Inaugural lecture

The importance of being multilingual

by

Prof Susan Coetzee-Van Rooy

Professor in English in the

Faculty of Humanities

North-West University

Vaal Triangle Campus

3 September 2010

Vaal Triangle Occasional Papers: Inaugural lecture 6/2010

Vanderbijlpark

2010

Printed by: The Platinum Press
North-West University
Vaal Triangle Campus

September 2010
ISBN 978-1-86822-594-1

TABLE OF CONTENTS

The importance of being multilingual

Inaugural lecture presented by Susan Coetzee-Van Rooy on 3 September 2010 at the Quest Conference Estate of the Vaal Triangle Campus of the North-West University.

Introduction

In this lecture I want to focus on the importance of being multilingual. To start with, I will briefly explore the reality that today the majority of people across the world are multilingual. This phenomenon is driven by globalisation and local responses to it. Two of the important language-related phenomena I want to delve into are the increased focus on linguistic rights and the incredible spread of English as an additional language. I will indicate why I think South Africa is a unique setting for the study of multilingualism in the current global context.

In the second section of the lecture, I want to focus on the most important reason for studying multilingualism: that is, the potential such study offers for helping us understand human cognition better. I will briefly share what we know about the cognitive benefits of bilingualism, and report on the paucity of research on multilingualism and cognitive benefits.

In the third section, I argue that South African universities need to prioritise the study of the relationship between multilingualism and cognition. I maintain that a better understanding of this relationship can assist us to re-conceptualise what appropriate academic development and support for multilingual students entail. Ultimately, I believe that the ability of universities to activate multilingualism as a resource lies at the heart of academic development in South Africa.

In the fourth section, I briefly explain the two paradigms that form the theoretical foundation of my work. The first paradigm is that of World Englishes. This paradigm affords me valuable conceptual tools to understand and describe how English is used in the multilingual mosaic of the South African society. The second paradigm is the complex-systems approach that I started to explore only recently. One of the most prominent features of the complex-systems approach is its ability to conceptually integrate variability, heterogeneity and unpredictability. I hope to show that this approach is ideal for a study of multilingualism and cognition in higher education.

In the fifth section, I report the findings of an empirical project in which I used a World Englishes and complex-systems approach to initiate research about the multilingualism of the students on our campus.

In the concluding section I would like to reflect on the potential usefulness of a combined World Englishes and complex-systems approach for the study of multilingualism and cognition in higher education. I also want to share a future research agenda for studies of multilingualism and cognition grounded in these two paradigms.

Section 1: Multilingualism as a contemporary phenomenon

We live in an epoch where being human means being multilingual. That is, multilingualism is an intrinsic part of the human condition. Some scholars refer to this condition as the new linguistic dispensation (Aronin & Singleton, 2008: 1, 12) that is the result of technological development and global economic forces.

Friedman (2005) maintains that today, "the world is flat". What he implies with this metaphor is that as a consequence of technology, more people can "plug, play, compete, connect, and collaborate with more equal power than ever before" (Friedman, 2005: x). He acknowledges that this does not lead to "equal" social and economic situations (Friedman, 2005: x), but he insists that globalisation holds an "equalising" potential because many more people than ever before have access to and the ability to use the tools necessary to connect, compete and collaborate. He describes the flat-world platform as the product of the development of the personal computer, fibre-optic cable and work-flow software (Friedman, 2005: 10).

When people of diverse backgrounds are in contact, they need a shared language code to facilitate communication. The incredible spread of English as a language of wider communication in the world today is closely linked to the forces of globalisation (Graddol, 1997; Pakir, 1999; Kloos, 2000). At a very basic level, the spread of English contributes to the increase of multilingualism in the world today because many people are learning English as an additional language (Kachru, 1996; Cenoz, 2009), while they continue to learn and use local languages.

Paradoxically, increased global contact has simultaneously heightened appreciation for the local (Preteceille, 1990; Kloos, 2000). In the context of language, this has given rise to a re-appreciation of the value of local languages within a broader movement for linguistic rights (Kloos, 2000: 282). The tension between the local and the global is also evident in discussions of the use of English. Scholars accept that English is owned by all its users and that local and global identities are expressed in English (Schneider, 2007: 14). In the World Englishes community, Pakir (1999) coined the term "glocal" to refer to the new use of English as a result of globalisation. "Glocal" English is useful globally, but rooted in the local contexts where it is used as additional language to express local identity (Pakir, 1999: 346). In discussions of local languages that co-exist with global English, scholars are increasingly turning to multilingual societies in Asia and Africa to deepen their understanding of how local languages are maintained in multilingual repertoires, often in the presence of English (Hornberger, 2002; Stroud, 2003).

In the ambit of globalisation, multilingualism today is therefore promoted mainly as a result of two broad realities (Cenoz, 2009: 1): an increased awareness of the importance of linguistic rights (Phillipson, 1992, 2000, 2009; Skutnabb-Kangas & Phillipson, 1995; Skutnabb-Kangas, 2000; Skutnabb-Kangas *et al.*, 2009;

Cummins, 2000; Mohanty, 2009); and the extraordinary spread of English as a language of wider communication in the world (Graddol, 1997, 2006).

There are two streams of scholarship focusing on the state of indigenous languages across the world. In the first approach, sociologists of language and language planners study patterns of language use in society, and many scholars in this domain warn that we are losing indigenous languages at an alarming rate. Romaine (2006: 449), for example, argues that about 60% of the world's languages are spoken by less than 10 000 speakers, and these languages might be at risk. Fishman (1991, 2001) proposes various ways in which language shift can be reversed.

The second prominent approach is reflected in the body of work produced by scholars who focus on linguistic rights. As a result of the research by scholars like Phillipson (1992, 2000, 2009), Skutnabb-Kangas (2000) and Cummins (2000), the notion of linguistic rights, especially as related to the importance of minority indigenous languages, has gained prominence. In this context, the phenomenal spread of English is not viewed in a positive light. English is seen as a "killer language" (Phillipson, 1992, 2000, 2009) that leads to "language murder" in the case of many indigenous languages (Skutnabb-Kangas *et al.*, 1995: xxxi). A historical overview of the development of this lethal English indicates that its first victims were languages like Celtic, West Saxon and Gaelic (Mesthrie, 2006: 386, 388).

One of the most striking features of the spread of English noted by linguists is the fact that users of English as an additional language now outnumber users of English as a home language (Graddol, 1997: 2-3; Graddol, 2006: 57; Kirkpatrick, 2007:1). The overwhelming predominance of users of English as an additional language globally results in an increase in different varieties of English. Linguists interested in the study of the varieties of English approach this variation from various perspectives. One of the most influential descriptive frameworks for the varieties of English is the notion of World Englishes coined by Braj Kachru (1985, 1986). In this paradigm, varieties of English are categorised into one of three circles. The Inner Circle varieties of English are used in countries like the United Kingdom, the United States of America and Australia, where English is the home language of the majority of the citizens. Outer Circle varieties are used in countries like India, where English was transplanted as an additional language mainly as a result of colonisation. There are also varieties of English used in Expanding Circle countries like China, Japan and South Korea where English is used to communicate in international situations.

South Africa is a unique context for the study of multilingualism. Due to its distinctive history it is a country where many indigenous languages and a variety of heritage languages are used; and where English is the undisputed additional language. There is no single "dominant" language in the country (Du Plessis, 2000: 101; Romaine, 2006: 461-462) and this gives rise to a distinctive expression of language and identity. The salient linguistic marker of South

African identity is multilingualism (Coetzee-Van Rooy, 2000; Coetzee-Van Rooy & Verhoef, 2002; Coetzee-Van Rooy, 2010). This is also expressed in the constitutional declarations about official languages (South Africa, 1996; South Africa, 2000) and language policies at all levels of education in South Africa (Department of Education, 1997; Ministry of Education, 2002). The North-West University (NWU), for example, supports multilingualism via its special language policy and plan.

South Africa is also a distinctive context for the study of varieties of English (Schneider, 2007: 173-174). Expressed in terms of the framework presented by Kachru (1985, 1986), English is used as Inner Circle tool by about 9% of the South African population who use it as home language. English is used as typical Outer Circle instrument because it is learnt as an additional language in schools by most learners, and it is used widely as a language of intra-national communication when citizens do not share the same home language. In some rural contexts in South Africa, English is used only with foreigners who visit occasionally, and in such situations it can be regarded as a foreign language. There are thus many different varieties of South African English.

A study of multilingualism in South Africa therefore holds the potential to deepen our understanding of the phenomenon at various levels. On the one hand, a sizeable number of indigenous languages are used in the country, and the notion of linguistic rights is captured prominently in the Constitution (South Africa, 1996) and the language policies in schools and at some universities. On the other hand, English is used widely as an additional language in South Africa, largely as a consequence of its colonial and postcolonial history and the forces of linguistic globalisation. Both drivers for the increased importance of multilingualism in the world today are present in exceptional ways in the South African context.

Section 2: Multilingualism and cognition

Why is it important to try to deepen our understanding of multilingualism? One of the most obvious reasons for the study of multilingualism is simply that the phenomenon is widespread across the world today, and therefore warrants investigation. The unique context in which languages co-exist in South Africa makes it an important site for the study of multilingualism. However, an even more compelling reason is the potential influence of multilingualism on other aspects of the human condition, such as cognitive development (Bialystok, 2001, 2005, 2007; Vygotsky, 1986).

In the early 1900s, the most prominent type of multilingualism that was studied was bilingualism. It was believed that bilingualism had a detrimental effect on cognitive functioning (Ng & Wigglesworth, 2007: 53-70). Until the middle of the twentieth century people readily accepted that mathematical and musical skills enhanced mental ability by increasing mental space. Conversely, when it came to languages and the learning of additional languages, the brain was seen as a finite space where languages had to fight for room. Up to the 1960s, bilingualism was not associated with any positive cognitive effects.

Groundbreaking work done by Leopold (1949), Peal and Lambert (1962), Gardner and Lambert (1959), Ianco-Worral (1972), Cummins (1977) and Bialystok (1988, 2001, 2005) proved the converse to be the case. These studies established that under certain conditions, bilingualism did not cognitively disadvantage children. Even more importantly, it was proved that in some cases, bilingual children outperformed monolingual children on certain cognitive tasks. Today we know that results from psycholinguistic research in the past 50 years indicate that there are cognitive benefits to being bilingual. Scholars report enhanced metalinguistic awareness and an enhanced ability to learn additional languages as benefits of bilingualism (Bialystok, 2001: 14, 15, 246; Datta, 2000: 25; Edwards, 2009: 18-20; Cenoz, 1998: 28; Cummins, 2009: 26). Datta (2000: 25) formulates the connection between bilingualism and cognitive advantage as follows:

> There is also wide-ranging empirical evidence to suggest that bilingualism leads to greater cognitive flexibility as well as greater understanding of language as a symbolic and rule-governed system. These are essential tools in academic success.

Despite scholars' acknowledgment of the importance of multilingualism today, research into multilingualism in general is in its infancy (Herdina & Jessner, 2002; Cenoz, 2009; Todeva & Cenoz, 2009). Furthermore, research about multilingualism from the continents with the most multilingual societies in the world, Asia and Africa, is often under-represented (Todeva & Cenoz, 2009); and research about the potential cognitive advantages of multilingualism is only starting now. Herdina and Jessner (2002: 160-161) describe three cognitive advantages of multilingualism established for the European context: (a) an enhanced sense of metalinguistic awareness; (b) enhanced language-maintenance strategies; and (c) enhanced language-management strategies. They agree that more studies should be conducted in different contexts to expand our understanding of these benefits, and more importantly, to tease out the implications of these cognitive benefits for education.

Section 3: The cognitive benefits of multilingualism in higher education in South Africa

This brings me to the importance of being a multilingual student in South Africa. If it is true that the condition of multilingualism is accompanied by cognitive advantages, higher-education institutions in South Africa should be at the forefront of research about this phenomenon. We should find out all we can about the nature of the multilingualism that our students bring to the university so that we can optimise the potential cognitive benefits related to the phenomenon. We should, for example, know how to capitalise on the enhanced metalinguistic awareness of our students.

