A Linguistic Research Programme for Reading in African Languages to underpin CAPS

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Abstract

Although ANAs show language-conditioned problems in reading comprehension and decoding ability, most South African research focuses disproportionately on (a) English and Afrikaans and (b) macro approaches to literacy rather than formal and psycholinguistic analyses of reading. Obviously African languages are structurally and typologically different to English and Afrikaans; reading strategies required for the mechanics of reading are necessarily different and should be supported by language-specific pedagogies. We argue for research programmes that situate reading pedagogy within the language-specific spaces defined by Linguistic approaches to understanding (a) orthography, (b) cognitive reading skills and models and (c) indigenous, language-specific norms and resources.

Keywords: psycholinguistics, linguistics, orthography, morphological awareness, phonological awareness, curriculum development

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1. The importance of literacy

Literacy is one of the most important academic skills: it is a significant predictor of success in life (IRA & NAEYC 1998), "determines educational success" (Pretorius & Mokhwesana 2009:55) and grade three literacy results are a good predictor of high school graduation (Snow, Burns & Griffin 1998). South Africa, like other developing countries with literacy challenges (Abadzi 2008, Spratt & Tamba 2005), needs to respond to what has been called a "crisis" in literacy teaching for nearly a decade. While recognizing that reading is not a unitary skill, teachers and teacher educators need better understandings of reading and writing in African Languages. Little research has been done into the methodologies most appropriate to becoming literate in an African language, or the methodologies which generate the excitement and sense of achievement is a key motivating factor for emergent readers (e.g. Guthrie & Wigfield, 1997; Guthrie, Wigfield & Perencevich, 2004).[1] Presently, little is known of how the issues of orthographic interact with morphology, syntax and lexis in African languages or how these translate into norms and standards which can inform curriculum design. Consequently, we know relatively little of the sequence, pace or relative difficulty of becoming literate in an African language. We therefore call for a research programme into the Linguistic[2] processes involved in literacy in African languages in particular.

2. CAPS & ANAs

As evidence mounts that South African education is facing severe challenges (PIRLS 2007, PIRLS 2012, SACMEQ III, NEEDU Report 2012 etc.), the Department of Education has responded, most recently, with the Curriculum Assessment Policy Statements (CAPS) supported by the Annual National Assessments (ANAs) as a quality assurance mechanism that provides accurate, standardized data to guide future targeted

[1] The term "African languages" refers to official South African languages of the Southern Bantu Language family, in line with the usage of the Draft Policy for the Incremental Introduction of African Languages in South African Schools (Department of Basic Education, 2013).

[2] By the term `Linguistic' we do not mean that the issues are generally language related or mediated through language in society (although they are). Rather we use it in its disciplinary sense relating to the study of language systems and to applied linguistic research of these systems.

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interventions and to "enable the sector to utilize the findings and devise ways to further improve the quality of basic education" (ANA 2013: 4).

However, without adequate understandings of the nature of the linguistics underpinning African language literacy, these measures may not be entirely effective. The CAPS document is testimony to how little is known of linguistic aspects of learning to read. Bikitsha and Katz's (2013) analysis of the CAPS isiXhosa home language document for Foundation Phase uncovered many anomalies and inconsistencies as a result of it having been translated from the English CAPS document without consideration of language specific structures e.g. some examples of phones use unfamiliar and sometimes inappropriate or misspelled words. Also, isiXhosa phonics sequences use significantly longer, multisyllabic words incorporating blends and di- and trigraphs (e.g. *ingca, inkcenkce, indlela, ingxolo, intsimbi, intlanzi, isitshixo, ingqondo, inkqayi*) in contrast to the simple graphemes and short words for English (e.g. -at, -et, -it, -ot, -ut, h-en, pen, tin, hot, hop etc.). Consonants and consonant clusters are taught together rather than introducing them gradually and must all be taught by the end of grade 1. This fails to recognize the complexity of learning blends such as *ng, tsh,* and consonant sequences such as *ngqw, ntshw*. There are also instructions to teachers that are meaningless for the language e.g. *qUkuqonda izikhamiso ezihamba ngambini ebezifundiswe kwiBanga-2* `Recognises 2-letter vowels taught in Grade 2' even though there are no two-letter vowels in isiXhosa. Similarly, *qUkuqonda ukuba izandi zimelwe zintlobo ngentlobo zopelo* `Understand that there are many ways of spelling words/sounds'; isiXhosa has a transparent orthography so there are no multiple ways of realizing sounds. Children being taught the phonics sequences recommended in this document may well struggle to become literate in spite of their familiarity with the language.

The 2013 ANAs draw attention to the poor state of literacy and language achievement in the schooling system.[3] With respect to language and literacy, learner achievement drops

[3] In this paper, we confine ourselves to discussing in detail the foundation phase language assessments as the remainder are beyond the scope of this paper. In addition, we do not draw comparisons between the 2012 and 2013 ANAs because "no technically defensible comparisons can be made on the results of ANA 2013 to those of previous years" (ANA 2013: 7).

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steadily from the very inception of schooling (Table 1). In KwaZulu-Natal, literacy achievement drops 15% over the course of the foundation phase; the province with the best achievement is the Free State dropping by 5.9% (ANA 2013:37-44). It is also concerning that of the grade 3s who were assessed, 43% failed to achieve the "Adequate Achievement" pass mark of 50% for Home Language. This can be compared to 63% of grade 9s for Home Language and 82.9% of grade 9s for First Additional Language (ANA 2013: 58-64).

	Gr1	**Gr2**	**Gr3**	**Gr4**	**Difference in percentage between Gr1 & Gr4**
National Average	**60.40%**	**56.50%**	**50.80%**	**49.30%**	
KZN	61.6	58.6	55.3	46.6	*15*
MP	57.1	54.1	47	43.2	*13.9*
LP	57.9	52.9	46.9	44.3	*13.6*
NC	56.8	52.8	46.2	43.9	*12.9*
GP	65.4	60.2	54.5	53.4	*12*
EC	54.8	51.8	47	43	*11.8*
WC	64.5	62	49.9	54.1	*10.4*
NW	56.6	51.2	46.8	46.9	*9.7*
FS	61.4	56.8	54.4	55.5	*5.9*

Table 1: Language achievement (ANA 2013: 37-44).

