correlations with fluency and comprehension, separately:

	Fluency (mcpm)	Comprehension
Total MA score	$r = .61^*$	$r = .33^*$
	$p < .0001$	$p = .004$

Table 9: Correlation between total MA scores and fluency and comprehension

The total MA scores had a moderate to strong and highly significant correlation with fluency ($r(74) = .61^*$, $p < .0001$) as opposed to the comprehension scores which have a weaker but still significant correlation ($r(74) = .33$, $p = .004$). The number of morphemes you can read correctly per minute is strongly related to how well you can identify and manipulate morphemes in MA tests. Therefore, MA does correlate with reading success in general in isiXhosa, but the comprehension aspect of reading success is not as developed, thus MA correlates more with fluency at this stage. It must also be considered that in reading lessons in classrooms, it has been found that there is a major emphasis on reading as the ability to decode/pronounce letters, and teachers sometimes leave "the most fundamental capacity to be learned, reading with comprehension" unmonitored (Spaull 2013a: 29). Therefore, MA does correlate with what South African teachers view as successful reading, namely fluency (rather than comprehension).

Saiegh-Haddad & Geva (2007) is one of the few studies that allude to MA correlating with fluency in shallow orthographies, though the majority of the literature reports that MA should have correlated more significantly with comprehension (Carlisle 2000; Deacon & Kirby 2004; Kirby *et al.* 2011). The opposite result in this study could be due to the floor effects of the comprehension test. Overall, children can decode successfully but struggle to understand what they have read. The following sections explore the different MA tests in more detail. It will be shown that the trend of strong correlations with fluency over comprehension continues when looking at the MA tests in isolation, rather than as a composite MA score.

4.2 Individual MA tests and fluency

	Fluency	
	<i>r</i>	<i>p</i>
Iimbabule/Wugs	.03	.79
Analogy	.45*	$p < .0001$
Word Building	.6*	$p < .0001$
Identification	.47*	$p < .0001$

Table 10: Correlations between different MA scores and fluency (mcpm)

It has now been established that the MA results in this study correlated more strongly with fluency. Upon a closer inspection of each MA test, it is clear that not all MA tests correlate equally or as strongly. The Iimbabule/Wugs test has no correlation with reading fluency and this correlation is not significant $r(74) = .03$, $p = .79$. By contrast, the Word Building test has a strong and highly significant correlation with reading fluency $r(74) = .6^*$, $p < .0001$, while Analogy $r(74) = .45^*$, $p < .0001$ and Identification $r(74) = .47^*$, $p < .0001$ have moderate correlations that are also significant.

4.3 Individual MA tests and comprehension

	Comprehension	
	<i>r</i>	<i>p</i>
Iimbabule/Wugs	-.05	.7
Analogy	.37*	$p < .001$
Word Building	.31	.06
Identification	.25*	.03

Table 11: Correlations between different MA scores and comprehension

The strongest and most highly significant correlation with reading comprehension is with the Sentence Analogy test $r(74) = .37^*$, $p < .001$. This small but significant relationship with comprehension has been reported on previously (Kirby *et al.* 2011). This test is made up of inflectional and derivational Morphological Awareness items. Based on the literature, it was

anticipated that derivational awareness will correlate more with comprehension (Carlisle 2003). In section 4.6.1, however, we will see that this is not the case and that inflectional morphology correlated more strongly with comprehension. The Iimbabule/Wugs test, as was seen with fluency, does not correlate at all with reading comprehension. This negative correlation is not significant either $r(74) = -.05, p = 0.7$. The Iimbabule/Wugs have no correlations with fluency $r(74) = .03, p = .79$ nor comprehension $r(74) = -.05, p = .7$ though it was predicted that it would. This could be due to the ceiling effects of all the children doing well in the Iimbabule/Wugs test. This test reveals Morphological Awareness of the noun classes found in isiXhosa, but it is unclear how this knowledge is currently aiding reading success at this time.

4.4 Qualitative discussion of the individual MA tests

The next section discusses the performance of each MA test, individually. It is followed by a summary of the correlations of the each of the tests' individual results, before resuming with MA scores of various types of MA. The different types of MA are made up of various combinations of the following individual MA tests. It is then explored how those different types of MA relate to fluency and comprehension, respectively.

4.4.1 Iimbabule/Wugs test

It must be considered that within the Iimbabule/Wugs test there was an unbalance between the number of singular → plural, and the number of plural → singular conversions. However, this should not have had a great effect as, even if the child was not able to produce the correct noun class, the children generally still understood the test. This can be seen by the relatively high mean (of a possible maximum score of 9) and low standard deviation of singular/plural conversions ($M = 7.54, SD = 2.12$) by producing relevant prefixes where applicable. Converting between the correct noun classes, the main morphological aspect of the task ($M = 5.9, SD = 1.85$), $t(75) = 14.65, p < .0001$, was more difficult than producing any plural/singular affixes in general.

Test item	Nonsense word	Possible answer	Noun class conversions	Grade 3 % answered
a	umqo	<u>aba</u> qo	1→2	2.47%
a - Diff root interpretation	umqo	<u>oo</u> mqo	1a→2a	8.64%
b	abazonko	<u>um</u> Zonko	2→1	4.94%
c	oozoka	<u>u</u> Zoka	2a→1a	48.15%
d	umqo	<u>im</u> iqo	3→4	43.21%
e	amabada	<u>ib</u> ada	6→5	83.95%
e - Incorrect allomorph ¹¹	amabada	<u>il</u> ibada	6→5	1.24%
f	amaxu	<u>il</u> ixu	6→5	4.94%
f - Incorrect allomorph	amaxu	<u>i</u> xu	6→5	53.1%
g	isipuka	<u>iz</u> ipuka	7→8	81.48%
h	izinka	<u>in</u> ka	10→9	30.86%
h - Diff root interpretation	izinka	<u>is</u> inka	8→7	25.93%
i	iimbabule	<u>im</u> babule	10→9	95.06%

Table 12: Percentage of correct inflectional morphemes on pseudo nouns (iimbabule)

The last column of Table 12 shows the percentage of children who gave a particular answer, regardless of whether it was right or wrong. The most successfully answered question was the conversion between the plural to the singular NC10→NC9, *iimbabule* →*imbabule*, with an average of 95.06% of children getting it right. Overall, the average for the test was 64.06% ($N = 76$). The total average was brought down by the least successfully answered question, NC2→NC1, *abazonko* → *um**Zonko*. A Kruskal-Wallis test also determined this low performance on this particular question significant ($M = 4.94\%$, $p < 0.0001$). This could be due to an inherent semantic human association with NC1/2. Future studies should administer the test showing