Sadly, scant research has been conducted from the vantage point that the multilingualism of South African students is a benefit that can enhance their

academic performance. There is a plethora of research about the advantages of multilingualism in South African schools (see, for example, the work conducted at PRAESA, Project for the Study of Alternative Education in South Africa), but research focusing on the context of higher education is limited. The work carried out by Elbie Henning at the University of Johannesburg is an exception. Since the mid-1990s Henning and her students have presented papers in which they set out their view that multilingualism is an important and positive quality of South African students in higher education. Quite simply, Henning and her associates (Henning *et al.*, 2001, 2002) argue that one of the most fundamental educational principles surely is to use the experiences and knowledge that students bring with them to the university as a starting point for new learning. Knowledge of and proficiency in "primary languages" are regarded as one of the most important resources that can be activated to guide students into university learning. Henning and her co-workers believe that using "primary languages" and early learning experiences in university classrooms is important, because recalling early encounters with concepts and using words that best capture those experiences, assist students in creating a bridge by means of which they can transfer their understanding of a scientific concept into English (Henning *et al.*, 2001: 112). Using this pedagogical approach, they "evoke" the resources students bring with them to the university classroom in an appropriate way (Henning *et al.*, 2001: 115).

Contrary to the pedagogical approach advocated by Henning and her associates, the multilingualism of our students is often implicitly, and sometimes explicitly, regarded as a "problem". In the National Benchmark Test (NBT) report, Yeld (2009), for example, shows that South African students probably do not enter higher education with the necessary academic language proficiency required to be successful. She states that "difficulties with the medium of instruction are undoubtedly a contributing factor to poor performance, and impact on success and throughput rates" (Yeld, 2009: 4). She argues that "the fact that... most students needed support should come as no surprise as many of them were not operating in their mother tongue" (interview with Yeld reported in Wyndham, 2009: 4).

Similarly, at an institutional level, Verhoef (2009) has reported that first-year students at the NWU show a steady and alarming decline in scores on the Test of Academic Literacy Levels (TALL), which has been conducted with first-year students since 2002. This finding pertained to students who took the test in Afrikaans and students who took the test in English on the Vaal Triangle Campus. She infers from the test results that learners who achieve a mark of 60% and higher "are most probably those who will be able to finish their studies within the minimum time" (Verhoef, 2009: 10 in report; p. 33 in meeting documentation), thus highlighting that proficiency in the languages used for teaching and learning (English or Afrikaans) will influence academic success.

I agree that proficiency in the language of teaching and learning influences academic success, as noted by Yeld (2009) and Verhoef (2009). What I find problematic is that the other languages in the linguistic repertoire of these multilingual students are made invisible because these arguments focus only on the students' proficiency in one of the languages they know. In this way, the language proficiency of students is forever described as "not being good enough" – in English or Afrikaans, used as languages of teaching and learning. The multilingualism of these students is at best ignored, and at worst (and in all likelihood most often) perceived as a problem.

A secondary problem is that reports about declining levels of academic literacy are based on incorrect assumptions. It is well known that the different versions of the TALL are not equalised (Van der Slik & Weideman, 2007). It is therefore problematic to argue that a decline in TALL results necessarily reflects a decline in levels of academic literacy, because the different versions of the test have not been equalised to date. The NWU should be careful to interpret the TALL results over a period of time as a trend.

Another problem I have with current discussions of the decline in levels of academic literacy of students in South Africa, is the lack of a sense of history that they display. It is humbling to remember that one of the UNESCO (2003) goals is to achieve universal quality primary-school education and a 50% increase in adult literacy by 2015. Debates about declining levels of academic literacy in higher education in South Africa seem to suggest that there was an earlier "better" time when all our students were more literate. This is incorrect in a context where universal primary-school education and literacy development in general have a short history, especially on our continent. Furthermore, it seems as if we expect that students should arrive at university with levels of academic literacy appropriate for university teaching and learning. I think we forget that it is our job to facilitate the development of academic literacy during the time that students spend at university. At best, we could expect students to demonstrate advanced levels of academic literacy when they **exit** university. Discussions about the academic literacy of first-year students should therefore not lament students' lack of fully developed academic literacy appropriate for university. Such discussions should much rather focus on an understanding of where students are in terms of literacy development and how we should work towards literacy development in the time students take to complete their degrees.

Amidst these related discussions, the potential cognitive benefits of multilingualism therefore have little prominence in universities' reflections on and discussions of appropriate ways to organise academic development and support. In terms of the potential influence of language on academic achievement, there is a single-minded focus on assessing the proficiency of students in the languages of teaching and learning. Testing the English academic language proficiency of students is a big industry in South Africa. The TALL and the NBT are conducted at an increasing number of South African universities to help universities plan

appropriate academic development and support strategies for students. Custodians of the TALL, for example Weideman, has expressed interest in working towards some form of measurement of proficiency in African languages, but currently there are no formal initiatives to try and assess the proficiency of multilingual students in any of the other languages they bring to higher education. It is therefore impossible to understand how a multilingual student's proficiencies in various languages interact and influence cognition.

A matter of even more fundamental concern is that, with the exception of the work of Henning and her associates (2001, 2002), there are no attempts to build a body of work that could assist universities in changing their pedagogies so that the multilingualism of their students is activated as a resource for cognitive and academic development. Verhoef is leading a team at the NWU who are currently investigating new ways to promote multilingualism and to expand the use of African languages at the institution. It is, however, too early to gauge the impact and direction of the work of this team.

Against the background of arguments related to the potential cognitive benefits of multilingualism, there is no error in trying to understand the influence of proficiency in the languages of teaching and learning on academic achievement. However, it is erroneous to assume that this might provide a complete answer to questions about the influence of language on cognition and academic achievement of the MULTILINGUAL students in South Africa. This oversight becomes even more pronounced if one views multilingualism as a complex system.

Section 4: Theoretical grounding

In this section of the lecture, I want to briefly explain the two theoretical paradigms that inform my research.

World Englishes

If one's interest is multilingualism and the special role that English plays in multilingual repertoires, there is no better paradigm to adopt than that of World Englishes. It is not feasible (or indeed, advisable) to attempt a complete description of this paradigm in the short space of a lecture. For the purposes of this discussion, I will focus on explaining the rationale of a World Englishes paradigm, as well as the relevant conceptual tools that I use in my research.

First of all, the World Englishes paradigm establishes a conceptual framework for investigating the spread and functions of English in global contexts (Kachru & Nelson, 2006: 1). Utilising the well-known three-circles model briefly referred to earlier, Kachru describes the varieties of English in the global context as belonging to the Inner, Outer or Expanding Circle (Kachru & Nelson, 2006: 1). The Inner Circle countries are those countries where English originated or where large populations from the British Isles migrated, and thus include Australia, Canada, New Zealand, the USA and the UK. In the Outer Circle countries there is a long history of the use of English mainly as a result of colonisation, as is the

case, for example, in India and Singapore. In these countries, English has been acculturated and nativised, it usually holds official status, and there is a body of creative writing in English. The third circle is the Expanding Circle, which includes countries like China, Japan and South Korea, where English is used for international communication. The three-circles model aims to provide a conceptual framework that captures the status and functions of English, as well as its dynamic identity-confirming capacity (Kachru & Nelson, 2006: 27).

The obvious power of this conceptual framework lies in its inclusivity and pluricentricity, and in the equal status it affords all the varieties of English. In this framework, there is great respect for the fact "that people take English as they find it, and use it as they will" (Kachru & Nelson, 2006: 34). In this paradigm, stigmas associated with a lack of proficiency in only one kind of English (the English of the idealised native speaker) disappear (Schneider, 2007: 14). In this tradition, prominent World Englishes scholars are redefining notions of error and innovation (see Van Rooy, 2010) and proposing new concepts like code gliding to describe the use of languages in the multilingual person's repertoire when English is used seamlessly with other languages (see Sridhar, 2010b).

Furthermore, there is a long history of World Englishes work studying the impact of English on other cultures and languages. Kachru (1996) has repeatedly urged and provoked World Englishes scholars to resist paradigms that conceive of people as essentially monolingual, and concepts such as "bilingual creativity" (Kachru & Nelson, 2006: 32) and "multilingual English users" (Kachru & Nelson, 2006: 19) are widespread in the body of World Englishes work. In my work on multilingualism and cognition in higher education in South Africa, I hope to strengthen the multilingual awareness of the World Englishes community even more, in the process of using this well-known framework to describe the context in which I study English and multilingualism in South Africa.

Complex systems

There is a long tradition of the social sciences following the direction of the natural sciences by, for example, applying similar theories or methods (Elliot & Kiel, 1996: 1). For almost four decades now, the complex-systems approach has been one of the dominant paradigms in the natural sciences. Scholars have argued that a complex-systems approach is ideal for studies in the social sciences because of its emphasis on nonlinearity, instability and uncertainty (Elliot & Kiel, 1996: 1, 2). Yet there has been a scientific lag in applying a complex-systems approach in the social sciences. One of the reasons for the delay is the formidable mathematics involved in the methodology. There are only a handful of applied mathematicians working in the social sciences who are capable of fully grasping the fundamentals of a complex-systems approach and therefore it has made little progress in the social sciences (Harvey & Reed, 1996: 295). Consequently it is not surprising that the use of a complex-systems approach is also fairly new in the field of applied linguistics (Herdina & Jessner, 2002; De Bot *et al.*, 2007:7; Larsen-Freeman & Cameron, 2008: 255; Weideman,

2009: 61). As far as I am aware, the approach has not been applied in studying the field of higher education.

Before formulating a definition of complex systems for the purposes of this lecture, I need to make at least three concessions. Firstly, one obviously needs to acknowledge the risk in applying a complex-systems approach without a thorough grasp of its foundations (Larsen-Freeman & Cameron, 2008: 14). However, I believe that the careful explanations and applications of the approach by other linguists and applied linguists (Larsen-Freeman, 1997; Herdina & Jessner, 2002; Larsen-Freeman & Cameron, 2008; Beckner *et al.*, 2009) provide some defence in this regard. Secondly, one needs to acknowledge that the more traditional modelling of multilingualism as a complex system remains a future challenge (Jessner, 2008: 280). Currently, applications of the approach should be viewed as existing in the realm of "thought modelling". Lastly, I acknowledge that the full implications of applying a complex-systems approach to multilingualism and cognition in higher education remain to be discovered (Larsen-Freeman & Cameron, 2008: 158, 225, 255).

With all these concessions in mind one may ask: why then try to apply a complex-systems approach to illuminate the role of multilingualism in the cognitive development and academic success of students in higher education at all? There are at least three compelling reasons to attempt a complex-systems approach. The first reason is that this approach enables scholars in the social sciences to consider their research problems from a perspective that accepts constant change and great variability as a given. Van Rooy (2008) argues that most linguistic approaches assume that variability is a non-fundamental, rather accidental property of language. His view of language directs him to opt for an evolutionary or complex-systems approach, from within which variability is regarded as a fundamental feature of language. Acceptance of variability is particularly important if one studies a phenomenon such as multilingualism and its potential influence on cognitive development. Applying a complex-systems approach therefore gives rise to a re-conceptualisation of the units of analysis in the social sciences, which, in turn, could lead to new insights. Secondly, a complex-systems approach helps researchers to ask new questions that could assist scholars in the field of applied linguistics to clarify a new theoretical paradigm to direct research (Larsen-Freeman & Cameron, 2008: 13; Weideman, 2009: 70, 73). In the World Englishes context a complex-systems approach will help scholars to resist the marginalisation of, for example, the multilingual nature of World Englishes users (Kachru, 1996). Thirdly, other social scientists have already noted the usefulness of a complex-systems approach in integrating and synthesising earlier work (Larsen-Freeman & Cameron, 2008: 112, 161-162), for example on discourse. The same gains could be reaped for research on multilingualism and cognition utilising a complex-systems approach.

It is impossible to attempt a comprehensive description of a complex-systems approach in one lecture. The aim of the following section is therefore to provide

a brief summary of the main conceptual tools used in this approach, with a view to exploring its potential to illuminate our understanding of multilingualism.

One of the most important initial issues to grasp is that there are numerous components in a complex system and that these components are diverse and dynamic. Even more importantly, one needs to understand that "a defining characteristic of a complex system is that its behaviour emerges from the interactions of its components" (Larsen-Freeman & Cameron, 2008:2). It is easy to see why scholars of multilingualism are attracted to a complex-systems approach. Multilingualism is widely described as a complex phenomenon: several heterogeneous variables (for example, socio-economic status or SES, age, intelligence, language aptitude, attitudes towards multilingualism, and histories of literacy) influence the acquisition of multiple languages and these variables often combine in unpredictable ways (Bialystok, 2001: 6, 221, 243; Ng & Wigglesworth, 2007:10). As a result, there is great variability in the achievement of proficiency in multiple languages or related achievements in literacy (Edwards, 2009: 86). It is not obvious how the causes and effects associated with the multiple languages used by a multilingual person over time may be determined. Furthermore, it is difficult to isolate the effects of multilingualism on related complex systems, like cognition.

