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COMPLEX SENTENCE COMPREHENSION WITHIN A SOUTH AFRICAN ADOLESCENT POPULATION

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1. INTRODUCTION

The current research study aims to investigate the complex sentence comprehension abilities of a sample of South African adolescents, and how these might be influenced by certain variables, such as age, gender, home language, literacy experiences, and preferred modality of presentation of learning materials, among other factors.

Within Western society, the term "adolescence" defines the time span between the ages of twelve and twenty years (Larson & McKinley, 1993). Adolescents are individuals who are at the point of trying to establish their identities (Larson & McKinley, 1993). They are having to make career choices, having to learn to think about their thinking, and are beginning to understand the potential which lies within adult communication (Larson & McKinley, 1993). During early adolescence, communication skills which assist in educational achievement are most pertinent (Larson & McKinley, 1993). As the adolescent progresses to later stages, this communication needs to be steadily expanded in order to reach vocational potential and to ensure appropriate social-personal interactions (Larson & McKinley, 1993).

South African Speech-Language Pathologists are assessing and treating many adolescents with varying speech and language difficulties. However, this task is made more difficult by the fact that we currently do not know what the language abilities of mainstream adolescents actually are. A recent study performed in the Western Cape profiled literacy levels in approximately 90 percent of primary schools within this province (Lewis, 2004). According to Lewis (2004), the study included almost 1000 schools. It was found that two thirds of learners in grade 6 do not meet literacy and numeracy standards for this particular grade. Most of these learners were in fact found to be performing at a grade 3 level, and the results coincided with a study performed two years previously, where only one third of learners were performing age-appropriately in terms of literacy (Lewis, 2004). As pointed out by Bashir, Conte, and Heerde (1998), the link between language deficits and literacy skills has been clearly recognised, and is high-lighted later in this section. If these children are unable to cope with language demands at the junior school

or intermediate phase level, how will this impact on their ability to cope at later stages of education? This is what the current study is then concerned with. It is hypothesised that individuals who struggled with basic literacy and comprehension, will still be displaying difficulties in these areas in adolescence, and that these difficulties will, in fact, be compounded. This will have implications for their ability to cope with the higher level comprehension (and expression) which is expected at this level (Nelson, 1993). Most school subjects are language-based. Even some math is reliant on the ability to comprehend complex language structures - for example, story-sums or instructions involving various mathematical terms such as "divide", "multiply", "factorise" (Westen, 1999), and it is expected by educators that the learners will be able to internalise the language and then be able to complete or participate in the activity accordingly. This is clearly expressed by Bashir, Conte and Heerde (1998): " [a]ll too often it is assumed that children come to school having mastered basic linguistic abilities and are now in a position, with appropriate instruction and guidance, to use and apply their knowledge of language and communication to various classroom activities…" (p. 5). This is not always the case, and if this initial assumption is not upheld, as is currently expected within this population, then there will be major implications for school success and education.

Related to changes in school performance may be the issue of the changing curriculum in South Africa. Olivier (1999) outlined changes between the old and the new curriculum. Where the old curriculum was based on rote learning, was textbook and worksheet bound, was teacher centered (as were teacher goals), a content-driven syllabus (broken down into different subjects) which was rigid and unalterable, and the public had no access to curriculum development, the new curriculum appears to have different premises (Olivier, 1999). The new curriculum reportedly focuses on critical thinking and reasoning, learning as driven by processes and outcomes which connect with real-life situations, learner- and outcome-centered goals, the teacher as facilitator, learning programmes being used merely as guidelines, emphasis on outcomes, and encouraging the involvement of the wider community (Olivier, 1999). As can be seen from Olivier's (1999) writing, the changing curriculum appears to incorporate less direct teaching of language, and emphasises groupwork, with teachers acting as facilitators, allowing the

learners to be largely responsible for the outcome of their educational experiences. This requires learners to work co-operatively (often in groups) in order to problem-solve and further their education (Hudelson, 1994).

Therefore, in addition, this study aims to explore the complex reasons for why the language ability of adolescents might be changing and evolving. If they are indeed changing, what could this be related to? Ordinary first- and second-language speaking adolescents will be observed, and their ability to engage in tasks of complex sentence comprehension reported. In addition to this, various aspects of their experiences will be considered, in an attempt to discover underlying possibilities for observed comprehension and literacy rates. Jooste's (2003) study showed that second language speakers are not acquiring academic language proficiency as easily as first-language learners. However, the current study's focus is on the fact that, not only are second-language English speakers behind in acquiring these skills, but, at this point, it appears that first-language English speakers may also be. If this is true, then the phenomenon is fairly new. The point is to answer the question "why"?

Are language and related abilities on the decline? And if so, at what level are mainstream individuals functioning. Particularly relevant is the issue of complex sentence comprehension, which forms the foundation not only for social interaction at this age, but for academic prowess and success (Nelson, 1993). If we do not know what to expect from adolescents within our society, how can we possibly hope to provide accurate assessment and remediation for clinical populations of adolescents? By looking at complex sentence comprehension and related factors, we may begin to understand the challenges facing today's youth in the classroom, and how various variables are affecting or enhancing their performance.