With respect to the PIRLS studies in particular, Howie (2012) shows that "There was no difference in the overall achievement for South African learners in 2011 compared to 2006" (Howie 2012: xvi). Both PIRLS reports paint a comprehensive picture of low levels of reading literacy in South African schools and confirm previous reports and research in systematic, wide-ranging research. Compared to other countries, "not only did we come last, but we came badly last with a long tail of underachievement" (Pretorius & Mokhwesana 2009:55). South African Grade Five learners were about three years (200

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points) behind international norms and in the Eastern Cape learners were an average of four years behind the international benchmark (Howie, 2008). Even South Africa's best learners in the 95th percentile did not achieve the advanced level: poor literacy is an issue that cuts across race and class divisions (Figure 1).

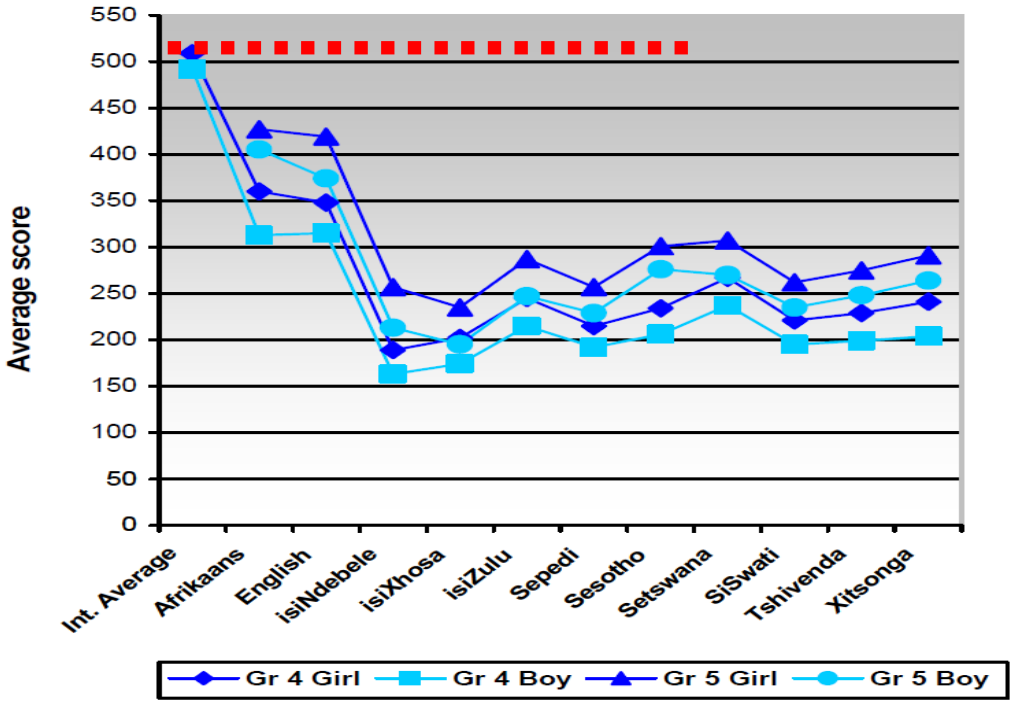

Figure 1: Average score by language, grade and gender. The dotted line indicates the international average (Howie et al. 2006)

When these statistics are broken down by language (Figure 1), the best performers were Afrikaans and English although both were well below the international average (PIRLS 2006:22). However, learners tested in African languages scored extremely poorly: the best performer, Setswana scored just above 250 points; IsIndebele and IsiXhosa scored below 200 points. These statistics mean that only 13% of South African grade fours reach the minimum international benchmark of 400 points. This can be contrasted with 98% for Russia and the international mean of 94%. Only 1% of South African grade fours reach the Advanced International Benchmark. Most shocking of all is that only 1% of IsiXhosa, SiSwati and IsIndebele learners reach the minimum international benchmark

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by Grade Four. This means that 99% of these learners are illiterate after three years of schooling.

3. Trends in SA literacy research

We analysed were most literacy research is focused. While substantial research focuses on literacy, we argue that there are imbalances to be addressed. These include (a) too little focus on the cognitive functions involved in understanding the "linguistic building blocks" of literacy and (b) a highly problematic focus on English and Afrikaans at the expense of African languages. Pretorius and Mokhwesana (2009:55) talk of a "virtual absence" of research and point out that there is no journal on the African continent dedicated to Linguistic literacy research.

In order to provide evidence of research trends in South Africa and abroad, we compared research hits on SABINET, a research database indexing South African research, and Ebscohost, an international research database. Search terms were chosen which encompassed different types of approaches to literacy e.g. "morphological awareness", "phonological awareness", "higher education literacy", "literacy ethnography", "literacy genre" etc. Where necessary, searches were filtered by the additional search term, `literacy'; wild-cards ensured that derivations of these search terms were also returned e.g. *lexicon, lexical, lexicography, lexicographic* etc. The same search terms were input into both search engines. If these databases are accurate reflections of research activity then the relative proportions of hits should give an approximation of the amount of research in the field.

We acknowledge that this methodology is not foolproof, e.g. many SABINET hits included theses, a category not included in Ebscohost. Furthermore, several SABINET hits included project descriptions with no associated 'deliverables' etc. It should be borne in mind that these could artificially inflate the SABINET results and it is therefore a possibility that the SABINET hits are disproportionately high, reflecting more academic research than is actually the case. Another factor to bear in mind is that some research

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which originates in South Africa may be present on Ebscohost if it is published in international journals. However, the total proportion of South African research on Ebscohost as a proportion of the whole is likely to be rather small and is therefore unlikely to skew results.

Finally, both databases have a return limit of 1000 hits. Thus, search terms which might have returned more than 1000 hits were limited at this level. The effect of this is to under-report and to thus inflate the relative proportions of the returns less than 1000. The results comparing the hits between SABINET and Ebscohost are shown in Table 2 and then graphically in Figure 2.