Larsen-Freeman (1997:142) highlights the following characteristics of complex systems: they are dynamic, complex (or heterogeneous), nonlinear, chaotic, unpredictable, sensitive to initial conditions, open, self-organising, feedback sensitive, and adaptive. In addition, in later work, the emergent behaviour of complex systems is emphasised (Larsen-Freeman & Cameron, 2008: 36-37, 58-60).

Complex-systems scholars are interested in the behaviour of **dynamic** systems – systems that change over time, all the time (Larsen-Freeman, 1997: 142; Larsen-Freeman & Cameron, 2008: 29). Change in complex systems is viewed on different levels and scales (Larsen-Freeman & Cameron, 2008: 30). This is one of the essential conditions of the multilingual experience: over the lifespan, the individual's knowledge of and proficiency in different languages change as a result of a myriad possible variables (Herdina & Jessner, 2002; Jessner, 2008; Bialystok, 2005).

Complex systems are complex because they include numerous **heterogeneous** components, in other words, components that differ in nature (Larsen-Freeman & Cameron, 2008: 28). Very often the components in a complex system consist of subsystems. The phenomenon of multilingualism is complex because of the heterogeneity of the variables that affect its behaviour at a particular time, as well as because of possible interactions between the components or subsystems of the complex system.

Complex systems often behave in **nonlinear** ways. Nonlinearity is a result of the interactions among elements and agents in a complex system over time (Larsen-

Freeman, 2008: 30). The degree of multilingualism achieved by individuals also seems nonlinear, in the sense that the outcome of multilingual learning sometimes seems disproportionate to the initial causes that motivate people to become multilingual (Edwards, 2009: 86). This, for example, is evident in the discrepancy between the high status and high levels of motivation to learn English in South Africa and the reported low English proficiency of South African students (Coetzee-Van Rooy, 2000; Coetzee-Van Rooy & Verhoef, 2002; Yeld, 2009; Verhoef, 2009). In general, a great degree of variability is reported in the learning of additional languages. A potential explanation for the nonlinear nature of multilingual proficiency is the threshold hypothesis formulated by Cummins (1979). It is possible that the potential cognitive benefits of multilingualism are only activated after achievement of very specific language proficiency thresholds for a particular combination of languages present in the multilingual mind. The notion of a **control parameter** used in a complex-systems approach could improve our understanding of Cummins's threshold and the resultant variation in language proficiency we observe in our multilingual students. Control parameters drive change in complex systems and in this way they determine the state a system assumes (Larsen-Freeman & Cameron, 2008: 53-54).

Complex systems are **open**; in other words, it is possible for input or energy to enter the system from the outside (Larsen-Freeman & Cameron, 2008: 31, 32), which, in turn, results in different states of "stability in motion". This is particularly prevalent in the context of language and the learning of additional languages if one considers Ellis's (2008: 233-234, 243) claim that "[l]anguages change over time. They change as a result of use". Herdina and Jessner's (2002) description of changes in the multilingual proficiency of individuals illustrates the "openness" of multilingualism as a system, and how different states emerge over time.

Complex systems are **adaptive**: changes in one area of the system give rise to changes in the system as a whole and vice versa (Larsen-Freeman & Cameron, 2008: 33). A view of multilingualism as a complex system in interaction with other complex systems like cognition implies that the whole system is considered when mutual influences are studied. The fact that African languages are not used in higher-education classrooms, and the lack of instruments to measure proficiency in African languages leave us with incomplete and therefore incorrect answers to questions such as how language interacts with cognition and how this influences academic performance. If we do not activate the potential of the complete multilingual system in the higher-education classroom, we limit the capacity of these complex systems to adapt into more appropriate and potent facilitators of cognition and academic development.

Complex systems undergo periods of **chaotic** behaviour (Larsen-Freeman, 1997: 143). The adaptive nature of complex systems assists them to maintain stability, while at the same time demonstrating high levels of flexibility and responsiveness (Larsen-Freeman & Cameron, 2008: 58). In the context of multilingualism, this is illustrated by the many reports of multilingual speakers and language teachers that recount apparent "regression" in the language proficiency of speakers. There seems to be little evidence that a specific combination of conditions inevitably results in high levels of multilingual proficiencies. The individual nature of multilingual proficiencies can be described more appropriately by explaining it within the context of a complex system that displays periods of chaotic behaviour over time.

The variability reported in multilingual and general language proficiency seems irregular and **unpredictable**. It is predictable that there is great variability in the language proficiencies of multilingual people, but this variability often seems random or unsystematic in nature. It is not predictable when this randomness will occur and what forms it will take at different stages.

Complex systems display a **sensitive dependence on initial conditions** (Larsen-Freeman, 1997: 144; Larsen-Freeman & Cameron, 2008: 57). Errors in describing the initial conditions of a complex system may result in an incorrect understanding of the behaviour displayed in later stages of the system's lifespan. This is a potentially fruitful point of departure for the application of a complex-systems approach in an investigation of the influence of multilingualism on cognitive development and, consequently, on academic success in higher education in South Africa. Slight differences in the initial conditions of complex systems could lead to future behaviour that diverges exponentially as time passes. A focus on the description of contexts within which multilingual students become multilingual might help to us to understand the influence of multilingualism on cognition and academic performance later in their lives. Ultimately, it might help us to understand how and why students who come from seemingly similar backgrounds achieve different results in higher education.

This also provides one of the most important methodological challenges for researchers of multilingualism, as expressed by Ng and Wigglesworth (2007: 10), speaking of bilingual people:

> Although bilinguals share the common experience of using more than one language in their lives, the ways in which they acquire their languages vary. Put any number of bilinguals together and the chances are there will not be a perfect match in any of their bilingual experiences.

This challenge is amplified in the context of studies involving multilingual people. It seems important, conceptually and methodologically, to acknowledge the nature and importance of initial conditions that play a role in the processes of becoming multilingual. This position is also held by Todeva and Cenoz (2009: 288). Ultimately, complex systems are **self-organising** and **emergent** (Larsen-

Freeman & Cameron, 2008: 58). Complex systems self-organise because it is the internal dynamic properties of the system that cause the emergence of new behaviour. The notion of emergentism is gaining ground in theoretical linguistics as well (see Hopper, 1998; Croft, 2001; Bybee, 2006; Ellis, 2008; Beckner *et al.*, 2009).

Like Larsen-Freeman (1997: 152), I do have some concerns about blithely applying something as multifaceted as a complex-systems approach to the phenomenon of multilingualism in higher education, in the short space of one lecture. Despite this trepidation, I think it is evident that a complex-systems approach holds the potential to present an integrated framework for the study of higher education as a system, in interaction with the multilingual character of students in South Africa. This very exploratory conceptual attempt makes clear that a complex-systems approach enables an integrated method for thinking about seemingly disparate views of the abilities of multilingual students, and the relationship between these abilities and academic achievement. It highlights possible oversights and limitations in current debates on these matters, such as a tendency to ignore the variety of languages that students bring to higher education, and being paralysed by the variability of language proficiencies that students demonstrate. These insights motivate and invite a review of the necessary elements that should be considered in planning appropriate pedagogies, strategies for academic and language development, and methods for the assessment of language proficiencies in higher education in South Africa. The potential power of identifying and understanding the control parameters that drive changes in multilingual students' academic achievement, and the prospective gains that could be made by a thorough study of the sensitive dependence on initial conditions via the multilingual histories of our students, are reason enough to continue exploring a complex-systems approach.

Section 5: Sensitive dependence on initial conditions: the multilingual histories of South African students

If one wants to understand the potential cognitive benefits of multilingualism for students in South Africa better, a logical first task in a complex-systems approach is a comprehensive investigation of the nature of the multilingualism that these students bring with them to higher education. Understanding small differences in the initial conditions of complex systems helps to explain future behaviour, because the behaviour of a complex system diverges exponentially as time passes. The findings described in the rest of this lecture is a first attempt to gather empirical evidence that can be used in future projects where multilingualism is modelled as a complex system that influences the cognition and academic development of students in higher education. The research questions addressed in the rest of the lecture are:

a) How many languages do these South African students know?
b) Which languages do they know?
c) When did they acquire these languages?
d) How proficient do they think they are in these languages?
e) How does being multilingual relate to the identity of these students?

Population

The population I report on is all the first-year students who attended the first day of orientation at the Vaal Triangle Campus of the North-West University on 23 February 2010. A thousand and eleven (n=1011) students participated in the study discussed here. There were 663 (65.6%) female participants and 348 (34.4%) male participants. The majority of the participants (907 or 90.2%) were typical first-year students between the ages of 16 and 20 years. A total of 34.5% of the fathers and 41.1% of the mothers of the participants had completed high school; and a further 35.9% of the fathers and 38.8% of the mothers of the participants had completed a qualification at a university or college. Of the participants, 52.5% had attended an urban high school in the predominantly white suburbs in South Africa and 27.2% had attended an urban high school in a township.

Instrument and data collection

The language-history questionnaire used in this project was compiled by combining and restructuring existing language-history questionnaires (Coetzee-Van Rooy, 2000; Gullberg & Indefrey, 2003; Marian & Kaushanskaya, 2007; Li *et al.*, 2006). It took the students about 120 minutes to complete the questionnaire.

Findings

The findings are reported as answers to the research questions posed at the beginning of this section of the lecture.

Research question 1: How many languages do the participants know?

The number of languages known by participants is cross-tabulated with their home languages in Table 1. Two profiles emerge from the data: the majority of the Afrikaans (224/243 or 92%) and English (67/96 or 70%) participants know one language in addition to their home language. The majority of the Southern Sotho (234/347 or 70%), Zulu (84/112 or 75%) and Tswana (60/92 or 65%) participants know three, four or five languages in addition to their home language. These profiles are clearly evident in Graph 1.

Research question 2: Which languages do the participants know?

There are two ways to answer a question that focuses on which languages the participants know: (a) one could concentrate on which languages are used as home languages by the participants; and (b) one could also consider which languages the participants know in addition to their home language.

The home-language distribution among participants is presented in Table 2. The data confirm that the respondents use the most common languages of the Gauteng province (Zulu, Afrikaans, Southern Sotho and English) as home languages (Statistics South Africa, 2001); and that Southern Sotho is the most common home language in the Vaal Triangle region. In the remainder of the discussion, the analyses focus on the five most common home-language groups represented in the study.

To determine which languages participants learnt in addition to their home languages, they were asked to list all the languages they know and to rank these languages in order of their relative proficiency or ability in each of the languages. The "strongest language" was defined as "the language in which I express myself the easiest and people who understand my strongest language understand what I communicate the best". The short answer to the question of which languages the participants know in addition to their home languages is: English, Southern Sotho, Tswana, Zulu and Afrikaans – the most widely spoken languages in the region. However, cross-tabulations of the home languages of the participants with their strongest language (Table 3), and second- (Table 4), third- (Table 5), fourth- (Table 6) and fifth-strongest languages (Table 7) reveal that the answer to which languages participants know depends on a variety of conditions.

In the context of strongest languages (Table 3):

- There is a close correspondence between **home language** and **strongest language** for the Afrikaans and English participants. Less than 10% of these participants chose a language other than their home language as their "strongest" language.
- In the case of Southern Sotho (110/348 or 32%), Zulu (42/113 or 37%) and Tswana (35/93 or 38%) participants, a third or more of the participants selected **English** as their strongest language.

In the context of second-strongest languages (Table 4):

- The most prominent finding is that **English** is the uncontested second-strongest language for the majority (596/996 or 60%) of the respondents.
- The well-known phenomenon of **Afrikaans/English bilingualism** is visible in the context of second-strongest languages where the majority of the English home-language respondents (76/93 or 82%) reported that Afrikaans is their second-strongest language.
- A **delayed or displaced home-language** effect is evident in the context of second-strongest languages where sizeable portions of speakers of

African languages (about 30%) indicated their home language as second-strongest language (for example, 94/342 or 28% of the Southern Sotho respondents).