¹¹ Task items (e) and (f) test allomorphs; if the root is two syllables, then the prefix must be one syllable, also referred to in this paper as 'short' prefixes, and mono-syllabic roots require a double syllable prefix, also referred to as 'long' prefixes. The example (e) *am**abada* → *il**ibada* above is therefore incorrect because of the use of a long prefix on a long root, but only 1.24% of participants answered this way. The children applied the rule of short prefixes to long roots. However, short roots also mainly received short prefixes when the phonology called for the morpheme to be two syllables long if the root is one syllable. This data was forwarded on to a colleague (Dr. William Bennett, Rhodes University) who was looking specifically at these phonological influences on morphology in isiXhosa.

pictures of inanimate objects such as imaginary musical instruments (McBride-Chang *et al.* 2008: 423) instead of animate creatures which may lead to less semantic effects of which noun class is chosen. Because the Iimbabule/Wugs test did not have any significant correlations with fluency $r(74) = .03, p = 0.79$ or comprehension $r(74) = -.05, p = .7$, future research could incorporate the test into the Sentence Analogy test, discussed next, as one of the easier inflectional morphology items. The next section briefly summarizes the Sentence Analogy test results and its correlations. Performance on inflectional items specifically in the test are reported on later in this chapter in §4.6.1.

4.4.2 Sentence Analogy

The Sentence Analogy test total had a moderate correlation with fluency $r(74) = .45^*, p < .0001$, which was stronger than the weaker correlation with comprehension $r(74) = .37^*, p < .0001$. This test, out of the four MA tests, is the only test that has a highly significant correlation with comprehension. This task also had the ability to test the specific differences between inflectional and derivational morphology, which aligns with the traditional view of testing MA. The significant correlation with comprehension is mainly due to the contribution of inflectional Morphological Awareness over derivational Morphological Awareness, but this is explored in more depth in the inflectional versus derivational awareness section, along with the correlations of inflectional/derivational morphology and fluency (§4.6.1). Kirby *et al.* (2011) administered a similar test to Grade 3 English children. Their results for this test had twice as many test items (10 inflectional and 10 derivational, respectively) ($M = 9.83, SD = 4.21$). Half involved no phonological change (*jump: jumped*), and half involved a phonological change (*stand: stood*) (Kirby *et al.* 2011: 398). The current study had half the test items (5 inflectional and 5 derivational), but the results were not as impressive ($M = 1.4, SD = 1.23$). In fact, the isiXhosa results are more similar to the Grade 1 English Word Analogy results (Kirby *et al.* 2011). IsiXhosa does not have as many exceptions to the morphological rules as English (for example *stand: stood*), but the morphology of isiXhosa will always create a phonological shift. As discussed in §3.4.2, children find items that need to be manipulated morphologically harder than items that can be solved phonologically, and this could be the reason for the poor result in the current test as all the isiXhosa items need to be solved with morphological manipulation. There is reason to believe, based on the positive developmental trend across the English grades that

Grade 4 and Grade 5 isiXhosa children might perform better on the test. This test should not be administered to children younger than Grade 3 in isiXhosa due to the complex phonological shifts caused by the affixes, even though the test is tapping into a similar, implicit, oral morphological knowledge, like the Iimbabule/Wugs.

4.4.3 Word Building

The number of correctly used morphemes was the best measurement within this test. Morphemes correctly used to build in the Word Building test had the highest correlation with morphemes correctly read and this was highly significant $r(74) = .6^*$, $p < .0001$. The correlation with comprehension was not significant nor strong $r(74) = .31^*$, $p = .06$.

Though the Word Building test had the potential to also test inflectional and derivational morphology, there were only three instances of children deriving verbs into nouns. Even though the children were instructed to build more complex words/sentences, children approached this test in a basic manner and did not move beyond using verbs as anything but verbs. For this reason this test was looked at as a general awareness of the structure of nouns and verbs and how prefixes and suffixes apply to each respectively. This section details the nouns and verbs built by children in the current study. The general awareness of prefixes and suffixes is explored in §4.6.2.1.

Noun and verb roots cannot stand in isolation in isiXhosa. Nouns need a minimum of one prefix marking a noun class in order to stand in isolation, and verbs need a minimum of one suffix marking tense in order to stand alone and be accepted as a correctly built word.

	Nouns	Verbs
Lowest score obtained by a child	0	0
Highest score obtained by a child	8	7
Sum of all nouns/verbs used	147	152
Mean score per child	1.93	2

Table 13: Total Number of nouns and verbs built in Word Building test

Nouns were anticipated to be more difficult to build than verbs because a noun class morpheme card had to be found and correctly matched to a particular root noun, as opposed to simply adding a FV {-a} to any verb stem. In spite of this, a *t*-test revealed that the difference between

the average number of nouns built ($M = 1.93$, $SD = 1.96$) is not statistically different to the average number of verbs built ($M = 2$, $SD = 2.1$) $t(75) = -.2$, $p = .85$.

Even though the agglutinating nature of isiXhosa orthography allows for multi-morphemic words that could translate as a sentence (and the children were instructed to do so), children are not building words of this complexity. Out of the 417 words built, 71.7% of words were built morphemically, 21.34% were built incorrectly, and only 6.95% were built phonetically, overall. It seems children understood the requirements of the task though approached it in a simple manner. Out of the morphemically built words, 5.07% were the phrase 'uku-ty-a' (to eat) and 4.68% of the words built could be translated as a sentence. The rest of the words were generally bi-morphemic words consisting of either one lexical root noun or verb, and one attached affix. This test has the ability to measure the developmental trend of the morphemic complexity of the words children build in subsequent grades.

4.4.4 Identification

Despite the overall poor performance in this test, the Identification test was consistent with the general trend of the MA tests; the correlation with comprehension was not as significant $r(74) = .25^*$, $p = .03$ as the highly significant correlation the Identification test had with fluency $r(74) = .47^*$, $p < .0001$.

The moderate Identification and fluency correlation suggests that being able to recognise and segment morphemes could help with the fluency of reading long morphologically complex words. MA and fluency has not been given much attention in the literature, though this research, and research on other morphologically complex languages shows that children are capable of identifying morphemes and thus morphemes could be used as a possible grain size for reading (see §2.2.1.1). This test mainly requires reading sentences with full understanding. We know from the reading comprehension and fluency results that children are able to read relatively fluently, but do not understand or remember what they have decoded. The correlation with the Identification test and the comprehension test are weak, but reading with understanding should improve the strength and significance of the correlation between the two, because the comprehension test also requires the same understanding of what is being read in order to complete the task.