Topics of Research	Sabinet hits	Ebsco International Hits	South African proportions	International proportions	Relative difference
Morphological awareness	1	331	0.02	6.78	0.26
Syntactic awareness	2	114	0.04	2.33	1.50
Phonological awareness	63	250	1.10	5.12	21.56
Literacy psycholinguistics	87	49	1.52	1.00	151.92
Orthography literacy	117	84	2.05	1.72	119.18
Literacy decoding	243	83	4.26	1.70	250.51
Lexical literacy	319	41	5.59	0.84	665.75
Literacy ethnography	370	384	6.48	7.86	82.45
Academic literacy	533	1000	9.34	20.47	45.61
Literacy narrative	974	541	17.06	11.07	154.05
Teaching literacy	1000	1000	17.52	20.47	85.57
Higher education literacy	1000	493	17.52	10.09	173.56
Classroom literacy practice	1000	515	17.52	10.54	166.15
Sum	5709	4885	100	100	

Table 2: Comparative research output on literacy-related topics.

The South African and International proportions refer to the ratio between a particular discipline of literacy research and the research output for all literacy disciplines (i.e.

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(Sabinet hits/5709) x100 or (Ebsco hits/4885) x 100). The relative difference column expresses the ratio of the SA proportion to the international proportion for any particular subdiscipline (i.e. (SA proportion/International proportion) x 100).

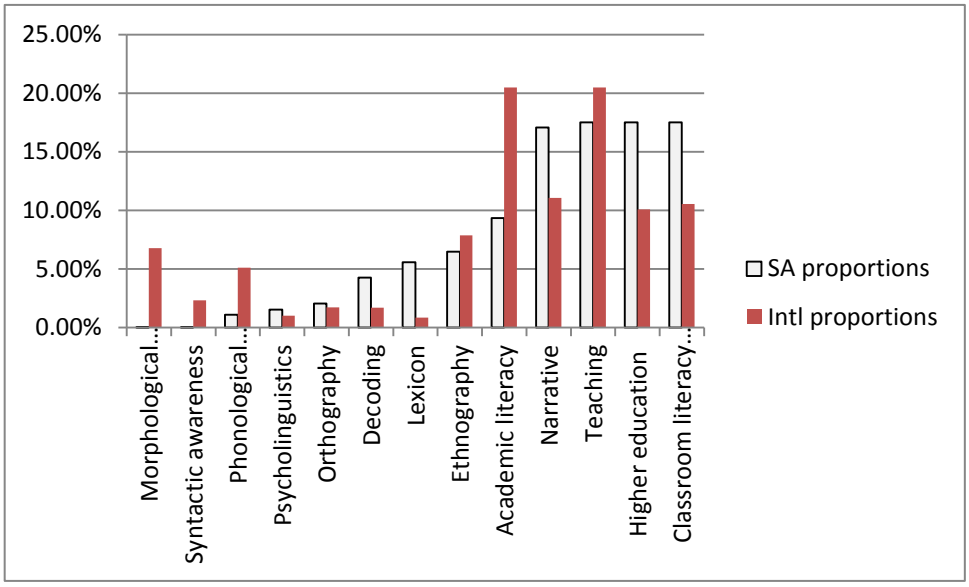

Figure 2: Graphic representation of comparative research output on literacy-related topics.

It is immediately apparent that both nationally and internationally, there is more literacy research done on macro-approaches to texts, co-texts and contexts (e.g. ethnographic approaches, academic literacy and narratives) which are increasingly important at secondary and tertiary level compared to micro-approaches to texts (e.g. morphological awareness, syntactic awareness and phonological awareness) which are important foundation phase concerns. Holm and Dodd (1996) note this for second language as an international trend saying, "… much of second language literacy literature continues to exhibit a strong top-down bias. The role of bottom up processes, although recognized as vital for proficient reading (Eskey 1989) has been largely ignored" (Holm & Dodd 1996: 120).

Interestingly, while there is comparatively more SA research on orthography (119,8%) and decoding (250% of the equivalent international proportion), this is not matched by

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research in phonological, morphological and syntactic awareness essential to the decoding process. For example, South African research on phonological awareness is just 21.56% of the equivalent international proportion; morphological and syntactic awarenesses are just 0.26% and 1.5% respectively.

The discrepancy between nominal mentions of "decoding" versus detailed theoretical content of decoding theory suggests that South African research involves meta-discussion of decoding without a concomitant investment in the linguistic understandings underpinning it. This interpretation is supported by a closer look at the "decoding" search hits. Without belabouring the point, a representative list of research titles shows that, with the exception of the first, very little research with "decoding" as a search term actually reflects a deep concern with its mechanics.[4] Thus, a statistic which might have demonstrated we were wrong in our interpretation turns out to prove the rule.

- *Butterfly effects in reading? The relationship between decoding and comprehension in Grade Six high poverty schools.*
- *Making sense of the PIRLS 2006 results for South Africa.*
- *Mathematical literacy examination items and student errors : an analysis of English Second Language students' responses.*
- *Diversity, exclusion and risk, as second-language learners of immigrant parents acquire first-time literacy in English.*
- *Teaching reading in an OBE framework.*
- *Literacy and disadvantage : learners' achievements in the early primary school years.*
- *The necessity of a media literacy module within journalism or media studies curricula.*
- *A comparison of the ideological foundation of the FAL and REFLECT approaches to teaching adult literacy in Uganda.*
- *The encroaching culture of illiteracy: perspectives on higher education.*

[4] This is because the search term might occur anywhere in the title, abstract or keywords in the SABINET database. Naturally, when the search is limited to just titles, there are many, many fewer hits.

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It is particularly revealing to show the ratio of research on a particular language to the proportion of the total South African population (Figure 3). When normalized in this way, it shows that the emphasis on English and Afrikaans is disproportionate to the number of speakers. TshiVenda, isiNdebele, SiSwati, Setswana and SeSotho are "about right". Interestingly, given the importance of isiZulu and Sepedi as lingua francas and isiXhosa as the second-largest language by speakers, there is strangely little research done on them.