An analysis of the data related to third-, fourth- and fifth-strongest languages reveals that two additional effects drive language choices in these contexts: the environmental effect (for selection of third-, fourth- and fifth-strongest languages; see Table 5-7) and the language-family effect (for selection of fourth- and fifth-strongest languages; see Table 6-7). The environmental effect refers to the selection of languages that are widely spoken in the environment; and the language-family effect refers to the selection of languages that are related to one's home or strongest language as additional languages to learn.

Research question 3: When did the participants acquire these languages?

The data reported in Table 3 and 4 directed the analyses of milestones for language learning. Participants were grouped into three categories related to their experiences: Group 1 included the Afrikaans, English, Southern Sotho, Tswana and Zulu participants who experience their home languages as strongest languages (see Graph 2); Group 2 included the Southern Sotho, Tswana, Zulu and Afrikaans respondents who indicated an African language or Afrikaans as home language and English as strongest language (see Graph 3); and Group 3 included all participants who indicated Afrikaans, Southern Sotho, Tswana and Zulu as home languages, and English as second-strongest language (see Graph 4).

The following observations can be made from these graphs. First of all, there is a perception among speakers of Southern Sotho, Zulu and Tswana that they start to learn their home languages after the age of two (see Graph 2). As a result of this, they perceive that they become proficient at certain tasks at a later stage than the Afrikaans participants, who perceive that they start to learn their home language earlier. Secondly, for participants who indicated Afrikaans, Southern Sotho, Tswana or Zulu as home languages, but who view English as their strongest language, the milestones for learning and becoming fluent are even later than for the participants who experience their home languages as strongest languages (Graph 3). Thirdly, the data for Southern Sotho, Zulu and Tswana participants who experience English as their strongest language (Graph 3), reveal that they achieve milestones in reading and writing English about one year earlier than Southern Sotho, Zulu and Tswana participants who experience English as their second-strongest language (Graph 4). Fourthly, I note that milestones for reading and writing in Southern Sotho, Tswana and Zulu are reported (Graph 3 and 4). I highlight this as an important finding, because it is underrepresented in discussions about literacy in South Africa and not studied widely (this is also noted by Pretorius & Mampuru, 2007; Pretorius & Currin, 2009). We therefore know very little about what these students read and write in Southern Sotho, Tswana and Zulu. Fifthly, the milestones for English as second-strongest language seem to be more similar among participants from different home languages (see Graph 4).

Research question 4: How proficient do respondents think they are in the languages they know?

The majority of the respondents (78% and 64%) believe that they do not have a strong foreign accent in their strongest language or second-strongest languages (see Table 8 and 10) and they also believe (74% and 67%) that other speakers of their strongest language or second-strongest languages do not identify them as non-native speakers of their strongest and second-strongest languages (see Table 9 and 11). The finding that these students believe that they use English with a native accent warrants further exploration. In the World Englishes paradigm, it could be evidence that the educated variety of Black South African English (BSAE) is accepted by these students as a fully nativised variety of South African English. These perceptions can be regarded as supporting evidence for earlier work by Coetzee-Van Rooy and Van Rooy (2005) that a BSAE accent is taken to be normal and a good outcome of the language-learning process. More than anything else, this perception is evidence that students believe they have successfully acquired the model of English to which they were exposed.

From Table 12 it is clear that respondents believe they are very proficient in speaking, listening, reading and writing their strongest languages. Table 13 indicates that although the Southern Sotho, Zulu and Tswana respondents report milestones in reading and writing these languages, they are not confident in their reading and writing skills in these languages as second-strongest languages. From studies conducted in schools in South Africa, we know that the indigenous languages are widely used in code-mixing and -switching (Heugh, 2009). We also know that the indigenous languages are not afforded formal or high status in schools. A thorough study of what these students read in Southern Sotho, Zulu and Tswana is required to assist us in understanding these perceptions. Contrary to the lack of confidence expressed regarding reading and writing indigenous languages as second-strongest languages, participants believe they are very proficient in reading and writing English as a second-strongest language.

Similar to earlier reported findings (see Coetzee-Van Rooy, 2000; Coetzee-Van Rooy & Verhoef, 2002), there is a discrepancy between the participants' perceptions of their proficiency and their results for standardised tests that assess elements of academic literacy. The participants in the study all wrote the TALL and the NBT after they were admitted to the university. Results in these tests are used to place students in appropriate development and support courses to enhance academic success. From Table 14 it is clear that 67% of all the respondents who wrote the TALL did not achieve more than 50% in the test. The majority of the Southern Sotho (264/337 or 78%), Tswana (66/92 or 72%) and Zulu (74/107 or 69%) respondents did not achieve more than 50% in this test of academic literacy. The results of the respondents who took the Afrikaans version of the test, the Toets vir Akademiese Geletterheidsvlakke (TAG) (see Table 15)

indicate that 52% (114/217) of the Afrikaans home-language respondents achieved more than 50%.
The same trend is repeated when one reviews results of the NBT component for academic literacy (see Table 16). The majority of the Southern Sotho (156/266 or 59%), Tswana (42/70 or 60%) and Zulu (51/88 or 58%) respondents did not achieve more than 50%; the Afrikaans (129/200 or 64%) and English (67/81 or 83%) respondents fared better.

Research question 5: How does being multilingual relate to the identity of participants?

The data in Table 17 and 18 indicate that the strongest languages of participants are perceived as the languages that contribute to the identity of the respondents. This is overwhelmingly the case for speakers of Afrikaans (214/217 or 99%), Southern Sotho (185/194 or 95%), Tswana (45/45 or 100%) and Zulu (48/50 or 96%) as strongest languages. This finding is not unexpected and is evidence of healthy in-group identity (also see Coetzee-Van Rooy, 2002).

Furthermore, the findings indicate that English contributes in some way to the identities of these respondents, as is expected in an Outer Circle context. A total of 76% (229/301) of the respondents who perceive English as their strongest language believe that it contributes to their identity and 58% (271/469) of the respondents who perceive English as their second-strongest language believe that it contributes to their identity. This finding is predictable in the context of the Outer Circle where English as an additional language forms part of the linguistic repertoire of many citizens, and where there is potential contact with English first-language speakers and second-language speakers. The multilingual nature of the participants cannot be explained by means of simple dichotomies, for example those related to integrative or instrumental motivations to learn English (see Coetzee-Van Rooy, 2006). The findings of this study seem to provide evidence that for these students English entered Phase 4 of Schneider's (2007) model of development towards endonormative stabilisation in the Outer Circle.

Discussion of findings

One of the most obvious findings is the extent of the multilingualism reported by these students. This finding is not unexpected, but against the background of the paucity of research on multilingualism from Asia and Africa, this empirical statement is valuable in itself. The extent of the multilingualism brought to higher-education classrooms in South Africa is an untapped resource that could trigger hitherto unknown cognitive growth and academic development. If we are able to unlock the potential cognitive benefits of the abundance of multilingualism brought to our classrooms, we might truly open access and opportunities for success for all our students.

An important consequence of this assumption is the complete rethinking of higher-education pedagogy as well as notions of academic development and

support in South Africa. Instead of bewilderment about the lack of academic literacy displayed by our students in English, we need to regroup our academic development and support efforts to first of all exploit what students bring with them to higher education. Once they are able to activate their current knowledge of concepts related to science and literacy, we could create facilitative environments in which students are encouraged to use the metaphors and languages in which they are most comfortable expressing scientific concepts, with a focus on supporting students to understand concepts first. Parallel to these efforts, we need to immerse students in reading academic texts in English so that they become better at expressing their understanding of concepts. Consequently, we need to scaffold learning experiences in which concepts required for science and literacy can grow organically so that students can exit university with a full understanding of the knowledge they acquired and the ability to express this in English.

It should be noted that discussions about the difficulties of corpus planning to prepare the African languages for fulfilling a role as media of instruction in higher education are not included in this lecture. I take heed of Mesthrie's (2008) thoughtful and sympathetic review of the challenges that would need to be overcome to develop indigenous African languages as languages of science. I am in full support of these efforts, if they are directed by speakers of African languages. In this lecture, I argue for an additional strategy: the application of a multilingual pedagogy in higher education that does not require the use of all indigenous languages at the same level in all university classrooms in South Africa. It would be a pedagogy that acknowledges the multilingualism of our students as a strength that should be activated in facilitating conceptual understanding at university level.

This pedagogy would imply the re-tooling of our faculty. I do not foresee large-scale learning of African languages. I foresee a sensitisation process where lecturers are taught how to assist students to use the formidable metalinguistic awareness they bring to classrooms so that they can compare concepts in various languages to improve understanding and their ability to express that understanding in academic English over time. Our expertise in language practice at the Vaal Triangle Campus could forcefully inform the creation of a multilingual pedagogy.

The focus on the assessment or evaluation of students' proficiency in English would then be normalised. The emphasis would be on understanding the multilingual repertoires of students, and we would need to become better at understanding which types of multilingual configurations would better support cognitive development in higher education. The assessment of language skills would move towards designing instruments that can assess the effect of multilingualism, as an integrated construct in the minds of these students, on cognition and academic achievement (see, for example, the idea of the M-factor or the multilingualism factor in Herdina & Jessner, 2002).

Another obvious finding is that English is the dominant second language for the majority of the respondents in the study. This finding, too, is not surprising, but the empirical report is important for scholars who struggle to categorise the nature of English used by South African students in an urban setting. An implication of this finding is that reference to English as possible third, fourth or fifth language in the repertoire of urban students speaking African languages is incorrect. Researchers who continue to refer to English as the third, fourth or fifth language of these students do not understand their multilingual profiles correctly, or simply express something else: a perception that the students have not attained high enough levels of proficiency. This view is not very constructive and should not enter discussions where the multilingual character of urban South African students is accepted as a given and as a positive force in unlocking their academic potential.

The finding that English is perceived as the strongest language for about 30% of the Southern Sotho (32%), Tswana (38%) and Zulu (37%) home-language speakers in the study merits further investigation. Before we consider the implications of the finding, we need to understand it better. Are we observing signs of stable additive bilingualism? The data related to language use not reported in detail in the lecture (see Table 19-22) seem to indicate some diglossia in the patterns of language use: English is not reported as an important language in the family domain for speakers who use it as strongest or second-strongest language. Are we seeing signs of language shift in this population? What language will these students use in their homes with their children one day? Is it problematic that the participants in this study who perceive English as second-strongest language see it as a factor contributing to their identity? Or are we seeing evidence of new ways of language maintenance and survival, as speculated by Romaine (2006: 464-465)? A better understanding of the phenomenon in this context should contribute greatly to an overall understanding of multilingualism, and this could resolve unanswered questions about language management and maintenance asked by scholars elsewhere in the world (Romaine, 2006).

The prominence of the environmental effect in the selection of additional languages to learn is another obvious finding of the study. Respondents indicated that they learn the most widely spoken languages in their environment as additional languages: that is, Southern Sotho, Zulu and Afrikaans. There is one important difference in the acquisition patterns of these dominant languages in the region. Afrikaans is primarily learnt as school language and Southern Sotho and Zulu are learnt in the community. The implications of the difference in domains of acquisition for African regional languages and Afrikaans (Jansen, 2009) need to be investigated in future studies.

Related to the environmental effect is the language-family effect that is visible in the study. If we assume that learning languages from different language families involves more intense language-management and language-maintenance work than is the case when learning languages from the same family (Herdina &

Jessner, 2002: 168-169), and that this could trigger the added cognitive benefits of multilingualism, we need to investigate the possible cognitive benefits among students who learn additional languages across language families. This would involve a careful study of speakers of African languages who learn indigenous African languages of the language family that their home or strongest language is not part of, in addition to English and/or Afrikaans.

One of the most surprising findings of the study is the perception among speakers of Southern Sotho, Tswana and Zulu as strongest languages, that they start to learn these languages only from the age of two. Why does this perception exist? Does it relate to possible differences between primary oral cultures and cultures in which literacy development has progressed over a longer time, as discussed in Ong (1982)? Does the perception of the participants confirm that they come from communities where parents do not speak to prelinguistic children at all (Pinker, 1994: 40)? What are the implications of this perception for the language learning achieved by these students? Or did the students possibly misunderstand the question? Furthermore, the respondents in the study indicated that they do believe that they achieve milestones in reading and writing in the indigenous African languages. This seems to be a novel finding, as many studies report that very little literacy is perceived in these languages (also noted by Pretorius & Mampuru, 2007; Pretorius & Currin, 2009). What do these students read and write in the indigenous languages? What are the potential implications of enhanced literacy in African languages for cognition and academic performance in higher education? Future studies need to investigate this more carefully.