Only mainstream South African adolescents will be considered within this study, as there does not yet seem to be a clear picture of how this population performs on language comprehension tasks. There is a paucity of data. In addition, the study will look at first- versus second-language English speakers, in order to determine whether this is one of the

variables affecting performance. These variables are considered toward the close of this section and are again provided in the data collection and research procedure section. Clinical populations cannot be considered until we know how typical adolescents (of first- and second-language origin, in same-medium high schools) perform, and perhaps why they perform in certain ways/patterns.

1.1. Language Comprehension

Language is a shared system of verbal symbols and rules, which affords individuals the opportunity to represent concepts and experiences, and to communicate (James, 1990). It is, in addition, said to be "arbitrary, creative, and learned" (James, 1990, p. 2). Language comprehension involves recognising words and recalling the objects, acts or relations for which these stand, while language production involves recognising objects, acts or relations and recalling words that represent them (James, 1990). In other words, comprehension will involve the understanding of sentences which are presented to the listener, and production will involve creating sentences which can be used to communicate various meanings to others (Carrow-Woolfolk & Lynch, 1982). Extended, comprehension is said to be a process through which meaning is attached to code (Carrow-Woolfolk & Lynch, 1982). It cannot occur until the underlying message of an utterance is uncovered (Carrow-Woolfolk & Lynch, 1982). Comprehension importantly involves understanding the intended or conveyed meaning of the speaker, rather than the literal meanings of the words and phrases (Carrow-Woolfolk & Lynch, 1982). According to Carrow-Woolfolk (1999), when an association between a linguistic form and its meaning is created, comprehension typically precedes or occurs at the same time as the ability to produce this component.

Language is further divided into various components, namely, phonology, semantics, syntax, and pragmatics, with the first three contributing to linguistic competence (this is the underlying knowledge of the phonological, semantic and syntactic rules of your home language), and the last to communicative competence (this refers to knowledge of how to utilise language in order to interact in appropriate ways, given various situations, and

includes linguistic competence) (James, 1990). Complex sentence comprehension (i.e. for meaning) appears to be an amalgamation of these skills. This is discussed further later.

1.2. A brief review of complex sentence comprehension

Complex sentence structures are said to be those which include multiple embeddings, and referential and logical connections across sentence boundaries (Nelson, 1993). As individuals get older, they are more able to expand the length of an utterance by adding a variety of nonclausal structures, through the use of embedding and phrase elaboration strategies (Nelson, 1993). This allows one to say or understand more from fewer words (Nelson, 1993).

Syntax is the specific grammatical structure of a sentence. Sentence comprehension is affected by aspects such as knowledge of morphology and phonology (Hammill, Brown, Larsen, & Wiederholt, 1980), which is more what the current research is focusing on.

Sentence processing necessitates the ability to process both word meaning and syntactic structure (Kempler, Almor, Tyler, Andersen, & MacDonald, 1998). Memory plays an important part in the processing of sentences, as a sentence takes place over time, and the listener must remember details from the start of the sentence in order to integrate new words into the overall meaning of the sentence (Kempler et al., 1998).

"Sentence comprehension is a complex process that involves at least knowledge of the syntactic rules that govern the long-distance syntactic relationships between words and phrases in a sentence, as well as the processes needed to implement this knowledge in a fashion that effectively supports rapid day-to-day communication." (Grossman, Lee, Morris, Stern, & Hurtig, 2002, p. 604).

1.3. Purpose of language comprehension in adolescents

As Westby (1994) points out, while young children learn to talk, as they get older, they have to talk in order to learn. Put differently, Wiig (1995) suggests that in childhood, world knowledge translates into word knowledge, and reflection of the environment leads to what is called spontaneous concept development. In late childhood and in adolescence,

word knowledge is conversely expected to translate into world knowledge, where scientific concepts are logically defined and encountered only within the structure of classroom education (Wiig, 1995). Language during the school years therefore expands to include a greater variety of language functions, different discourse styles and organisation, more abstract vocabulary, increasingly complex syntax, and metacognitive skills (Westby, 1994). All activities, be they social or academic, involve communication, and, by extension, language, which is used to share meanings (Westby, 1994). Also, it is easier to talk with one person, rather than a group, and to a person one knows well (Westby, 1994). In these situations, simpler semantics and syntax may be used (Westby, 1994), which places less of a demand on processing. This is called the rhetorical dimension (Westby, 1994). Within the referential dimension, an individual's comprehension and expressive abilities need to expand, growing further than what is needed for the immediate situation (Westby, 1994). Consequently, the child learns to speak about past and future occurrences, begins to generalise about these, and eventually begins to theorise about them (Westby, 1994). At each of these referential levels, the individual is more removed from the contextual cues (Westby, 1994). As an individual grows older, and especially in the high school years, the requirements related to language increase and expand to application to increasingly abstract functions (Westby, 1994). An example is the ability to inference (Westby, 1994). Also, in contrast to the rapid changes that occur in the language abilities of very young children, growth of language in adolescence occurs in a manner which is slow and protracted (Nippold, Schwarz, & Undlin, 1992).