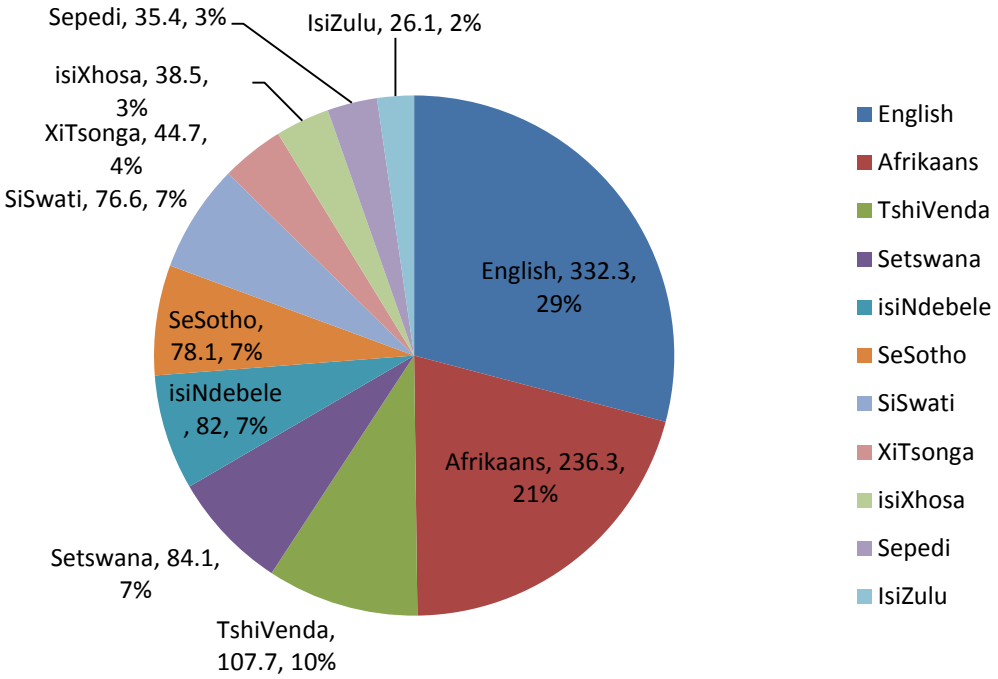

Figure 3: Literacy Research output as a percentage of population vs percentage of literacy research output.

	Percentage of SA population	**Percentage of whole SA research output**	**Research output/% of population x 100**[5]
English	9.6	31.9	332.3
Afrikaans	13.5	31.9	236.3
Setswana	8	6.7	84.1

[5] A score of 100 indicates a perfect match between the proportion of research devoted to the language versus the proportion of South Africans speaking that language i.e. that research is at 100% of what it "should" be.

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isiXhosa	16	6.2	38.5
IsiZulu	22.7	5.9	26.1
SeSotho	7.6	5.9	78.1
Sepedi	9.1	3.2	35.4
TshiVenda	2.4	2.6	107.7
XiTsonga	4.5	2.0	44.7
SiSwati	2.5	1.9	76.6
isiNdebele	2.1	1.7	82.0

Table 3: Proportions of language population groups versus research output per official language in South Africa

To illustrate this informally in another way, we also searched Google Scholar for all articles since 2000 with the words "literacy" and any South African indigenous language in the title.[6] There were only eight of which one was a duplicate; and none of them focused on micro-linguistic approaches. It therefore seems that most literacy research focuses on the meta- and macro-linguistic issues (in English and Afrikaans) which tend to become increasingly important after the foundation stage. Therefore, there is a great need for micro-literacy work on African languages.

4. Linguistic dimension in need of research

The following sections identify and discuss four main linguistic dimensions which we consider to need drastic attention: (1) the effects of non-L1 aligned LOLT, (2) orthography, (3) cognitive skills, automaticity and vocabulary development and (4) the need for norms and reading resources. We contend that without intellectual investment in these areas, future curriculum statements and annualized assessments will continue to be problematic.

4.1.Linguistic dimension 1: The effects of non-L1-aligned LOLTs

At a macro-level, there is a close correlation between Language of Learning and Teaching (LOLT) and L1 alignment and Human Development. The Human Development Index is a United Nations measure of quality of life. There are several such indices but

[6] "allintitle: literacy isiNdebele OR isiXhosa OR isiZulu OR "Sesotho sa Leboa" OR Sesotho OR Setswana OR siSwati OR Tshivenda OR Xitsonga".

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we chose the UN Human Development Index (HDI) because of its international scope and perceived objectivity. We analysed whether there is a correlation between HDI score and whether the learners in that country were exposed to a LOLT that was aligned with their L1. To do so, we arbitrarily compared the 21 highest, medium and lowest scoring countries based on publically accessible data on Wikipedia (http://en.wikipedia.org/wiki/List_of_countries_by_Human_Development_Index accessed 10 January 2014). Each country was then evaluated on whether its LOLT was aligned with the L1s of its learners.

This assessment is not entirely straightforward: all countries include linguistic minorities (e.g. Germany, Ireland, Indonesia etc.); some countries have multiple official languages (e.g. Norway which has the official languages of Bokmål and Nynorsk, both of which may be used in schools), many countries may include a foundation or primary education in an L1 and then enforce a non-L1 LOLT during later education and for many countries, data are hard to find. Nevertheless, in general one can make generalizations about the degree of alignment between the L1 and LOLT. Thus for example, in Norway, school educations are largely in Bokmal but there is a very high tolerance and even encouragement of the use of local dialects at schools both in oral and written form and thus there is good alignment of L1 and LOLT.