Recurrent reports of a discrepancy between perceptions of proficiency in English and scores on proficiency tests need to be explored in future studies. Possible explanations offered in earlier work (Coetzee-Van Rooy & Verhoef, 2002) need to be reviewed in light of data from this study. Obviously, if English is perceived as one's strongest or second-strongest language, one would describe one's abilities in English as "strong". Is it the upward mobility of these students relative to members of their society that directs these perceptions? Or are we simply dealing with perceptions of different things? In other words, students may perceive their communicative skills in the languages they know, while tests of academic literacy measure another type of language proficiency. In this regard, it is important to consider the crucial distinction between Basic Communication Skills (BICS) and Cognitive Academic Language Proficiency (CALP) made by Cummins (1979). For success in higher education, mastery of a very specific register is needed, which takes time to develop. Research conducted by Van Rooy (2008) and Van Rooy and Terblanche (2006, 2010) on Tswana learner English written corpora indicates that students acquired BICS well, but that there are gaps in their CALP, when compared to corpora of Inner Circle student writing. In revisiting the pedagogy for higher education in South Africa, we need to take careful note of these findings and use it as information that could structure the academic development and support activities envisioned earlier in this lecture.

Section 6: Conclusions and future research questions to pursue

I want to focus on three broad sets of conclusions. First of all, I want to reflect on the usefulness of a complex-systems approach in the study of multilingualism and cognition in the context of higher education in South Africa. Secondly, I wish to relate the findings of the study I discussed to a World Englishes paradigm, and lastly I would like to outline a future research agenda, highlighting unresolved issues.

A complex-systems approach towards multilingualism helped me to conceptualise the multilingual histories of students in a very specific way. A complex-systems approach highlights the importance of initial conditions as explanatory devices for behaviour displayed later in the lifespan of the system. One of the most important implications of this acknowledgement is that an understanding of the initial conditions under which students become multilingual could help to explain the degrees of presence or absence of cognitive benefits related to academic performance in higher education later in their lives. Findings from this empirical study indicate that the initial conditions for becoming multilingual are perceived in varying ways by these respondents. Two findings are viewed in tandem in this regard: self-reported perceptions of age of acquisition and relative position of the home language as strongest language. A total of 70% of the Southern Sotho, Tswana and Zulu respondents in this study experience their home language as their strongest language; and there is a perception among these students that they start to learn their home language only after the age of two. However, 30% of the Southern Sotho, Tswana and Zulu respondents do not perceive their home language as their strongest language; and they share the perception that they start to learn their home language after the age of two. The Afrikaans-English bilingual students experience that they learn their home language from birth and that their home language is also their strongest language. If one works towards mathematical modelling of the integration and interaction of multilingualism as a complex system with cognition, these perceptions need to be included in the modelling. Furthermore, these perceptions may be involved in explanations of language development and its influence on academic development perceived later in the lives of these students. The application of a complex-systems approach made me view the multilingual histories of students differently. It also helped me to ask different questions. A complex-systems approach to the multilingual histories of students assisted me to formulate different reasons for the variety of multilingual language proficiencies and resultant cognitive and academic development evident later in the lives of these students.

A complex-systems approach also has implications for a World Englishes perspective. It highlights the importance of considering all the languages in the repertoires of multilingual speakers. The role of English in the multilingual mind in the Outer Circle can be fully understood only if it is viewed in relation to all the languages that form part of the linguistic repertoires of these speakers (Ridge, 2004: 200). There is nothing "marginal" about the phenomenon in this context.

The methodological implications of this position might have far-reaching consequences in a World Englishes approach. Consequently, this view might strengthen pedagogical projects that aim to discover appropriate "World Englishes" pedagogies (Sridhar, 2010a).

Lastly, I want to highlight future research questions emanating from this exploratory application of a complex-systems approach to multilingualism and cognition.

Modelling of multilingualism as a complex system

One of the most interesting long-term projects includes working towards mathematical modelling emerging from a complex-systems approach to multilingualism. This entails collaboration between scholars studying multilingualism and applied mathematicians who could use data to test models. The M-factor in the Dynamic Model of Multilingualism (DMM) proposed by Herdina and Jessner (2002: 129) could be a starting point, especially if data about multilingual histories and experiences are used to provide values for modelling. We are not there yet.

Learning more about multilingualism and cognitive development in higher education

In the meantime, we need to learn more about multilingualism and cognitive development in higher education. Some of the questions we need to explore next are:

- What types of multilingual profiles increase the probability of positive cognitive and academic development in higher education?
- What is the most appropriate way to evaluate the language proficiencies of multilingual students in South Africa?
- What do we learn from the discrepancy between self-reported perceptions of language proficiency and standardised measures of language proficiency? How do these perceptions influence students' motivation to participate in academic development and support activities?
- What are the literacy patterns in indigenous languages reported by these respondents? What do these students read? How often? How does this influence multilingual profiles and consequent links with cognitive development?

Pedagogical implications for higher education

The pedagogical implications of this approach need attention. We need to answer questions like:

- What is the most appropriate way in which to optimise the reported cognitive benefits of multilingualism in the higher-education context?
- What is the most appropriate way to re-tool faculty to tap into the resources students bring to class?

Implications for language planning

In the context of language planning, future projects could aim to answer the following questions:

- What do we learn about language maintenance in contemporary multilingual urban contexts in South Africa that could assist language planners across the world in understanding new potential ways of language maintenance?
- What are the patterns of language maintenance and language loss among these students, particularly for students who perceive English as their strongest language although they report an indigenous language as home language?
- How would understanding the multilingualism of our students better inform our language policies and plans?

A sustained focus on these and other emerging questions could ultimately give rise to a better understanding of language and human cognition, and language and identity.

I am fortunate to be part of a research unit and a university that afford me the time and resources to embark on longitudinal projects where these and other questions will be studied. While we are busy with this research, multilingual students arrive at South African universities every year. These students regard their multilingualism as one of the most important markers of their South Africanness (Coetzee-Van Rooy & Verhoef, 2002; Coetzee-Van Rooy, 2010). Ironically, one of the first experiences they have at university is to undergo an assessment of their proficiency in English, the most widely used medium of instruction in higher education. In this process, they could be forgiven for beginning to think that there are parts of them that they should not bring to university. At universities in South Africa, the potential positive cognitive benefits of multilingualism reported elsewhere in the world (Herdina & Jessner, 2002: 160; Jessner, 2008: 279) are ignored or underrepresented. The findings reported in this lecture indicate that the multilingual character of these students cannot be ignored in considering factors that influence their cognitive development and consequently their academic success. If we do not get this right, the academic and language-development support interventions we work so hard on might not succeed. In this process we need to keep in mind the insight of Ayo Bamgbose (1994: 34) that a well-integrated citizen in Africa is a multilingual citizen. I look forward to the day when universities in South Africa celebrate the multilingualism of our students by activating the strengths related to multilingualism in all our classrooms, rather than by quibbling about interpreting at meetings or signage at main gates.

Acknowledgements
Many of the ideas included in this lecture were presented at conferences of the Linguistics Society of Southern Africa in 2009 (Cape Town) and the International Association of World Englishes in 2010 (Vancouver). Comments and feedback from colleagues at those conferences as well as the sustained interest and expert input from Bertus van Rooy contributed a great deal to the development of my ideas. Articles based on the ideas presented in this lecture have also been submitted to journals for review with a view to publication. I thank the anonymous reviewers who directed my attention to ideas I needed to clarify. A special acknowledgement to Ms Anelle Strydom and her associate Ms Zhandi Van Zyl who dedicated their time to capture the data of the 1000+ multilingual histories reported on in the lecture. Without your dedication and great care, this research project would not have been as comprehensive. A special acknowledgement to Dr Haidee Kruger who agreed to edit the text at short notice. Remaining errors remain mine.

References

Aronin, L. & Singleton, D. 2008. Multilingualism as a new linguistic dispensation. *International Journal of Multilingualism*, 5(1):1-16.

Bamgbose, A. 1994. Pride and prejudice in multilingualism and development. (*In* Fardon, R. & Furniss, G., *eds.* African languages, development and the state. London: Routledge. pp. 33-43.)

Beckner, C., Blythe, R., Bybee, J., Christiansen, M.H., Croft, W., Ellis, N.C., Holland, J., Ke, J., Larsen-Freeman, D. & Schoenemann, T. 2009. Language is a complex adaptive system: position paper. *Language Learning*, 59 (Supplement 1):1-26.

Bialystok, E. 1988. Levels of bilingualism and levels of linguistic awareness. *Developmental Psychology*, 24:560-567.

Bialystok, E. 2001. Bilingualism in development: language, literacy and cognition. Cambridge: Cambridge University Press.

Bialystok, E. 2005. Bilingualism across the lifespan: the rise and fall of inhibitory control. *International Journal of Bilingualism*, 9(1):103-119.

Bialystok, E. 2007. Acquisition of literacy in bilingual children: a framework for research. *Language Learning*, 51 (Supplement 1):45-77.

Bybee, J. 2006. From usage to grammar: the mind's response to repetition. *Language*, 82(4):711-733.

Cenoz, J. & Genesee, F., *eds*. 1998. Beyond bilingualism: multilingualism and multilingual education. Clevedon: Multilingual Matters.

Cenoz, J. & Genesee, F. 1998. Psycholinguistic perspectives on multilingualism and multilingual education. (*In* Cenoz, J. & Genesee, F., *eds*. Beyond bilingualism: multilingualism and multilingual education. Clevedon: Multilingual Matters. pp. 16-32.)

Cenoz, J. 2009. Towards multilingual education: Basque educational research from an international perspective. Bristol: Multilingual Matters.

Coetzee-Van Rooy, A.S. 2000. The influence of cultural identity and acquisition planning for English as a second language in South Africa. Unpublished PhD thesis, Potchefstroom University for Christian Higher Education.

Coetzee-Van Rooy, A.S. 2002. Cultural identity profiles of Afrikaans and Southern Sotho learners of English: resource or hazard? *World Englishes*, 21(1):63-81.

Coetzee-Van Rooy, A.S. 2006. Integrativeness: untenable for World Englishes learners? *World Englishes*, 25(3-4):437-450.

Coetzee-Van Rooy, A.S. 2010. Higher education and making the most of multilingualism in the Outer Circle: let's start at the very beginning... Paper presented at the International Association of World Englishes (IAWE) conference, 25-27 July 2010, Vancouver, Canada.

Coetzee-Van Rooy, A.S. & Verhoef, M. 2002. Perceptions of English proficiency: views from Southern Sotho speakers. *South African Journal of Linguistics*, Supplement 38:163-185.

Coetzee-Van Rooy, A.S. & Van Rooy, A.J. 2005. Labels, comprehensibility and status. *World Englishes*, 24(1):1-19.

Croft, W. 2001. Radical construction grammar: syntactic theory in typological perspective. Oxford: Oxford University Press.

Cummins, J. 1977. Delaying native language reading instruction in immersion programs: a cautionary note. *Canadian Modern Language Review*, 34:46-49.

Cummins, J. 1979. Linguistic interdependence and the educational development of bilingual children. *Review of Educational Research*, 49:222-251.

Cummins, J. 2000. Language, power and pedagogy: bilingual children in the crossfire. Clevedon: Multilingual Matters.

Cummins, J. 2009. Fundamental psycholinguistic and sociological principles underlying educational success for linguistic minority students. (*In* Skutnabb-Kangas, T., Phillipson, R., Mohanty, A.K. & Panda, M., *eds.* Social justice through multilingual education. Bristol: Multilingual Matters. pp. 19-35.)

Datta, M. 2000. Bilinguality, literacy and principles. (*In* Datta, M., *ed.* Bilinguality and literacy. London: Continuum. pp. 14-37.)

De Bot, K., Lowie, W. & Verspoor, M. 2007. A dynamic systems theory approach to second language acquisition. *Bilingualism: Language and Cognition*, 10(1):7-21.

Department of Education (DoE). 1997. Language in education policy, 14 July 1997. Pretoria: Department of Education.

Du Plessis, T. 2000. South Africa: from two to eleven languages. (*In* Deprez, K. & Du Plessis, T., *eds*. Multilingualism and government. Pretoria: Van Schaik. pp. 95-110.)

Edwards, V. 2009. Learning to be literate: multilingual perspectives. Bristol: Multilingual Matters.