	Neg	Past
Lowest % obtained by a child	0	0
Highest % obtained by a child	88.89%	85.71%
Mean % for test	34.21%	29.51%

Table 14: Percentage of negative versus past tense morphemes identified

I hypothesized that identification of negation morphemes in this test would be significantly easier due to the double negation marking in isiXhosa and the consistent {a-} negative prefix. However, children seem unaware of this consistency in the negation prefixes and there was no significant statistical difference between the mean of the negation morphemes identified ($M = 34.21\%$, $SD = 27.74$) and the mean number of past tense morphemes identified ($M = 29.51\%$, $SD = 26.43$) $t(75) = 1.63$, $p = .11$.

Morphological intervention has proved successful in the past (Bowers, Kirby, & Deacon 2010; Reed 2008). Children need to become aware of the regular consistencies of the morphemes in their language, such as the negation morphemes in isiXhosa. If isiXhosa readers were explicitly tutored in specific affixes, there is reason to believe being able to identify and understand less abstract, meaningful grammatical morphemes, such as the past tense and negation morphemes, should help contribute to an improvement in reading comprehension overall. Future research could explore knowledge of the affixes in other morphological processes, such as future tense sentences. The precedent to this test is root identification tasks which may be inherently easier as lexical roots have more concrete semantics to identify. Root identification tests in future should use this type of MA test, rather than a morphological decomposition test like the "comes from test" (see critiques of this test under §2.6.2.1).

The Identification test has the representative power to see how many of the test items were attempted with a morphological approach and how many were identified using a whole word or lexical approach (Verhoeven & Perfetti 2011). The following diagram shows the distribution of correct morphological approaches in order to identify morphemes within words:

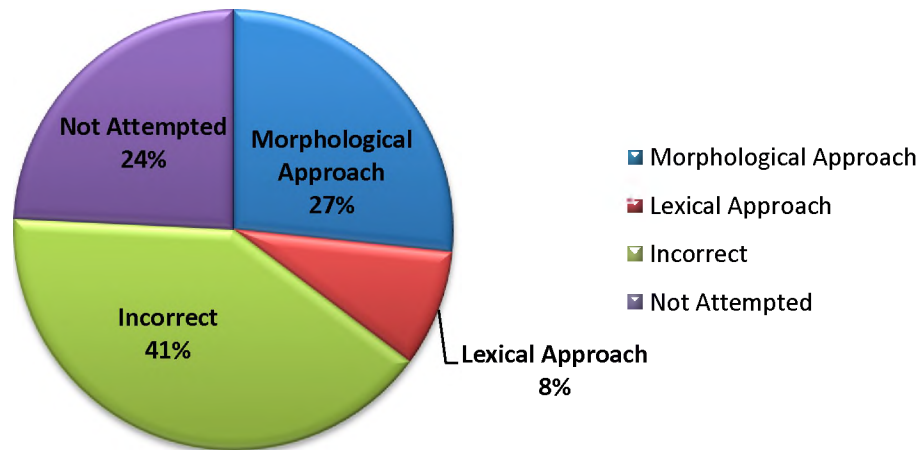


Figure 12: Pie chart showing distribution of the approaches taken by Grade 3 isiXhosa children in identifying morphemes within words

Once explained what the task required of them, children understood that they should be highlighting something smaller than a whole word. The previous pie chart shows that in just over a quarter of the overall test items (negation and past tense identification combined), the correct morpheme, or a combination of the correct morpheme(s) and one incorrect morpheme were identified. Only 8% of the identification attempts were to highlight the whole verb, instead of only the smaller required morphemes attached to the verb. 65% of children did not understand the task requirements and highlighted incorrect morphemes or incorrect words, for example the subject nouns in the sentences. This also includes children who could not attempt all the test items due to time constraints. As we saw from the comprehension results, the lack of reading with understanding was likely to be the reason for the poor performance in this task. Even children who read with comprehension may benefit from no time limit, given the complex nature of the test.

The quarter of the morphemes that were identified (which excludes the items where a morphological approach was taken, but the morpheme highlighted was incorrect) is beginning evidence for children being able to access the morpheme unit as a grain size for comprehension (see also Probert 2015). The general correlation with fluency across all the MA tests, with the exception of the limbabule/Wugs test, also suggests that morphemic units could be used a grain size for decoding, too.

4.5 Summary of correlations

The previous sections have demonstrated how aspects of Morphological Awareness relate to comprehension and fluency. These results are presented schematically in the following table. From this table, it can be seen that the relationship between Morphological Awareness and fluency and comprehension is complex and not a one-to-one relationship. Overall, the Iimbabule/Wugs test did not correlate with either fluency or comprehension. Word Building was strongly correlated with fluency while Identification and Analogy were moderately correlated with fluency. With respect to comprehension, Identification correlated weakly and Word Building was not significant while the Analogy correlated moderately.

	Fluency	Comprehension	Discussed in section:
Composite MA	Strong	Moderate	(§4.1.1)
Iimbabule	Not sig.	Not sig.	(§4.4.1)
Analogy	Moderate	Moderate	(§4.4.2)
Word Building	Strong	Not sig.	(§4.4.3)
Identification	Moderate	Weak	(§4.4.4)

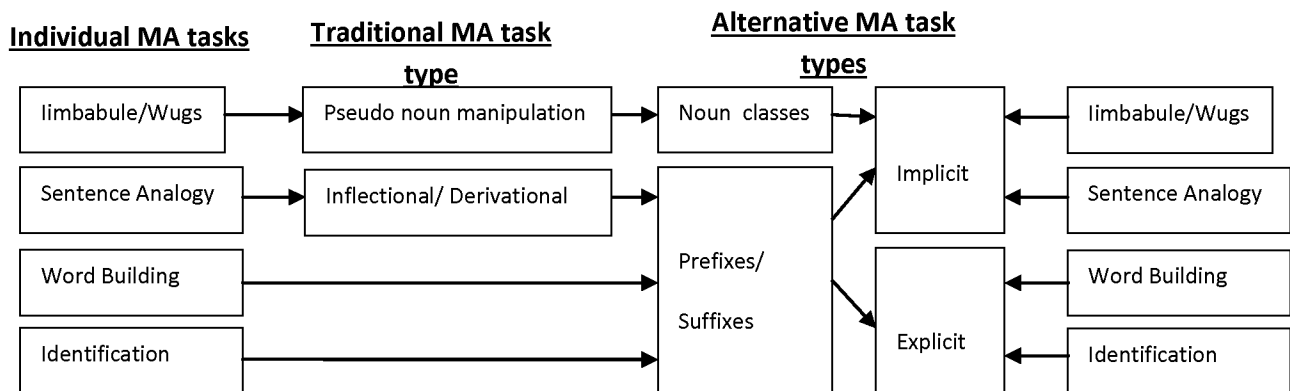
Table 15: Schematic summary of individual MA test correlations with fluency and comprehension