When these countries are compared (Table 4), High HDI countries almost exclusively have aligned L1s and LOLTs, Medium HDI countries have a mix of aligned and non-aligned LOLTs while Low HDI countries almost exclusively have LOLTs which are not aligned to L1. There is a highly statistically significant difference between the three groups (χ^2 (2, N=92) =37.212, p=<.001). In addition, we ran a linear regression: use of L2 as LOLT was a highly significant inverse predictor of HDI score (β=-0.296, F(59) =68.28, p<0.001). Although there may be many reasons why countries have the HDI scores they do and one must be cautious of the possibility of spurious correlations, one can nevertheless interpret these results in a plausible way: as argued earlier, educational

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success is a gateway to participation in the economy and language and literacies are extremely important in the mediation of education.[7]

	L1 LOLT	L2 LOLT
High	20	1
Mid	10	11
Low	0	20

Table 4: HDI correlates with language of teaching and learning

Research suggests a strong link between underachievement (particularly in literacy and mathematics assessments) and learning in an additional language (MacDonald et al, 1991; Taylor & Vinjevold, 1999; PIRLS, 2007, 2012; Fleisch, 2008). In the PIRLS (2006) results, the effect of LOLT/L1 alignment is the difference between the `same' and `different' columns as indicated informally by the braces in Figure 4. With the sole exception of Xitsonga (in grade four) and isiZulu, Tshivenda and Xitsonga (in grade five), the `same' groups outperform the `different' groups. This measurable performance differential is the effect of an L1 and LOLT being misaligned. Interestingly, the differences are particularly large in English and Afrikaans. In part, this may be due to English and Afrikaans classrooms being more likely to include learners whose L1s may be structurally/typologically highly divergent from the LOLT (e.g. isiZulu is syntactically, morphologically and phonologically different to English and Afrikaans). In contrast, it is more likely that in a Sepedi classroom, learners are likely to be speakers of another language from the Southern Bantu language family which are structurally and typologically similar. Thus, in a Sepedi classroom, learners may transfer at least some linguistic resources from their L1 to the L2 whereas this will be more difficult in an English or Afrikaans classroom.

[7] We would like to thank Prof. Ron Simango (Rhodes University) for originally pointing out the correspondence between relative development and LOLTs.

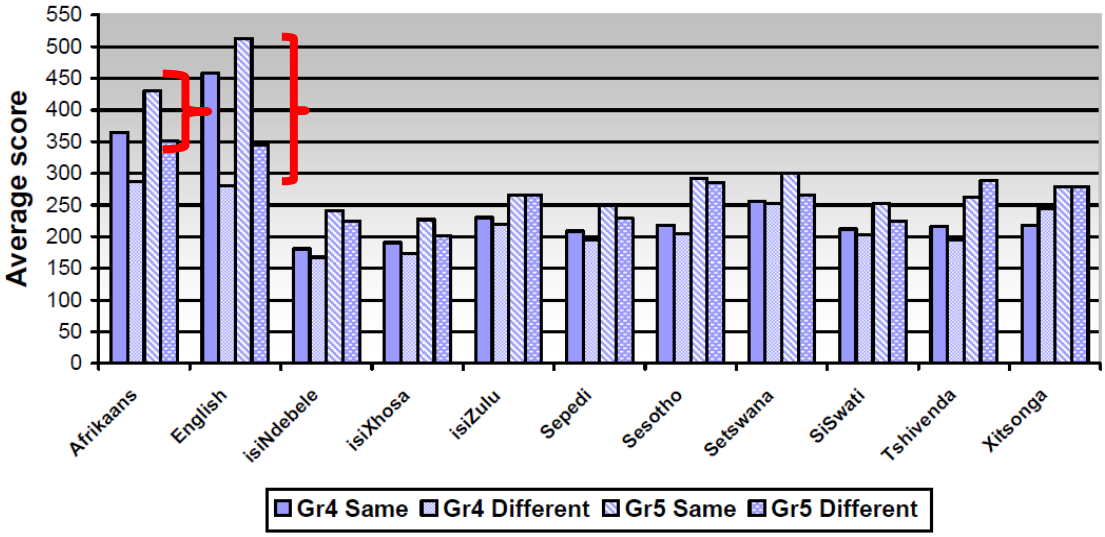

Figure 4: Relative performance of learners tested in L1 or L2 (adapted from Howie et al 2006).

4.2.Linguistic Dimension 2: Orthography

The question of orthography also plays an important linguistic role. Bantu languages are agglutinative in nature – informally speaking, this means that a whole sentence can be expressed in a single word – and consequently the nature of the "word" differs from that in English (Guthrie 1948, Louwrens & Poulos 2006, Prinsloo 2009, Van Wyk 1995). Bantu words tend to be multisyllabic and multimorphemic: a clause consisting of monosyllabic words – "the cat sat on the mat" – is simply not as easy to do in a language like isiXhosa. This has consequences for ease of acquisition or word recognition and automaticity (see Linguistic Dimension 3: Automaticity and vocabulary development). It also has implications for lexicography – and the paucity of research has resulted in poor dictionaries (Prinsloo 2009; Gouws 1990) which, in turn, are poor classroom resources.

Orthographies, as systems of encoding the written forms of a language, are inextricably intertwined with issues of standardization. Orthographies incorporate tradeoffs between the political (e.g. which dialects are standardized, by whom, and the purposes for which such standardization and literacy are intended, as well as whether a `roman' orthography is used or not); the pragmatic (e.g. the costs of standardization, of publishing and translating in different standards etc.); the linguistic (e.g. which phones are represented,

how phones are represented as di/trigraphs, whether the language is more suited to an alphabetic or syllabic script etc.); and the perceptual/psycho-linguistic (e.g. whether the mapping is to and from grapheme to an alphabetical, syllabic or lexical level, whether the orthographic word maps in a one-to-one way to the psychological or linguistic word and the effects of this on reading skills etc.).

4.3.Linguistic Dimension 3: Orthographic transparency and integrity

One way in which some of these interlocking issues can be untangled is by viewing an orthography from the perspective of relative transparency and integrity. A transparent language has a one-to-one mapping from phonemes to graphemes. Thus, the English word `dog' is highly transparent because each phoneme maps to a grapheme in a systematic way; correspondingly, the pronunciation of the word is entirely predictable from the script. This can be contrasted with the Afrikaans word for dog, `hond' versus dogs `honde', where the final stop is devoiced in the singular but not in the plural. Although this is not represented orthographically, it is predictable from having knowledge of the phonology of the language, but not from the script itself. Bantu languages are generally considered to be very transparent; English is one of the least transparent alphabetic languages.