Elliot, E. & Kiel, L.D. 1996. Introduction. (*In* Kiel, L.D. & Elliott, E., *eds*. Chaos theory in the social sciences: foundations and applications. Ann Arbor: The University of Michigan Press. pp. 1-15.)

Ellis, N.C. 2008. The dynamics of second language emergence: cycles of language use, language change, and language acquisition. *The Modern Language Journal*, 92(2):232-249.

Fishman, J.A. 1991. Reversing language shift: theoretical and empirical foundations of assistance to threatened languages. Clevedon: Multilingual Matters.

Fishman, J. A. 2001. Can threatened languages be saved? Reversing language shift, revisited: a 21st century perspective. Clevedon: Multilingual Matters.

Friedman, T.L. 2005. The world is flat: the globalized world in the twenty-first century. London: Penguin.

Gardner, R.C. & Lambert, W.E. 1959. Motivational variables in second-language acquisition. *Canadian Journal of Psychology*, 13:266-272.

Graddol, D. 1997. The future of English. London: British Council.

Graddol, D. 2006. English next. London: British Council.

Gullberg, M. & Indefrey, P. 2003. Language background questionnaire. Developed in the Dynamics of Multilingual Processing. Nijmegen: Max Planck Institute for Psycholinguistics.

Harvey, D.L. & Reed, M. 1996. Social sciences as the study of complex systems. (*In* Kiel, L.D. & Elliott, E., *eds*. Chaos theory in the social sciences: foundations and applications. Ann Arbor: The University of Michigan Press. pp. 295-323.)

Henning, E., Mamiane, A. & Pheme, M. 2001. Entering the academy as "the other" – about writing competence and the bridge to the discourse community. *South African Journal of Higher Education*, 15(1):109-128.

Henning, E. & Van Rensburg, W. 2002. Academic development in writing composition: beyond the limitations of a functionalist and pragmatic curriculum. *Journal for Language Teaching*, 36(1&2):82-90.

Herdina, P. & Jessner, U. 2002. A dynamic model of multilingualism: perspectives of change in psycholinguistics. Clevedon: Multilingual Matters.

Heugh, K. 2009. Contesting the monolingual practices of a bilingual to multilingual policy. *English Teaching: Practice and Critique*, 8(2):96-113.

Hopper, P. 1998. Emergent grammar. (*In* Tomasello, M., *ed.* The new psychology of language. Mahwah: Lawrence Erlbaum Associates. pp 155-175.)

Hornberger, N. 2002. Multilingual language policies and the continua of biliteracy: an ecological approach. *Language Policy*, 1(1):27-51.

Ianco-Worral, A. 1972. Bilingualism and cognitive development. *Child Development*, 43:1390-1400.

Jansen, J. 2009. Knowledge in the blood: confronting race and the apartheid past. Stanford: Stanford University Press.

Jessner, U. 2008. A DST model of multilingualism and the role of metalinguistic awareness. *The Modern Language Journal*, 92(2):270-283.

Kachru, B.B. 1985. Standards, codification and sociolinguistic realism: the English language in the Outer Circle. (*In* Quirk, R. & Widdowson, H.G., *eds*. English in the world. Cambridge: Cambridge University Press. pp. 11-30.)

Kachru, B.B. 1986. The alchemy of English: the spread, functions and models of non-native Englishes. Urbana: University of Illinois Press.

Kachru, B.B. 1996. The paradigms of marginality. *World Englishes*, 15(3):241-255.

Kachru, Y. & Nelson, C.L. 2006. Asian Englishes today: World Englishes in Asian contexts. Hong Kong: Hong Kong University Press.

Kiel, L.D. & Elliott, E., *eds.* 1996. Chaos theory in the social sciences: foundations and applications. Ann Arbor: The University of Michigan Press.

Kirkpatrick, A. 2007. World Englishes: implications for international communication and English language teaching. Cambridge: Cambridge University Press.

Kloos, P. 2000. The dialectics of globalization and localization. (*In* Kalb, D., Van der Land, M., Staring, A., Van Steenbergen, B. & Wilterdink, N., *eds*. The ends of globalization: bringing society back in. Lanham: Rowman & Littlefield. pp. 281-298.)

L2 Language History Questionnaire (Version 2.0). Richmond University: Laboratory of Language and Cognitive Science.

Larsen-Freeman, D. 1997. Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18(2):141-165.

Larsen-Freeman, D. & Cameron, L. 2008. Complex systems and applied linguistics. Oxford: Oxford University Press.

Leopold, W.F. 1949. Speech development of a bilingual child: a linguist's record. Volume III: Grammar and general problems. Evanston: Northwestern University Press.

Li, P., Sepanski, S. & Zhao, X. 2006. Language history questionnaire: a web-based interface for bilingual research. *Behaviour Research Methods*, 38(2):202-210.

Marian, V., Blumenfeld, H.K. & Kaushanskaya, M. 2007. The language experience and proficiency questionnaire (LEAP-Q): assessing language profiles in bilinguals and multilinguals. *Journal of Speech, Language and Hearing Research*, 50(4):940-967.

Mesthrie, R. 2006. World Englishes and the multilingual history of English. *World Englishes*, 25(3-4):381-390.

Mesthrie, R. 2008. Necessary versus sufficient conditions for using new languages in South African higher education: a linguistic appraisal. *Journal of Multilingual and Multicultural Development,* 29(4):325-340.

Ministry of Education. 2002. Language policy for higher education. Government Gazette Nr 24101. Pretoria: Government Printer.

Ministry of Education. 2005. The development of indigenous African languages as mediums of instruction in higher education. Pretoria: Ministry of Education.

Mohanty, A.K. 2009. Multilingual education for social justice: globalizing the local. Hyderbad: Orient Black Swan.

Ng, B.C. & Wigglesworth, G. 2007. Bilingualism: an advanced resource book. London: Routledge.

Ong, W. 1982. Orality and literacy. London: Routledge.

Pakir, A. 1999. Bilingual education with English as an official language: sociocultural implications. (*In* Alatis, J.E. & Tan, A.-H., *eds*. Georgetown Round Table on languages and linguistics: language in our time. Washington: Georgetown University Press. pp. 341-349.)

Peal, E. & Lambert, W.E. 1962. The relation of bilingualism and intelligence. *Psychological Monographs*, 76(27):1-23.

Phillipson, R. 1992. Linguistic imperialism. Oxford: Oxford University Press.

Phillipson, R., *ed*. 2000. Rights to language: equity, power and education. Mahwah: Lawrence Erlbaum.

Phillipson, R. 2009. Linguistic imperialism continued. London: Routledge.

Pinker, S. 1994. The language instinct: the new science of language and mind. London: Penguin.

Preteceille, E. 1990. Political paradoxes of urban restructuring: globalization of the economy and localization of the politics. (*In* Logan, J.R. & Swanstrom, T., *eds*. Beyond the city limits: urban policy and economic restructuring in comparative perspective. Philadelphia: Temple University Press. pp. 27- 60.)

Pretorius, E.J. & Mampuru, D.M. 2007. Playing football without a ball: language, reading and academic performance in a high-poverty school. *Journal of Research in Reading*, 30(1):38-58.

Pretorius, E.J. & Currin, S. 2009. Do the rich get richer and the poor poorer? The effects of an intervention programme on reading in the home and school language in a high poverty multilingual context. *International Journal of Educational Development*, 30:76-76.

Ridge, S.G.M. 2004. Language planning in a rapidly changing multilingual society: the case of English in South Africa. *Language Problems and Language Planning,* 28(2):199-215.

Romaine, S. 2006. Planning for the survival of linguistic diversity. *Language Policy*, 5:441-473.

Schneider, E.W. 2007. Postcolonial English: varieties around the world. Cambridge: Cambridge University Press.

Skutnabb-Kangas, T. & Phillipson, R., *eds*. 1995. Linguistic human rights: overcoming linguistic discrimination. The Hague: Mouton de Gruyter.

Skutnabb-Kangas, T. 2000. Linguistic genocide in education or worldwide diversity and human rights? Mahwah: Lawrence Erlbaum.

Skutnabb-Kangas, T., Phillipson, R., Mohanty, A.K. & Panda, M., *eds*. 2009. Social justice through multilingual education. Bristol: Multilingual Matters.

South Africa. 1996. Constitution of the Republic of South Africa, Act 108 of 1996. Pretoria: Government Printer.

South Africa. 2000. South African Languages Bill. Pretoria: Government Printer.

Sridhar, K. 2010a. Societal multilingualism and World Englishes: their implications for TESOL. Paper presented at the 16th International Association of World Englishes (IAWE) conference, 25-27 July 2010, Vancouver, Canada. .

Sridhar, S.N. 2010b. Turning table: Indian English as a bilingual language. Paper presented at the 16th International Association of World Englishes (IAWE) conference, 25-27 July 2010, Vancouver, Canada.

Statistics South Africa. 2001. Census. Pretoria: Government Printers. (Available at http://www.statssa.gov.za/census01/html/GPPrimary.pdf)

Stroud, C. 2003. Postmodernist perspectives on local languages: African mother-tongue education in times of globalization. *International Journal of Bilingual Education and Bilingualism*, 6(1):17-36.

Todeva, E. & Cenoz, J., *eds*. 2009. The multiple realities of multilingualism: personal narratives and researchers' perspectives. Berlin: Mouton de Gruyter.

UNESCO. 2003. Education in a multilingual world. Paris: UNESCO.

Van der Slik, F. & Weideman, A. 2007. Testing academic literacy over time: is the academic literacy of first year students deteriorating? *Ensovoort*, 11(2):126-137.

Van Rooy, B. 2008. Societal and linguistic perspectives on variability. Presidential address presented at the 14th International Association of World Englishes (IAWE) conference, 3-5 December 2008, Hong Kong.

Van Rooy, B. 2010. Psycholinguistic evidence for a distinction between error and innovation. Paper presented at the 16th International Association of World Englishes (IAWE) conference, 25-27 July 2010, Vancouver, Canada.

Van Rooy, B. & Terblanche, L. 2006. A corpus-based analysis of involved aspects of student writing. *Language Matters*, 37(2):160-182.

Van Rooy, B. & Terblanche, L. 2010. A multidimensional analysis of a learner corpus. (*In* Renouf, A. & Kenoe, A., *eds.* Language and computers. Corpus linguistics: refinements and reassessments. Amsterdam: Rodopi. pp. 239-254.)

Verhoef, M. 2009. Memorandum: status report, March 2009, language management at the Vaal Triangle Campus. Discussed at the meeting of Institutional Management and Vaal Triangle Campus Management on 18 May 2009, Boardroom, Building 24 on the Vaal Triangle Campus. Item 5.5 on agenda, pp. 23-34 in meeting material.

Vygotsky, L. 1986. Thought and language. Cambridge: MIT Press.

Weideman, A. 2009. Uncharted territory: a complex systems approach as an emerging paradigm in applied linguistics. *Per Linguam*, 25(1):61-75.

Wyndham, H. 2009. MPs worry new benchmark tests will hold students back. *Business Day*, 26 August 2009, pp. 4-5.

Yeld, N. 2009. National benchmark tests project as a national service to higher education: Summary report June 2009. Pretoria: HESA.