These results are inconsistent with respect to the previous literature which has not considered MA to be as important for fluency as it is for comprehension. However, the majority of the literature concentrates on MA contributing to complex word reading comprehension, whereas all the words in isiXhosa are inflected and thus it is unclear what a non-complex word in an agglutinating language would be. MA and fluency has not been given as much attention as MA and comprehension though the results for isiXhosa imply that MA and fluency can also have a strong relationship. The majority of previous MA tests have been root identification or tests with compound morphology, thus MA tasks focusing on affixes are expected to give different results to what has been found previously. The Analogy results are consistent with the established relationship between MA and comprehension as it is the only test that has a moderate and significant correlation with comprehension.

The customary view of MA divides tests according to inflectional and derivational morphology and states that it is derivational morphology that will have the strongest correlations with comprehension, most likely due to inflectional morphology being easier and thus resulting in ceiling effects and limited predictive powers. The traditional view of MA is explored next

before alternative MA task types such as a general language awareness comprised of composite prefix and suffix scores. The next section interprets these results by positing that the difference between explicit and implicit Morphological Awareness is more important than the traditional distinction between inflectional and derivational morphology.

4.6 Different types of MA and reading success



The previous section looked at the four MA tests in isolation and how they compared to reading fluency and comprehension. Traditionally, inflectional and derivational Morphological Awareness are measured against reading success, particularly comprehension in reading (Carlisle 2000, Carlisle 2003, Kirby *et al.* 2011). Inflectional versus derivational awareness was explored in the Sentence Analogy test. This study looks at an additional two alternative types of Morphological Awareness made up of composite scores from within various MA tests. It looks at a general awareness of the structure of the language, in isiXhosa. This is an awareness of the Bantu noun classes (tested in the limbabule/Wugs test) and awareness of the agglutinating nature of isiXhosa which makes extensive use of prefixes and suffixes on nouns and verbs to build words and sentences. This is tested broadly across the Sentence Analogy test, the Word Building test and the Identification test. The other task type distinction could be whether the MA tests tap into a more implicit type of Morphological Awareness or whether they asked the children to manipulate or identify morphemes in a more explicit way. The definitions of implicit and explicit MA knowledge to follow relates to first language speaker's MA and are based on an amalgamation of different MA definitions in the literature (Carlisle 2003; McBride-Chang *et al.* 2005; Zhang & Koda 2013; Bowers, Kirby, & Deacon 2010; Ellis 2008):

- A. **Implicit MA test definition:** a type of morphological processing which is a less conscious or implicit processing of morphological information. Relies on acquired complex knowledge of the structure of the language, but it is knowledge that cannot necessarily be described. These tasks test awareness of and access to features of language that children would know extracted from experience or subconsciously "what sounds right", rather than from explicit rules. Performance in these tasks requires sensitivity to the structure of multi-morphemic words and being able to identify affixes but does not necessarily entail consciously thinking about the morphemes in isolation or not manipulating them in a way that shows explicit understanding of the morphemes. This type of MA can be accessed orally and could be performed on pseudo, as well as real words.
- B. **Explicit MA test definition:** These tasks require consciously manipulating or identifying meaningful morphemes and the morphological structure of words. They test the ability to construct new meanings by making use of knowledge of familiar or previously learned morphemes and the ability to manipulate familiar morphemes to create novel words based on the knowledge of the function of affixes. This kind of MA can be explained or taught using explicit rules about the language. Explicit tasks requires children to be able to read with understanding and cannot be accessed orally.

4.6.1 Traditional: Inflectional/Derivational awareness

Inflectional morphology compared to derivational morphology is a traditional view of Morphological Awareness. Inflectional morphology is known to be easier to manipulate in tests and derivational morphology has been established in English to make the biggest contribution to comprehension in reading (Carlisle 2003, Kirby *et al.* 2011). These two types of MA were measured through the Sentence Analogy test and consisted of 5 inflectional morphology test items and 5 derivational morphology test items. Overall, the Sentence Analogy test total had a moderate correlation with fluency $r(74) = .45^*$, $p < .0001$, which was stronger than the weaker correlation with comprehension $r(74) = .37^*$, $p < .0001$ but this is mainly due to the contribution of inflectional Morphological Awareness over derivational Morphological Awareness.

	Inflectional (5)	Derivational (5)
Lowest score obtained by a child	0	0
Highest score obtained by a child	5	4
Sum of all infl/deriv answered	137	75
Mean score per child	1.8	0.99

Table 16: Inflectional versus derivational scores in Analogy test

There is a significant difference between the performance on inflectional morphology test items ($M = 1.8$, $SD = 1.34$) as opposed to derivational morphology ($M = 0.99$, $SD = .96$) $t(75) = 5.5$, $p < .001^*$. Based on the previous literature, inflectional morphology is known to be easier and thus it is generally derivational Morphological Awareness that correlates with comprehension.

In the current study, inflectional morphology has a moderate relationship with reading fluency $r(74) = .45^*$, $p < .001$. This is slightly stronger than the correlation with derivational morphology and fluency $r(74) = .4^*$, $p < .001$, though both correlations are highly significant.

Typically, these types of Morphological Awareness are compared against children being able to define complex morphological words. Rather, this study's comprehension test was based on a passage of text in context, which is more aligned to the comprehension practises that are expected from children in schools, but inherently more difficult. In comprehension of sentences read in a story, it is inflectional MA in this study that has a moderate and significant relationship with comprehension $r(74) = .4^*$, $p < .001$. Derivational awareness, by contrast, did not have as strong or a significant relationship with comprehension to report on $r(74) = .26^*$, $p = .02$.