The integrity of orthography is the degree to which it corresponds to linguistic structures. It can play itself out at different levels according to "grain size": the linguistic level a particular orthography best represents: phonemes, morphemes, syllables or whole word recognition (Ziegler and Goswami 2005). Orthographies can be evaluated at the phonemic and syllabic levels. English is more oriented around the notion of the phoneme and this is reflected by the alphabetic writing system. However, Bantu languages tend to structure phonological words around a syllabic CV(V) template.[8] Since the primary unit of phonological organization, the syllable, is mapped to at least two graphemes, there is a non-one-to-one mapping from grapheme to syllable and the orthography has less integrity at the syllabic level as a result. African-language teachers may already implicitly

[8] It is important to distinguish between the phonological consonant clusters and graphemic ones. Although a word like Ngqura appears to have a cluster as an onset, in fact it is only a simple C onset.

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recognize that an alphabetic script may be less optimal for a syllable-oriented language by intuitively teaching automaticity of syllable recognition instead of phoneme recognition.[9] This is sometimes referred to anecdotally and derogatorily as the `ba-be-bi-bo' methodology where CV syllables are written on the blackboard and children recite them (Figure 5). However, it is probably the case that this is a rational and valid technique responding to language structures worthy of more research.

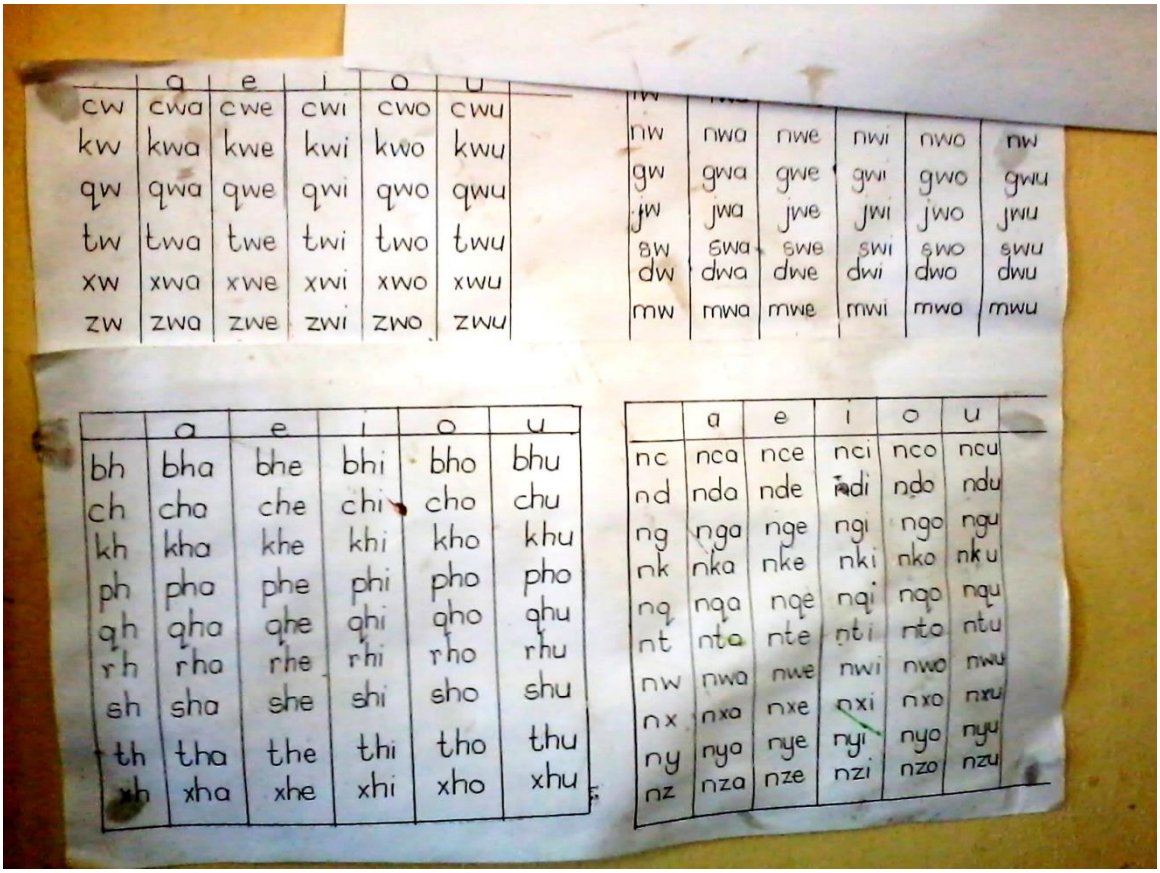

Figure 5: Syllable lists in an Eastern Cape school

Orthographic integrity also plays out at the word level. Because of the agglutinating morpho-syntactic structure of Bantu languages, combined with the use of an alphabetic system, the orthographic word tends to be relatively long. The linguistic word corresponds to speaker intuitions about where the word boundaries are regardless of

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orthography. The extent of the linguistic word is illustrated by, for example, the scope of phonological processes (Kula 2002). Conjunctive orthographies can be considered to have a higher degree of integrity because the linguistic word tends to correspond to the orthographic word, whereas disjunctive orthographies may have lower degrees of integrity because the orthographic word may not reflect the underlying linguistic word. The effects of this are illustrated by the following extracts.