Appendix A

Table 1: Cross-tabulations for home language and number of languages known by participants (n=1004)

Home Language	1 L	2 Ls	3 Ls	4 Ls	5 Ls	6 Ls	7 Ls	8 Ls	9 Ls	10 Ls	17 Ls	TOTAL
Southern Sotho	2	35	82	80	83	36	23	4	2	0	0	**347**
Afrikaans	0	224	17	2	0	0	0	0	0	0	0	**243**
Zulu	0	7	25	33	26	14	3	2	1	1	0	**112**
English	4	67	11	5	6	2	0	0	1	0	0	**96**
Tswana	1	15	17	20	23	7	6	2	0	1	0	**92**
Northern Sotho	0	3	6	10	9	8	4	0	1	1	0	**42**
Xhosa	0	4	5	9	11	5	3	2	1	0	0	**40**
Venda	0	1	3	2	1	3	0	0	0	0	0	**10**
Swati	0	2	1	2	0	0	0	0	0	0	0	**5**
Tsonga	0	0	1	3	0	1	0	0	0	0	0	**5**
Ndebele	0	0	1	0	0	1	0	1	1	0	0	**4**
Shona	0	1	2	0	0	0	0	0	0	0	0	**3**
German	0	0	1	0	0	0	0	0	0	0	1	**2**
Chinese	0	0	1	0	0	0	0	0	0	0	0	**1**
Polish	0	0	1	0	0	0	0	0	0	0	0	**1**
Greek	0	0	1	0	0	0	0	0	0	0	0	**1**
TOTAL	**7**	**359**	**175**	**166**	**159**	**77**	**39**	**11**	**7**	**3**	**1**	**1004**

Key to table 1: L=language; Ls=Languages

Graph 1: Number of languages known by participants according to home language (n=1004)

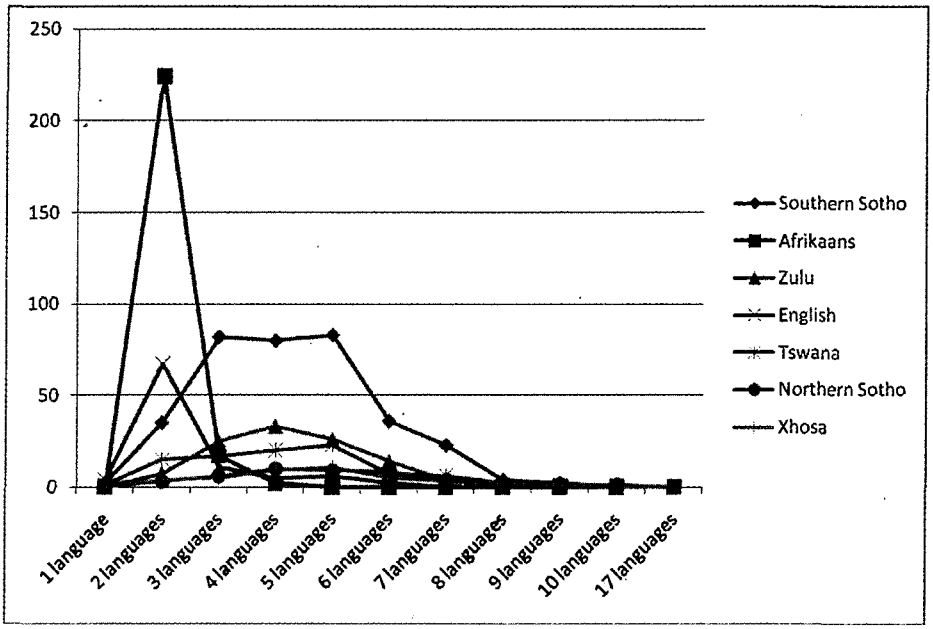


Table 2: Home language distribution of participants (n=1004)

Home language	Frequency	Percentage
Southern Sotho	347	34.56%
Afrikaans	243	24.2%
Zulu	112	11.15%
English	96	9.56%
Tswana	92	9.16%
Northern Sotho	42	4.17%
Xhosa	40	3.97%
Venda	10	0.99%
Swati	5	0.5%
Tsonga / Shangaan	5	0.5%
Ndebele	4	0.4%
Shona	3	0.3%
German	2	0.2%
Chinese	1	0.1%
Greek	1	0.1%
Polish	1	0.1%

Table 3: Cross-tabulations of home language and strongest languages of participants (n=1007)

Home Language	Afrikaans	Dutch	English	Ndebele	Northern Sotho	Shona	Southern Sotho	Swati	Tsonga	Tswana	Venda	Xhosa	Zulu	Chinese	TOTAL
Afrikaans		0	18	0	0	0	0	0	0	0	0	0	0	0	243
English	1	1	91	0	0	0	2	0	0	0	0	0	1	0	96
German	0	0	1	0	0	0	0	0	0	1	0	0	0	0	2
Ndebele	0	0	3		0	0	0	0	0	0	0	0	0	0	4
Northern Sotho	1	0	21	0		0	6	0	0	2	0	0	0	0	42
Shona	0	0	1	0	0		0	0	0	0	0	0	0	0	3
Southern Sotho	2	0	110	0	3	0		0	0	1	0	0	2	0	348
Swati	0	0	3	0	0	0	0		0	0	0	0	1	0	5
Tsonga	0	0	0	0	0	0	0	0		0	0	0	1	0	5
Tswana	0	0	35	0	0	0	3	0	0		0	0	0	0	93
Venda	0	0	2	0	0	0	0	0	0	0		0	0	0	10
Xhosa	0	0	11	0	0	0	4	0	0	1	0		2	0	40
Zulu	0	0	42	0	0	0	7	0	0	1	0	0		0	113
Chinese	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Polish	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Greek	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
TOTAL	229	1	340	1	15	2	252	1	4	61	8	22	70	1	1007

Colour key used in table: orange=home language effect; blue=English effect; tan=environment effect; pink=Sotho family effect; green=Zulu family effect

Table 4: Cross-tabulations of home language and second strongest languages of participants (n=996)

Home Language	Afrikaans	English	French	Ndebele	Northern Sotho	Portuguese	Southern Sotho	Swati	Tsonga	Tswana	Venda	Xhosa	Zulu	Polish	Greek	TOTAL
Afrikaans		225	0	0	0	0	0	0	0	0	0	0	0	0	0	243
English	10	5	1	0	0	2	4	0	0	1	0	0	4	0	0	93
German	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Ndebele	0	0	0		1	0	0	0	0	0	0	0	0	0	0	4
Northern Sotho	2	18	0	0		0	1	0	0	0	1	0	1	0	0	42
Shona	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Southern Sotho	12	213	0	0	2	0		0	1	8	0	3	9	0	0	342
Swati	0	2	0	0	0	0	0		0	0	0	0	0	0	0	5
Tsonga	0	3	0	0	0	0	0	1		0	0	0	0	0	0	5
Tswana	5	46	0	0	4	0	8	0	0		0	1	1	0	0	93
Venda	0	7	0	0	0	0	0	0	1	0		0	1	0	0	10
Xhosa	1	21	0	0	0	0	2	0	0	1	0		4	0	0	39
Zulu	2	53	0	0	1	0	47	1	0	0	0	6		0	0	113
Chinese	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polish	0	0	0	0	0	0	0	0	0	0	0	0	0		0	1
Greek	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
TOTAL	34	**596**	**1**	**3**	**20**	**2**	**130**	**5**	**3**	**38**	**2**	**20**	**56**	**1**	**1**	**996**

Colour key used in table: orange=home language effect; blue=English effect; tan=environment effect; pink=Sotho family effect; green=Zulu family effect

Table 5: Cross-tabulations of home language of participants and third strongest language (n=618)

Colour key used in table: orange=home language effect; blue=English effect;

Home Language	Afrikaans	Dutch	English	French	German	Italian	Ndebele	Northern Sotho	Portuguese	Southern Sotho	Spanish	Swati	Tsonga	Tswana	Venda	Xhosa	Zulu	Turkish	TOTAL
Afrikaans		2	0	1	3	1	0	1	1	3	1	0	0	0	0	0	1	1	15
English	11	0		0	2	0	0	0	3	2	0	0	0	1	0	1	4	0	24
German	0	0	0	0		0	0	1	0	0	0	0	0	0	0	0	0	0	2
Ndebele	0	0	0	0	0	0		0	0	1	0	1	0	0	0	0		0	4
Northern Sotho	7	0	3	0	0	0	0		0	5	0	0	0	7	2	0	8	0	38
Shona	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Southern Sotho	62	0	19	0	0	0	0	19	0		0	0	0	62	3		114	0	303
Swati	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0		0	3
Tsonga	0	0	1	0	0	0	0	0	0	2	0	0		0	0	0	1	0	4
Tswana	18	0	8	0	1	0	0	9	0	22	0	0	0		0	4	7	0	76
Venda	3	0	1	0	0	0	0	1	0	2	0	0	0	1		0	1	0	9
Xhosa	2	0	7	0	0	0	0	0	0	6	0	0	0	0	0			0	35
Zulu	12	0	12	0	0	0	1	3	0	37	0	4	3	3	0			0	103
Chinese	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polish	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Greek	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
TOTAL	117	**2**	**51**	**1**	**7**	**1**	**1**	40	**4**	91	**1**	**6**	**3**	81	**5**		163	**1**	**618**

tan=environment effect; pink=Sotho family effect; green=Zulu family effect

Table 6: *Cross-tabulations of home language and fourth strongest language of participants (n=419)*

Home Language	Afrikaans	Dutch	English	Ndebele	Northern Sotho	Shona	Southern Sotho	Swati	Tsonga	Tswana	Venda	Xhosa	Zulu	Swahili	Total
English	2	1	0	0	1	1	1	0	0	1	0	1	2	1	11
German	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Ndebele	0	0	0	0	0	0	1	0	0	0	0	0	2	0	3
Northern Sotho	4	0	0	1	2	0	5	0	0	5	0	2	12	0	31
Shona	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Southern Sotho	37	1	4	0	15	0	3	1	0	50	0	[illegible]	72	0	207
Swati	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2
Tsonga	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2
Tswana	10	0	2	0	7	0	12	0	1	3	0	4	13	0	52
Venda	0	0	0	0	0	0	1	0	2	0	0	0	1	0	**4**
Xhosa	2	0	0	0	1	0	[illegible]	0	0	1	0	2	[illegible]	0	28
Zulu	20	0	3	2	2	0	[illegible]	[illegible]	0	3	1	[illegible]	1	0	78
Chinese	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Greek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	76	**2**	**10**	**3**	29	**1**	[illegible]	[illegible]	**3**	63	**1**	[illegible]	114	**1**	**419**

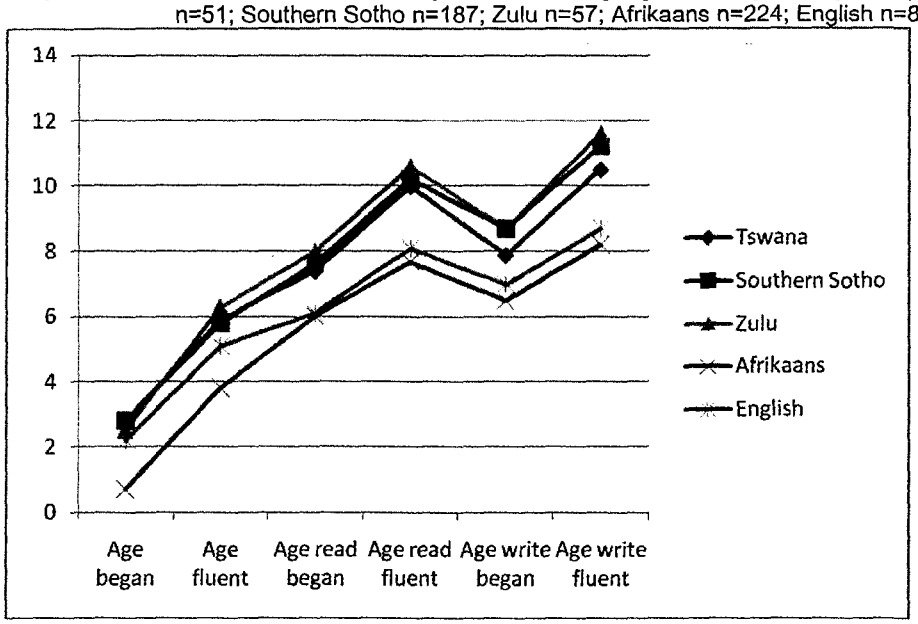
Colour key used in table: orange=home language effect; blue=English effect; tan=environment effect; pink=Sotho family effect; green=Zulu family effect

Table 7: Cross-tabulations of home language and fifth strongest language of participants (n=264)