There is a significant difference between inflectional awareness and derivational awareness but both inflectional and derivational Morphological Awareness significantly correlated with reading fluency. Derivational awareness' average was significantly lower than the inflectional morphology's but it correlated almost as strongly with fluency. This implies that improvement in fluency or derivational morphology should have positive improvement effects on the other. Only inflectional morphology significantly correlates strongly and significantly with comprehension at this time. This was a result that was unanticipated due to the emphasis on derivational morphology and comprehension in the literature. The Sentence Analogy test requires analytical reasoning, perhaps even more so in an agglutinating language, and older

children with more cognitive development may perform better. The predictive properties of inflectional morphology may peak sooner than derivational awareness', especially in younger participants, and it is still important to test both (Marinova-Todd, Siegel, & Mazabel 2013).

4.6.2 Alternative test types

It is also important to remember that different languages make diverse use of inflectional and derivational morphology, and there are aspects of inflectional morphology that are difficult in isiXhosa that are not necessarily difficult in a language like English. Derivational morphology may still be more difficult overall, but it is also very systematic in isiXhosa, unlike English which has a lot of exceptions to the morphological rules. Different tasks may also require a more conscious awareness of the morphemes as opposed to tasks that tap into a more subconscious understanding of how the language works. The next section looks at a more general awareness of language structure with regards to prefixes and suffixes, which are both used substantially in isiXhosa, and not necessarily whether those affixes represent inflectional or derivational morphology.

4.6.2.1 General language structure: Prefixes/Suffixes

The prefixes from the noun classes in the Iimbabule/Wugs test were not included because there is no equivalent suffix measurement in the test and would have resulted in a bias towards prefixes (a manipulation of pseudo verbs test would balance it out, see section 2.6.1). The composite prefix and suffix scores were therefore comprised of how many prefixes/suffixes were identified in the Identification test, how many were used for building in the Word Building test, and how many were successfully manipulated in the Sentence Analogy test. Within each of these individual tests there were no significant differences found between prefixes and suffixes.

	Total Pref	Total Suff
Lowest score obtained by a child	0	1
Highest score obtained by a child	19	18
Mean score per child	6.75	8.03

Table 17: Total prefix composite versus total suffix composite

A paired *t*-test reveals that there is a significant statistical difference between the average performance with prefixes ($M = 6.75$, $SD = 4.04$) and the averages for suffixes ($M = 8.03$, $SD =$

4.31) $t(75) = -3.04, p = .003$, with children manipulating, building or identifying the suffixes slightly more often, overall. This slightly stronger suffix trend continues when correlated with fluency and comprehension but otherwise the correlations between prefixes are fairly matched.

In English, inflectional morphology typically comes at the end of words (cats, runs, jumping, jumped, John's, hotter, hottest) whereas derivational has more prefixes, as well as suffixes (unhappiness, disloyalty, reactivation). Suffixes cause more complicated shifts in phonology and semantics in English and thus prefixes tend to be easier to acquire (Reed 2008). Prefixes usually retain the ability to decompose and break down the word because they do not cause phonological shifts in the pronunciations of newly formed words (Reed 2008). However, this might not be true for all languages. In languages like isiXhosa, there could be vowel coalescence in the beginning of words which may make the prefix hard to identify because the spelling of the word has changed to remain true to speech. Research also suggests that knowledge of prefixes does not substantially grow until Grade 4 when readers are exposed to more text (Reed 2008). Once again, this may not hold true for all languages. Because of the noun class morphology of isiXhosa, learners have been exposed to prefixes at a much higher frequency and therefore knowledge of prefixes may be well established before Grade 4.

Languages like Czech and Turkish access morphemes in reading (Goswami & Ziegler 2006) and Finnish children read multi-morphemic words more successfully over mono-morphemic words (Bertram, Laine, & Virkkala 2000) therefore suggesting that the more morphemic the language, the more a reader should pay attention to the morphemes. Agglutinating languages like Basque and Finnish report children paying special attention to the suffixes at the ends of their long words because the functional morphemes appear as suffixes (Acha, Laka, & Perea 2010). Consider the following Basque examples:

(71) *mutil-a-ren-gana*

BOY-det-gen-TOWARD

"toward the boy"

(72) *emakume-a-ri*

WOMAN-det-prep

"to the woman"

Basque children may learn to be sensitive to word final elements (Acha, Laka, & Perea 2010: 362). By contrast, isiXhosa's inflectional and derivational morphology use prefixes and suffixes

equally to achieve noun classes, agreement markers and tense (see example (73) on the following page).

Prefixes on nouns generally agree with prefixes on verbs, and suffixes generally display syntactic information like passive voice or tense marking. Despite the fact that isiXhosa makes use of prefixes for functional information and thus needs an awareness of word initial as well as word final elements, there was a slight tendency to do better with suffixes (similar to other agglutinating languages in the literature). Statistically, in isiXhosa, there are significant, moderate, and almost equal correlations between prefixes $r(74) = .54^*$, $p < .001$ and suffixes $r(74) = .58^*$, $p < .001$ and fluency. There is a significant correlation between suffixes and comprehension $r(74) = .37^*$, $p = .001$, but it is much weaker than the suffix and fluency correlation mentioned above. Though prefixes were more on par with suffixes in correlations with fluency, they have a weak, though significant, correlation with comprehension $r(74) = .25^*$, $p = .03$.

This shows that it is a general awareness of the use of prefixes and suffixes that correlates more with how quickly you can decode morphemes in reading, and not necessarily only the knowledge of lexical roots of nouns and verbs. Educators have revealed that an emphasis on "a clear understanding of such aspects as prefixes, suffixes, and roots determines the success rate in teaching vocabulary" (Oz 2014).

Specific tutoring in both prefixes and suffixes could also improve comprehension in agglutinating languages like isiXhosa. This is because, in general, the affixes on both sides of the verb hold important grammatical information that the children need to be paying attention to, in addition to the lexical roots. Consider the following isiXhosa example:

(73)	"Nditya umbona.	Ndiyawuthanda."
	Ndi.ty.a u(m).bona	Ndi.ya.wu.thand.a
	PRN.eat.FV NC.mielies	PRN.*.them.like.FV
	<i>I eat mielies.</i>	<i>I love them.</i>

The above sentences show that fairly simple sentences in English translate to long, morphologically complex sentences in isiXhosa. The prefixes attached to the verb stem, {-thand-}, are the subject and object markers. If children can only identify the lexical roots, then

they will not understand the rest of the syntactic information in the sentence, such as the *who* and *what*. The {-ya-} morpheme is a linguistic signal to show that nothing will follow the verb within the verb phrase, and anything between the {-ya-} and the verb stem is a complement of the verb, similar to a SOV structure. This {-ya-} is omitted when the tense is in the past for phonetic reasons. The SM and OM are very restricted in their distribution. The OM occupies the position closest to the verb. The SM is prefixed to the leftmost edge of the verb in isiXhosa (Smouse 2013: 66). General tutoring in this kind of systematic morphology may not only improve fluency, but is likely to improve comprehension as children will be able to access more information from the long and morphologically complex word:

ndi	ya	wu	thand	a
SM	*	OM	VERB	FV
I	*	them	like	(presently)

Figure 13: Morphological decomposition of an isiXhosa sentence

Based on the second sentence in the previous example (73), one can see how the prefixes and suffixes work in conjunction to create meaning in the sentences such as subjects, objects and tense/aspect among other things. The SM agreement is able to hold the information of the agent in the sentence so that the subject noun can be dropped and only the SM can be left on the verb, so long as the SM is apposite to the class of the absent subject noun (Du Plessis 1997). Morphological models need to account for how important prefixes and suffixes can be for comprehension in reading too as they often hold important grammatical information like *who*, *what* and *when*.