> *Ekuqaleni uNkulunkulu wadala izulu nomhlaba. Umhlaba wawuyihlane elingenalutho; kwakungubumnyama phezu kotwa, kepha uMoya kaNkulunkulu wehla wenyuka phezu kwamanzi.*
>
> *In the beginning God created the heavens and the earth. Now the earth was formless and empty. Darkness was on the surface of the deep. God's Spirit was hovering over the surface of the waters.*

	English	***Zulu***
Words	*35*	*18*
Word length w.r.t. graphemes	*4.4*	*8*
Flesch Kinkaid Reading age	*4.9*	*24.2*

Table 5: comparative readability statistics for an English and Zulu text

While these two texts while semantically and functionally identical, they present very different reading challenges. The relative transparency of the isiZulu text is offset by the length of the words: the average length of the isiZulu words is double that of English.[10] Perhaps longer word length makes for more difficult reading but at the very least the cognitive resources required for reading isiZulu are different to those required for English; the reading experiences of these learners will correspondingly be different. There is a need for teaching methodologies and reading materials that take these differences into account.

[10] Longer word length in isiZulu is almost entirely a consequence of using an alphabet. If isiZulu were encoded using a syllabary then average word length would decrease to 3.5 graphemes. Although this would very likely have a positive impact on the learning experience, it is very unlikely that there could ever be the political will to embark on such a project.

4.4.Linguistic dimension 4: Cognitive skills, automaticity and vocabulary development

As learners gain proficiency in reading, recognition of individual words becomes automatic, considerably speeding up the reading process. This allows deeper and more critical reading as well as the use of contextual and semantic cues as "automated word recognition frees mental resources for closer consideration of the meaning of a text and thereby allows readers to employ reading for the acquisition of new information and knowledge" (Verhoeven 2009:38). The importance of automaticity is paramount as there is a variety of evidence showing close relationships between automaticity, vocabulary size and text comprehension (Verhoeven 2009). This is put crisply by Abadzi: "it is essentially impossible to read haltingly and comprehend much material" (Abadzi 2008: 593). In South Africa, it appears that learners do not read with comprehension in mind (ANA South Africa 2011) and that they are unable to "go beyond decoding text" (Spaull, 2013:4). The question we should be asking ourselves is what is it about the way learners decode in African languages that inhibits or delays automaticity? Areas that need further research include implementation of teaching methodologies, word length and its cognitive effects, Phonological and Morpho-syntactic awarenesses as well as Semantic processing.

4.4.1. Conjunctive orthographies and word recognition

Agglutination, compounded by conjunctive orthographies, could result in a relatively high number of "orthographic neighbours" (i.e. words that differ by relatively few letters) which have been shown to inhibit reading speeds (Perea & Rosa 2000; Andrews 1997, Grainger 1992). It may also increase the net number of distinct forms in texts for any particular lemma, making it more difficult to develop automaticity of `word' recognition. In addition, conjunctive orthographies may increase the mean length of words making word recognition and automaticity more complex than for an English learner.[11] Longer words impose larger loads on short-term and visual memory and character recognition

[11] Increased word length should be seen against the backdrop of a much more transparent orthography than English. Therefore, it is not unreasonable to suppose that the total processing load of reading in either language is not grossly different, although clearly the exact manner and distribution of work would probably be different.

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buffers (Garrod 2006) and this could affect the decoding process. Short term memory stores about seven pieces of data for about 12 seconds (Abadzi 2008: 584). This is significant when one considers how long a child might take to decode a long word and it may "have a knock-on effect in other areas of the reading process" (Urquhart and Weir 1998:189). Abadzi (2008) reinforces the importance of automaticity, pointing out that just 5% inaccuracy in reading translates to only 75% comprehension (Barr et al. 2002 cited in Abadzi 2008).

4.4.2. Morpho-syntactic and phonological awarenesses and their cognitive effects: implications for automaticity

Morpho-syntactic and phonological awarenesses are instrumental in reading fluency in alphabetic-disjunctive orthographies. Morpho-syntactic awarenesses are generally the less well understood of the two (Verhoeven & Prefetti 2003) but relate to the ability to identify and manipulate words and morphemes (e.g. identification, deletion, substitution and insertion tasks) and to do so orally and graphemically (Carlisle 1995). Morphological awareness correlates with increased vocabulary size and with comprehension and becomes more important as a child progresses through school (Nagy, Berninger & Abbot 2006, Ramirez, Chen & Geva 2010, Verhoeven & Perfetti 2003, Deacon & Kirby 2004, Carlisle 1995, McBride-Chang, Wagner, Muse, Chow, Shu 2005, McBride-Chang, Zhou, Wat and Wagner 2003, Carlisle 2000). This type of awareness may well be more important for literacy in African languages than it is in English. "Critical questions to be answered are how orthographic, phonological, and semantic information become available during visual word identification, how children become morphologically aware, how they acquire sets of rules for reading and spelling multimorphemic words, and to what extent such rules can be explicitly taught" (Verhoeven & Perfetti 2003: 212).

Phonological awareness includes and explicit awareness of and ability to manipulate sounds (in identification, deletion, substitution and insertion tasks) at a variety of linguistic levels (phonemic, syllabic etc.). Similarly, graphemic awareness includes the ability to do the same types of manipulations on printed graphemes. These awarenesses

are in a mutually reinforcing relationship with literacy and has been demonstrated for many languages including English, Turkish, Czech, German, Greek, Italian, Portuguese (Bryant & Goswami 1987, Morais 1991; Morais et al. 1979; Scheule and Boudrea 2008; Caravolas and Landerl 2010). There is, however, relatively little for South African languages (but cf. Diemer 2013; De Sousa & Broom (2010); De Sousa, Greenop & Fry (2010) for isiZulu, and Cockcroft & Alloway 2012 for South African English).

4.4.3. The linguistic specificity of constellations of cognitive strategies

The cognitive skills underpinning literacy play out differently in different languages and for different orthographies and this is reflected in different rates of acquisition and development in children (Bialystok 2002).

Phonological awareness develops in relation to a particular language and orthography. Much research has demonstrated this with respect to alphabetic orthographies (Mann 1996; Read et al. 1986 cited in Holm & Dodd 1996) and languages sharing an alphabetic system but with different degrees of transparency e.g. English vs Italian (Bialystok 2002, Goswami 1999). Bialystok (2002) reviews a number of examples: Italian children achieve relatively high phonological awareness scores, presumably because of the transparent orthography (Cossu, Shankweiler, Liberman, Katz and Tola (1988). Czech children do better than English ones at detecting consonant clusters (Caravolas and Bruck 1993), reflecting the fact that Czech has very complex onsets. French speaking children tend to have better syllable awareness whereas English speaking children have better phoneme awareness (Bruck and Genesee 1995). Spanish children are differentially sensitive to PA at syllable and phoneme level (Gonzalez and Garcia 1995).