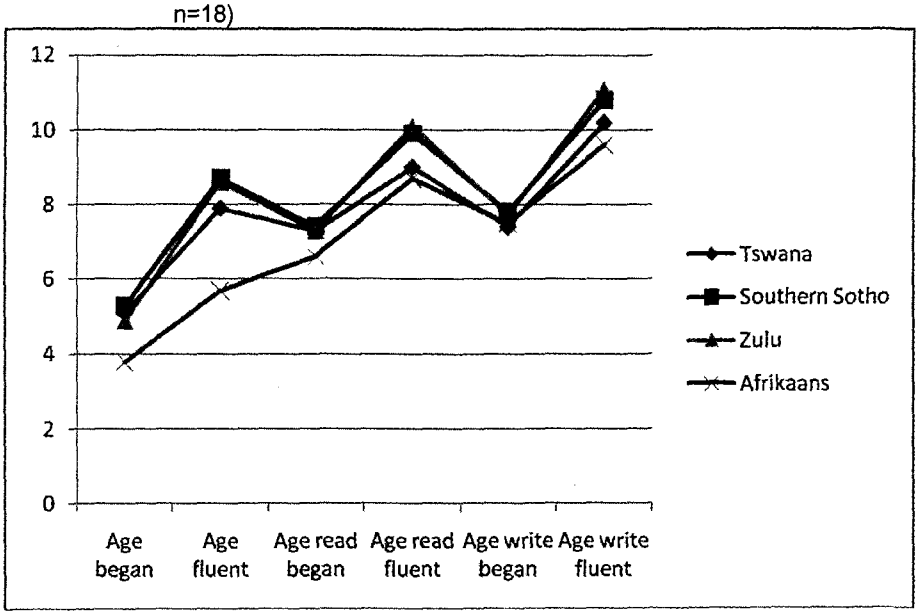
Home Language	Afrikaans	Dutch	English	French	German	Ndebele	Northern Sotho	Southern Sotho	Swati	Tsonga	Tswana	Venda	Xhosa	Zulu	Sign Language	TOTAL
Afrikaans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
English	1	1	0	0	0	0	2	0	1	1	1	0	0	1	0	8
German	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Ndebele	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
Northern Sotho	6	0	0	0	0	1	0	1	1	1	3	1	3	5	0	23
Shona	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Southern Sotho	32	0	0	1	1	0	11	1	1	4	30	0	18	26	1	126
Swati	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tsonga	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tswana	7	0	2	0	0	0	3	5	0	1	0	2	6	10	0	36
Venda	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	3
Xhosa	5	0	0	0	0	0	1	2	1	0	11	1	0	0	0	21
Zulu	11	0	1	0	0	2	3	6	1	0	10	0	8	0	1	44
Chinese	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Greek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**80**	**1**	**3**	**1**	**1**	**3**	**21**	**16**	**6**	**7**	**56**	**4**	**36**	**47**	**2**	**264**

Colour key used in table: orange=home language effect; blue=English effect; tan=environment effect; pink=Sotho family effect; green=Zulu family effect

Graph 2: Means for milestones in years: home language is strongest language (Tswana n=51; Southern Sotho n=187; Zulu n=57; Afrikaans n=224; English n=88)



Graph 3: Means for milestones in years: home language is not English, but English is strongest language (Tswana n=36; Southern Sotho n=27; Zulu n=41; Afrikaans n=18)



Graph 4: Means for milestones in years: home language is Southern Sotho, Tswana, Zulu or Afrikaans and English is second strongest language (Tswana n=40; Southern Sotho n=151; Zulu n=41; Afrikaans n=187)

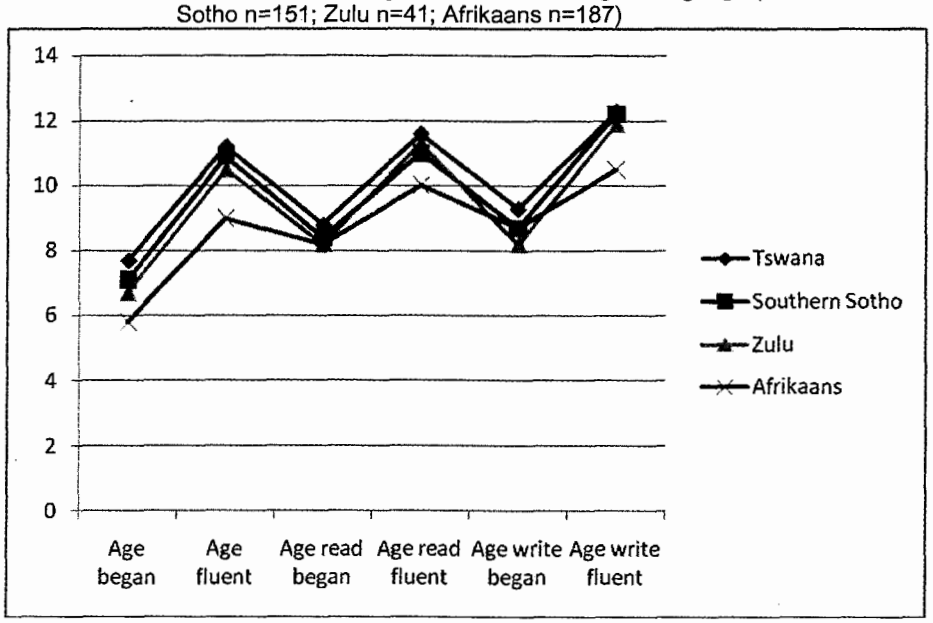


Table 8: Self-perception of foreign accent for strongest language (n=903)

Self-perception of accent	Afrikaans	Sesotho	English	Zulu	Tswana
1	6	14	24	6	**7**
2	13	43	60	14	14
3	42	87	159	28	19
4	165	63	110	17	12
TOTAL	**226**	**207**	**353**	**65**	**52**

Key to table: 1 = strong foreign accent; 4 = not strong foreign accent

Table 9: Other perception of foreign accent for strongest language (n=899)

Other perception accent	Afrikaans	Southern Sotho	English	Zulu	Tswana
1	8	15	34	2	9
2	18	54	62	21	12
3	50	86	132	29	10
4	149	51	122	14	21
TOTAL	**225**	**206**	**350**	**66**	**52**

Key to table: 1 = identified by other L1 users as non-native speaker a lot; 4 = seldom

Table 10: Self-perception of foreign accent for second strongest language (n=794)

Self-perception of accent	Afrikaans	Sesotho	English	Zulu	Tswana
1	11	10	38	6	5
2	24	18	113	7	6
3	36	26	213	13	12
4	41	41	104	14	8
TOTAL	**112**	**95**	**468**	**40**	**31**

Key to table: 1 = strong foreign accent; 4 = not strong foreign accent

Table 11: Other perception of foreign accent for second strongest language (n=746)

Other perception accent	Afrikaans	Sesotho	English	Zulu	Tswana
1	15	12	36	8	2
2	28	16	120	5	7
3	36	31	211	15	10
4	33	35	101	13	12
TOTAL	**112**	**94**	**468**	**41**	**31**

Key to table: 1 = identified by other L1 users as non-native speaker a lot; 4 = seldom identified by other L1 users as non-native speaker

Table 12: Self-perceptions of proficiency for skills in strongest language (n=929)

Language skill	Rating	Afrikaans	Sesotho	English	Zulu	Tswana
Speaking	**1**	0	0	0	2	0
	2	0	1	4	4	3
	3	38	44	122	23	12
	4	192	167	236	38	43
	TOTAL	**230**	**212**	**362**	**67**	**58**
Listening / Understanding	**1**	0	0	0	0	1
	2	2	2	4	3	0
	3	35	37	82	16	14
	4	193	172	276	48	43
	TOTAL	**230**	**211**	**362**	**67**	**58**
Reading	**1**	0	4	0	1	2
	2	1	32	5	11	5
	3	62	63	94	23	19
	4	167	112	263	32	31
	TOTAL	**230**	**211**	**362**	**67**	**57**
Writing	**1**	0	13	2	2	3
	2	6	24	12	13	2
	3	89	67	152	18	15
	4	135	108	196	34	38
	TOTAL	**230**	**212**	**362**	**67**	**58**

Key to table: 1 = not proficient at all; 4 = very proficient

Table 13: Self-perceptions of proficiency for skills in second strongest language (n=788)

Language skill	Rating	Afrikaans	Sesotho	English	Zulu	Tswana
Speaking	**1**	3	0	2	0	0
	2	27	9	20	1	1
	3	61	43	282	16	15
	4	24	57	188	24	15
	TOTAL	**115**	**109**	**492**	**41**	**31**
Listening / Understan-ding	**1**	2	0	1	0	0
	2	17	5	13	2	1
	3	60	42	172	16	11
	4	36	62	306	23	19
	TOTAL	**115**	**109**	**492**	**41**	**31**
Reading	**1**	3	26	0	8	6
	2	19	33	13	19	11
	3	57	34	157	13	8
	4	36	16	322	1	6
	TOTAL	**115**	**109**	**492**	**41**	**31**
Writing	**1**	5	34	1	12	10
	2	19	31	23	15	11
	3	69	28	239	13	6
	4	22	16	229	1	4
	TOTAL	**115**	**109**	**492**	**41**	**31**

Key to table: 1 = not proficient at all; 4 = very proficient

Table 14: TALL scores for participants that wrote the English literacy test (n=651)

	Afrikaans	English	Southern Sotho	Tswana	Zulu	Totals
0-25%	0	0	37	13	12	**62**
26-50%	8	24	227	53	62	**374**
51-74%	12	47	71	24	29	**183**
75-100%	5	19	2	2	4	**32**
TOTALS	**25**	**90**	**337**	**92**	**107**	**651**

Table 15: TAG scores for participants that wrote the Afrikaans literacy test (n=220)

	Afrikaans	English	Totals
0-25%	4	0	**4**
26-50%	99	2	**101**
51-74%	107	1	**108**
75-100%	**7**	0	**7**
TOTALS	**217**	**3**	**220**

Table 16: NBT academic literacy results (n=705) (mean=51,6; SD=9,8)

	Afrikaans	English	Southern Sotho	Tswana	Zulu	Totals
0-25%	1	0	0	0	0	**1**
26-50%	70	14	156	42	51	**333**
51-74%	128	64	110	28	36	**366**
75-100%	1	3	0	0	1	**5**
TOTALS	**200**	**81**	**266**	**70**	**88**	**705**

Table 17: Strongest language and identity (n=807)

Language	*1*	*2*	*3*	*4*	TOTAL
Afrikaans	0	3	12	202	**217**
English	25	47	66	163	**301**
Southern Sotho	4	5	22	163	**194**
Tswana	0	0	2	43	**45**
Zulu	1	1	4	44	**50**
TOTAL	**30**	**56**	**106**	**615**	**807**

Key: 1=disagree; 4=agree

Table 18: Second strongest language and identity (n=782)

Language	1	2	3	4	TOTAL
Afrikaans	25	32	31	31	119
English	65	133	159	112	469
Southern Sotho	3	5	17	94	119
Tswana	1	1	6	23	31
Zulu	3	4	6	31	44
TOTAL	**97**	**175**	**219**	**291**	**782**

Key to table: 1=disagree; 4=agree

Table 19: Contribution of interactions and activities to learning strongest languages (n=928)

	Afrikaans	Southern Sotho	English	Zulu	Tswana
Interaction with friends	94%	88%	85%	79%	83%
Interaction with family	98%	93%	68%	97%	90%
Reading	87%	78%	96%	84%	80%
Self-instruction	44%	53%	58%	58%	58%
Watching TV	65%	47%	88%	55%	51%
Listening to the radio	67%	62%	83%	65%	65%
School / education	97%	73%	96%	70%	83%

Table 20: Contribution of interactions and activities to learning second strongest languages (n=787)

	Afrikaans	Southern Sotho	English	Zulu	Tswana
Interaction with friends	50%	88%	77%	83%	75%
Interaction with family	49%	91%	47%	88%	100%
Reading	64%	33%	96%	29%	36%
Self-instruction	22%	26%	57%	32%	16%
Watching TV	43%	35%	97%	44%	42%
Listening to the radio	19%	41%	89%	44%	52%
School / education	87%	28%	94%	15%	28%

Table 21: Current exposure to interactions and activities in strongest languages (n=927)

	Afrikaans	Southern Sotho	English	Zulu	Tswana
Interaction with friends	94%	76%	87%	64%	84%
Interaction with family	98%	89%	66%	89%	95%
Reading	80%	50%	96%	54%	67%
Self-instruction	38%	41%	58%	35%	44%
Watching TV	62%	40%	92%	42%	46%
Listening to the radio	60%	53%	87%	48%	65%
School / education	94%	55%	95%	46%	63%

Table 22: Current exposure to interactions and activities in second strongest languages (n=773)

	Afrikaans	Southern Sotho	English	Zulu	Tswana
Interaction with friends	46%	80%	73%	64%	77%
Interaction with family	38%	88%	44%	85%	96%
Reading	52%	31%	90%	15%	29%
Self-instruction	12%	22%	55%	7%	13%
Watching TV	42%	33%	94%	42%	42%
Listening to the radio	16%	30%	87%	49%	55%
School / education	77%	33%	89%	15%	21%

End of Appendix