The Word Building test can be doubled up as a teaching method to explain how different morphemes can conjoin to form words with multiple sources of information, such as in Figure 13. This should in turn help comprehension of reading complex multi-morphemic words in isiXhosa. We know that, paradoxically, in young children, production may precede comprehension (Smouse 2013; Gxilishe *et al.* 2009); though children are able to construct these

morphemically complex words and sentences orally, they may not understand them while reading until they are given explicit instruction on how to break up the long words into more manageable and meaningful 'grains' or 'chunks'.

It is not necessarily specific affixes within the language's structure that is more important for reading fluency; it is not a specific awareness of derivational over inflectional, or nouns over verbs, or prefixes over suffixes. Rather, it seems to be a general awareness of how one's language uses these structures to create words and meaning. The next section explores whether it is the intrinsic, built-in, implicit awareness of these language structures, or whether it is a more manipulative, conscious and explicit awareness of the language structure that will contribute more to fluency and comprehension, respectively.

4.6.2.2 Implicit/Explicit and reading success

The implicit type tasks were a composite of the Iimbabule/Wugs scores and the Sentence Analogy scores. The explicit MA type tasks were a composite of the morphemes correctly used in the Word Building test, as well as the Identification test score. The implicit and explicit distinction in the current study could also be that of orally administered tasks against tasks that required reading written text and accessing morphemes, whether it was building with morphemes or identifying them. However, the implicit tasks could be presented as reading written text tasks and they would still be testing a more subconscious kind of Morphological Awareness. Even if the tests were not administered orally, there would still be no explicit manipulation or identification of the morphemes. For this test in particular, the morphemes are, arguably, manipulated and produced in a way that "sounds right" to the reader, regardless whether if the test is administered orally or not.

MA literature in more recent years has moved away from the traditional inflectional versus derivational awareness as the only way to measure MA in different languages. This is mostly because data should be cross-linguistically comparable, and an intent focus on derivational morphology, for example, may not work well in other languages. Rather, tests that ask children to consider morphemes in similar ways should be used in order for it to be possible for a comparison between languages.

4.6.3 Summary of different types of MA correlations

	Fluency	Comprehension	Discussed in section:
Inflectional (Analogy)	Moderate	Moderate	(§4.6.1)
Derivational (Analogy)	Moderate	Weak	(§4.6.1)
Comp Prefix	Moderate	Weak	(§4.6.2.1)
Comp Suffix	Strong	Moderate	(§4.6.2.1)
Implicit MA	Moderate	Not sig.	(§4.6.2.2)
Explicit MA	Strong	Moderate	(§4.6.2.2)

Table 18: Schematic summary of different types of MA

Having a more conscious awareness of morphemes in general and being able to manipulate them or identify them in explicit MA tests correlates more strongly and significantly with how many morphemes are read per minute $r(74) = .62^*$, $p < .001$ than it correlated with comprehension $r(74) = .32^*$, $p = .005$. The strong correlations found in the Word Building test (discussed previously in §4.4.3) contribute to making the explicit MA task type correlate the most with fluency. The correlations with comprehension are less impressive, as has been the general pattern throughout the MA tests. The more implicit Morphological Awareness test that can be performed orally has weak correlations with both fluency $r(74) = .35^*$, $p = .002$ and comprehension $r(74) = .22$, $p = .06$. The poor correlations overall for the implicit task type could be due to the Limbabule/Wugs bringing down the correlations. The Limbabule/Wugs test in particular had extremely weak correlations with both fluency and comprehension (§4.4.1). If the Limbabule/Wugs were excluded (or in future studies were included within the Sentence Analogy test), and only the Sentence Analogy was used as the implicit task score, then there would be a greater and highly significant correlation with comprehension $r(74) = .37^*$, $p < .0001$ (Sentence Analogy correlation with comprehension repeated here for convenience). This suggests that implicit Morphological Awareness still needs to be tested through tests like the Sentence Analogy test. As general comprehension and analytical reasoning improves, this implicit awareness task may continue to have a significant correlation with comprehension that becomes stronger. The inherent knowledge about morphemes that children have can correlate with the amount of understanding they have of morphemes read.

4.7 Morphological Awareness and gender

A preliminary analysis indicated that Foundation Phase comprehension in literacy is not affected by gender. From international literature, we can anticipate the females outperforming the males (Beaton & Zwick 1992; BCR 2015; Howie *et al.* 2012). In the current study, girls ($M = 59.8$, $SD = 39.49$) were decoding morphemes twice as fast as the boys ($M = 33.22$, $SD = 30.29$), and this was highly significant $t(75) = 3.28$, $p = .002^*$. However, though the girls were able to decode significantly quicker, it did not mean they performed better in the comprehension test. The mean percentage of comprehension is almost identical for girls ($M = 27.94\%$, $SD = 31.46$) and boys ($M = 27.11\%$, $SD = 38.21$), and there is no significant difference between the amount the girls and boys understood over the total amount they attempted to read $t(74) = .1$, $p = .92$. The poor comprehension results of this study echo the NEEDU report (Spaull 2013a) where Foundation Phase South African children are generally only able to answer one question correctly in comprehension tests.

There were also no gender differences across the four different MA tests. This suggests that tuition in MA would result in a non-gendered effect in learning to read and comprehend, whereas instruction in decoding words using phonetics seems to favour females at this point in their literacy acquisition. It must also be gauged what is more important: being able to read quickly but with very little comprehension, or decoding more slowly but able to comprehend everything being read.