Neuro-psychological models of reading also point toward different skill sets. One of the most widely accepted models of reading involves a dual-route model of processing involving both automatic whole-word recognition and decoding (Coltheart 1982, McCusker, Hillinger & Bias 1981 (both cited in Holm & Dodd 1996; Levey Pernet, Treserras & Boulanour 2009, Invernizzi & Hayes 1996). Readers of opaque scripts use a lexical recognition route at least some of the time during acquisition. Readers of

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transparent orthographies acquire literacy via a sublexical, decoding route (Wimmer & Goswami 1994). Importantly, both types of readers eventually achieve automaticity. However, more recent research shows that, also at an intralanguage level, even highly competent readers use a number of different reading strategies: in English, about 62% of reading is devoted to letter recognition, 16% to whole-word recognition and 22% to context (Pelli & Tillman 2007 cited in Abadzi 2008). Thus, readers use combinations of these strategies and "the division of labour between the phonological and orthographic components" (Holm & Dodd 1996: 121) may vary from language to language. Exactly which strategies are accessed by African readers remains under researched (cf. Probert & De Vos 2014).

4.4.4. Differential transfer of cognitive skills

Different orthographies and language systems interact with cognitive skills differently, affecting the ability to transfer in bilingual contexts (Huang & Hanley 1995, Read, Zhang, Nie and Ding 1986 (cited in Holm and Dodd 1996: 120). Complicating the picture in South Africa is the fact that learners may develop phonological and morpho-syntactic awarenesses in their L1 during the foundation phase. When the LOLT changes to English in grade four, it is important that these skills be transferred to the L2. However, there is very little research on how orthographic environment affects acquisition of a second language (Simon & Van Herreweghe 2010).

A range of evidence shows that transfer can occur when two languages are similar (Bialystok 2002 and references therein including Ciscero and Royer (1995); Durgunoglu, Nagy and Hancin-Bhatt (1993); Durgunoglu (1998) and Rickard Liow and Poon (1998)). However, when there are disparities between languages, transfer is a more complex process with either lack of transfer or inappropriate transfer which needs to be unlearned (Koda 1990). However, we know very little about how these awarenesses interact with African languages. Given the linguistic typological differences between Bantu versus West Germanic languages, it is a completely open question which sub-skills transfer and which ones do not.

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4.5. Linguistic Dimension 4: norms and reading resources

Of critical importance is the lack of adequate normative teaching and assessment resources. Regular, contextualized formative assessment is critical for successful literacy acquisition (IRA & NAEYC 1998) and English teachers can draw on a deep body of international research on age-appropriate reading speeds, vocabulary size norms, word recognition norms and even tools to determine the reading ages of particular texts (e.g. the Flesch-Kincaid test is embedded within Microsoft Word). With respect to reading speeds, there are well-developed norms for English. Thus, a speed of 53wpm is appropriate for grade one reading aloud; 89wpm for grade two; 107wpm in grade three and 123wpm for grade four (Hasbrouck & Tindal 2006). Similar norms are largely absent for African languages (Abadzi 2008). Even for Afrikaans, for half a century there was only a single literacy assessment tool developed in 1944 – it was only revised in 2002 (Esterhuyse, Beukes & Heyns 2002).

The parametric variation in the nature of the word, prevents the norms of one language being applied to another in an ad hoc fashion e.g. what does a reading speed of 60 "words" per minute mean to a speaker of isiXhosa written in a conjunctive orthography? That such norms and resources would be beneficial has been demonstrated: Pretorius and Mokhwesana (2009) showed that word-recognition rates increased as teachers became more aware of what rates of achievement were possible – and achieved them earlier and earlier in the year. Similarly, Abadzi (2008) estimates that just 90 hours of instruction administered over a period of just a few weeks could raise reading speeds to 45 words per minute.

5. Conclusions and directions for future research

Literacy is different in each language and sits at the confluence of a cognitive, orthographic and linguistic/structural nexus. Thus there is no one-size-fits-all approach to literacy. Very little foundational literacy research is done on this nexus and so we know little about how literacy "works" in African languages. Without this understanding we lack the knowledge to compile sound teaching methods. However, before we approach

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pedagogy, there are a wealth of theoretical, psycholinguistic and descriptive questions that need to be answered about the linguistic properties of South African languages.

- Detailed and theoretically informed descriptions and analyses on the linguistic structures of African language.
- Psycholinguistic investigation of the cognitive skills involved in reading in African languages (lexical recognition, phonological awareness, morpho-syntactic awareness, semantic awareness and automaticity) and their ability to transfer to other linguistic contexts.
- The psycholinguistic effects of orthography and its interaction with the Linguistic.
- Normative data, resources and language tools.
- Language specific pedagogy.

Once we start to understand them, these issues can be addressed by language-specific pedagogies that target the unique cognitive skill sets needed to read effectively in each language. At least the following aspects need urgently to be researched: the best sequence of introducing consonants / vowels; consonant blends and clusters; suitably simple, age appropriate and culturally relevant vocabulary sets with which to introduce letters and sounds; lists of common words based on authentic corpus study; grade-appropriate word counts as baseline measures of reading proficiency; age-appropriate themes for Foundation Phase which allow the introduction of large numbers of simple words and their associated concepts; ways of and metalanguage for introducing agglutinating language syntax to pre-readers and emergent readers for the promotion of morphological awareness (e.g. noun classes; inflectional and derivational morphology; identification of roots and morphemes; word order etc.).

This endeavor must be supported by well-designed teaching and learning resources, norms and other tools. There is thus room for a new social contract between linguistics, educators and materials developers where each discipline can engage deeply with the other and allow a creative process of cross-pollination.

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