4.8 Summary of all MA correlations within reading

The four MA tests were looked at individually to see how each correlated with the reading measures of fluency and comprehension. Composite scores comprised from different tasks were then correlated with fluency and comprehension to see if there is a particular type of Morphological Awareness that would be most useful for literacy acquisition. Firstly, the traditional view of MA was examined by comparing the correlations of inflectional morphology and derivational morphology. Next a more general awareness of language structure using a composite score of prefixes and suffixes was compared against children's fluency and comprehension. Moving away entirely from language specificities, a general implicit MA was compared against a more explicit type of Morphological Awareness. This distinction is one between asking the children to produce innate morphological knowledge and one of asking the

children to overtly and explicitly manipulate and identify the smallest units of meaning within morphologically complex words or sentences. This results in 10 main correlations with fluency and comprehension that were explored in the current study:

		Fluency (mcpm)	Comprehension of Amount Read
<i>Individual MA tests</i>	Iimbabule/Wugs	0.03	-0.05
	Identification	0.47**	0.25
	Word Building	0.6**	0.31
	Sentence Analogy	0.45**	0.37**
<i>Traditional MA test type</i>	Inflectional	0.45**	0.4**
	Derivational	0.4**	0.26*
<i>Alternative MA test types</i>	Comp Prefix	0.54**	0.25*
	Comp Suffix	0.58**	0.37**
	Implicit MA	0.35**	0.22
	Explicit MA	0.62**	0.32**

* $p \leq 0.05$ ** $p \leq 0.005$

Table 19: Summary of different MA results' *r* correlations with reading success

The comprehension test was not performed very successfully overall; children could not answer questions about sentences they had just decoded, even if they had decoded them fluently and without errors. However, despite the very poor performance in the comprehension test, there are still several moderate correlations with MA and comprehension suggesting that these results are consistent with what the literature states. What this suggests is that MA by itself is not a sufficient criterion for comprehension, but that does not mean it's not part of the solution to the comprehension problem. The fact that there were ranges of fluency scores and floor effects with the comprehension scores means that the MA tests were able to correlate more strongly with

fluency, but perhaps more strongly than the literature typically suggests, thus MA and fluency need to be given more attention in the literature too. "Some forms of Morphological Awareness ... show their maximal growth beginning in fourth grade and thereafter" (Berninger *et al.* 2010: 156), therefore these children may perform better in the more complex MA tests in subsequent grades. The influence on MA on reading also varies "depending on the morphological structure of languages studied, and the methods, or type of MA tested" (Marinova-Todd, Siegel, & Mazabel 2013: 6). Though tests like Sentence Analogy were successfully answered in English children, the inherently more complex morphological structure of isiXhosa may mean that children need more time to develop their different Morphological Awarenesses. MA certainly contributes towards fluency in isiXhosa, and the moderate correlations with comprehension despite the poor performance in the comprehension test means that MA may eventually contribute towards comprehension significantly too in isiXhosa, as reported with other languages in the literature.

Chapter 5: Conclusion

IsiXhosa readers have been identified as the least literate readers in South Africa and thus a good starting point to address the general literacy crisis happening in the country. Teaching aids have not looked at the specifics of the language and rather have translated teaching guides from non-suitable and dissimilar orthographies. The Bantu languages in general are phonologically transparent, but morphologically much more complex than languages like English, thus this morphological aspect demands more attention, especially in teaching. To date, there are still no standardized tests for assessing micro-linguistic aspects like Morphological Awareness in isiXhosa and often the previously established MA tests do not always suit the orthography of the isiXhosa language. This research addressed this issue by adapting and revising four MA tests that could more adequately test what isiXhosa children know about the morphological structure of their language at this stage in their literacy development (Grade 3).

In the literature, having a good awareness of the morphology of your language has a positive relationship with aspects of reading like spelling, word reading, complex word reading, word recognition, vocabulary development and reading comprehension (Deacon, Kirby, & Casselman-Bell 2009; Wolter, Wood, & D'zatko 2009; Saiegh-Haddad & Geva 2007; McBride-Chang *et al.* 2008; Acha, Laka, & Perea 2010; Kirby *et al.* 2011). Reading comprehension and its relationship to MA has been the biggest focus in MA literature, particularly derivational morphology and comprehension. This derivational Morphological Awareness mostly concentrates on compound morphology and derived complex words, but in a language like isiXhosa, the compounding process is not as salient a morphological process, and even inflectional morphology creates complex words. In conclusion, I will reflect on how my results answer the research questions posed in §1.4 and how these results differ from what the literature proposed would be found.

(1) To what extent does Morphological Awareness correlate with reading success in isiXhosa?

MA does correlate with reading success in general in isiXhosa, though the correlations are often stronger for fluency than the more moderate correlations with comprehension. The literature prepares us for the biggest correlations of MA to be with comprehension, but the general poor

performance in the comprehension test could be the reason there were no strong correlations with MA. Reading success had to look at fluency and comprehension separately, and not as a composite score in the current study due to the significant contribution of MA more towards one of the two reading measures.

Nevertheless, these results do echo those reported in South African literacy literature. Comprehension levels among SA children have been found to be very low, and it was also found that most teachers focus on teaching fluency and decoding than on comprehension (Spaull 2013a, Taylor 2012). In this context, we find that MA correlates very strongly with fluency, which is interesting as it looks like MA is a good predictor of what is considered reading "success" in the SA context, namely fluency.

MA still might be part of the solution to the comprehension problem as, despite floor effects, there were some tests that still had moderate correlations with comprehension. This leads me to my next point, namely that there are also different types of MA, and some types correlate more with comprehension than others.

		Fluency (mcpm)	Comprehension of Amount Read	Discussed in section:
<i>Individual MA tests</i>	Iimbabule/Wugs	Not sig. 0.03	Not sig. -0.05	(§4.4.1)
	Identification	Moderate 0.47**	Weak 0.25	(§4.4.4)
	Word Building	Strong 0.6**	Not sig. 0.31	(§4.4.3)
	Sentence Analogy	Moderate 0.45**	Moderate 0.37**	(§4.4.2)
<i>Traditional MA test type</i>	Inflectional	Moderate 0.45**	Moderate 0.4**	(§4.6.1)
	Derivational	Moderate 0.4**	Weak 0.26*	(§4.6.1)
<i>Alternative MA test types</i>	Comp Prefix	Moderate 0.54**	Weak 0.25*	(§4.6.2.1)
	Comp Suffix	Strong 0.58**	Moderate 0.37**	(§4.6.2.1)
	Implicit MA	Moderate 0.35**	Not sig. 0.22	(§4.6.2.2)
	Explicit MA	Strong 0.62**	Moderate 0.32**	(§4.6.2.2)

Table 20: Summary of different MA results' r correlations with reading success (repeated for reader's convenience)

(2) *What types of Morphological Awarenesses are most useful for acquisition of literacy in isiXhosa and how do they relate to language structure?*

- a. *Is awareness of inflectional morphology different to awareness of derivational morphology and how do these correlate with reading?*
- b. *To what extent does NC morphology affect Morphological Awareness, and is there a difference with respect to nouns and verbs?*

MA literature has concentrated on the relationship found between Morphological Awareness pertaining to derivational morphemes and reading comprehension. However, in this study it was found that mostly inflectional morphology correlated most strongly with fluency, and secondly to comprehension. Derivational Morphological Awareness had moderate correlations with fluency, too, but no significant correlations between derivational MA and comprehension were found. This could be due to the floor effects found within both derivational morphology and comprehension tests. It is important to test both inflectional and derivational morphology because the predictive powers of inflectional morphology are known to peak sooner than those of derivational Morphological Awareness (Kirby *et al.* 2011). Derivational morphology has been signalled in the literature as important as the process of creating new meaningful words can aid in vocabulary knowledge, which has positive direct and indirect contributions to reading comprehension. It seems, however, that the derivational awareness of the Grade 3 participants of this study could still be under development. The MA tests needs to be repeated with older or more competent readers, in order to judge if there is a stronger relationship between derivational morphology and comprehension in isiXhosa, and whether the relationship between inflectional morphology and MA plateaus.

It must also be considered that there are different levels of complexity within the broad spectrum of derivational awareness. In a morphologically rich and agglutinating language like isiXhosa, producing and manipulating inflectional morphology can also be difficult, thus still predictive. It is argued throughout this study that MA should not necessarily test specifics like inflectional and derivational awareness within the language's structure, but rather a more general awareness of the morphology of the language should be measured.

It was predicted that the noun classes would affect the building of nouns over verbs due to having to match the root to the noun class prefix card (with there being more than one noun

class option available) but there was no significant difference between the numbers of nouns and verbs produced during the Word Building test. There was also no significant differences found between identifying affixes within negative and past tense sentences. Rather, it seems to be a general awareness of all these structures and morphological processes that correlate with reading. This general awareness of the extensive use of prefixes and suffixes in the language could be more important for literacy acquisition at this stage.

A general knowledge of prefixes and suffixes correlated highly with reading fluency. This is probably because an awareness of the morpheme allows readers to access it as a grain size and could allow for easier processing in reading. IsiXhosa makes extensive use of prefixes and suffixes and these affixes hold a lot of grammatical information such as subject and object marking that must also be interpreted for full understanding and comprehension of the words and sentences. Currently, theories like the PGST do not include morphemes as a possible grain size, and most morphological models concentrate only on lexical root morphemes. This study has shown that prefixes and suffixes also need to be considered, and an awareness of these can be different to an awareness of the root morphemes. Children struggled to identify specific affixes even after explicit instruction, but this was due to a lack of comprehension in reading in general. An awareness of the consistencies of the morphemes in the language should help comprehension of words.

An awareness of morphological structure in an agglutinating language can help with word recognition, too (Acha, Laka, & Perea 2010). This is because MA has been proven to contribute significantly to complex derived word reading in general, and words in more morphologically rich languages are automatically more complex (Saiegh-Haddad & Geva 2007). This explains the fluency scores which are stronger than the literature would typically suggest but that could be because the literature has not looked at such morphologically complex languages. When more complex languages have been looked at, as in the case of Arabic, the MA tests used were not appropriate for the orthography of the language.

The general awareness of the prefixes and suffixes of the language can be taken one step further; whether the understanding of the affixes is implicit or explicit is also important as a type of MA. The test in this study that had the strongest relationship with fluency was the Word Building test and the test that had the strongest relationship with comprehension was the Sentence Analogy test. Interestingly, this meant a more implicit understanding of how

morphemes work correlated more with comprehension, and the explicit tasks that required children to read correlated more with reading fluency. Therefore, MA tests should also be divided along the lines of whether they tap into a more implicit awareness of MA or whether they require explicit manipulation of the prefixes and suffixes. Most of the inflectional and derivational tests in the literature still has an inherently implicit method of testing the children's MA, and this could be why their results correlated so strongly with comprehension, as the implicit task in this study correlated with comprehension.

(3) How can MA best be measured in isiXhosa and what are the challenges to implementing MA testing?

MA in all languages needs to be tested with implicit as well as explicit tasks that tap into the various awarenesses of prefixes and suffixes that are used in the language. For isiXhosa, the two best measurements of MA seem to be the implicit Sentence Analogy test and the explicit Word Building test. The moderate correlation between the Identification test and fluency also suggests that being able to recognise and segment morphemes could help with the fluency of reading long morphologically complex words. The Identification test could also be performed as a root identification test which may be more successful for younger readers. Perhaps affix identification should only be administered to older participants in order to test whether readers are aware of the smallest units of meanings within their long and complex words. It is possible that the more morphologically rich the language, the more time children need to fully develop their MA as the Grade 3 isiXhosa results for tests like the Sentence Analogy was more closely related to the Grade 1 Analogy scores of English children (Kirby *et al.* 2011). Other tests like the limbabule/Wugs test show that even young children can have fully developed aspects of MA, though this test measured a morphological process that is much harder than the English equivalent and therefore age may not be the defining factor in MA but perhaps rather task types. The limbabule/Wugs measures a small but interesting subset of isiXhosa noun class morphology, but this particular implicit awareness of the language structure does not contribute significantly on its own to fluency or comprehension. This was due to children performing very well in this test and thus producing ceiling effects. This shows that some aspects of morphology are best measured as a developmental trend over the grades and Grade 3 may still be too young to test

certain kinds of MA (such as the explicit identification of functional morphemes) but the children are still capable of producing easier, implicit morphological knowledge.

In conclusion, Grade 3 isiXhosa children are able to decode morphemes fairly successfully, but this decomposition is happening without comprehension of these morphemes. This resonates South African children's general literacy state, as measured by other studies. MA correlates more strongly with fluency rather than comprehension at this stage. This is particularly true of MA tests that require an explicit understanding of the language's structure and use of morphological processes through affixes, whereas implicit tests like Analogy correlated the most strongly with comprehension, overall. This also suggests that explicit tutoring in the general morphological processes of their language (prefixes and suffixes) could further develop children's implicit knowledge of language structures which should ultimately improve comprehension, in addition to further improving fluency.

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