While listening, learners must be able to "perceive, encode, analyse, compare, and store an ongoing stream of verbal information" (Gaulin & Campbell, 1994, p. 55). As individuals progress through the school years and the dominant modes of learning at school become more embedded in complex language and reading, the demands on verbal working memory increase substantially (Gaulin & Campbell, 1994). If any aspect/s of language processing is/are inefficient, then it is entirely likely that additional resources will be necessary and ultimately total working memory capacity could be surpassed, forcing language comprehension to be compromised (Gaulin & Campbell, 1994).

Working memory and the inclusion of a measure thereof in the current study is discussed later in the literature review.

In short, as we grow older, and especially in adulthood, we are expected to be capable of analysing, synthesising, and evaluating information (Westby, 1994). With increasing age, the adolescent needs to make the transition to metalinguistic maturity and strategic language usage (Wiig, 1995). As related to this study, an adolescent needs to have an evolving concept and understanding of complex language, as the linguistic demands of the classroom steadily increase. In everyday situations also, complex syntax is likely to be used. With increasing age, people are more able to discuss topics and occurrences which do not pertain to the here-and-now, which may have happened, may still happen, or may be only hypothetical. Differently put, at the later stages of language development, adolescents are expected to use language competently within a variety of modalities and contexts (Nelson, 1993). As a consequence more involved syntax is likely to be used in conveying ideas to others. The ideas which need to be conveyed are often largely out of context, highlighting the necessity for use and processing of more and more complex language structures.

More specifically, as related to the classroom, the adolescent needs to be able to understand a rich variety of complex sentence structures which include multiple embeddings and referential and logical connections which transcend sentence boundaries (Nelson, 1993). Another factor which predicts success is the individual's ability to use their sentence level skills in order to recognise "syntactic synonomy" (Nelson, 1993, p. 424). Various tasks given at school require the student to be able to recognise paraphrases of what they have already read, to paraphrase material for themselves, to infer relationships between sentences with similar meanings, and to use sophisticated sentence-analysis strategies in order to complete true-false or multiple-choice tests (Nelson, 1993). At very late stages, adolescents are required to use metalinguistic skills in order to reflect on syntactic operations, and in some cases, even discuss these (Nelson, 1993).

1.4. Academic Language Proficiency

There is a difference between conversational and academic language, as alluded to above, and classroom language is more tacit, complex and abstract than one would encounter outside this context (Cummins, 1996 and Baker, 1996, cited in Jooste, 2003). Gibbons (1991), as cited in Jooste (2003) says that "playground language" and "classroom language" differ in that the former is used for making acquaintances, and taking part in daily activities. It relies on gesture, body language and physical and visual contact, while classroom language requires higher level thinking skills, where individuals are asked to hypothesise, evaluate, infer, generalise, predict or classify. However, although not used outside the classroom, these skills are what academic success hinges upon (Cummins, 1996, cited in Jooste, 2003). Cummins (1981, 1984) calls the above "playground language" Basic Interpersonal Communication Skills (BICS), and "classroom language" Cognitive Academic Linguistic Proficiency (CALP) (Jooste, 2003). Other labels include context-embedded language, for communication, and context-reduced language for CALP which requires abstract and cognitively demanding receptive and productive skills which are integrated in academic thinking and reasoning, and which allow the processing of complex information and almost entire linguistic reliance (Carasquillo & Rodriguez, 1996 in White, 1997; Alfers & Murray, 1994; Baker, 1993; Cummins, 1984; Cummins & Swain, 1983 all cited in Jooste, 2003). Cummins (1991a) points out that interpersonal language and communication in a second language may take only two years to develop, while academic language and understanding, on par with first-language speakers, takes substantially longer (up to five years). Often, the distinction between conversational and academic language is not taken into account, and individuals reaching conversational proficiency are felt to be able to cope with academic demands (Cummins, 1991a). Any extra support that these individuals may have been receiving is withdrawn at the stage of conversational proficiency of the second language, rather than at the stage of academic proficiency (Bialystok & Cummins, 1991). An example of support in the U.S. is in the use of the minority language for teaching "until the student is judged to have *sufficient* competence in the majority language to follow instruction in that language" (Bialystok & Cummins, 1991, p. 225, emphasis added). Students who are able to function adequately in face-to-face encounters and use the language in an appropriate conversational way are

usually considered “fully proficient” (Harley, Cummins, Swain, & Allen, 1990). Skutnabb-Kangas and Toukomaa (1976, cited by Cummins, 1991a) showed that educators of immigrant Finnish children deemed them fluent in both their home and second language, although these children had decreased levels of verbal academic performance in both languages. Also, individuals who appear proficient in (example) English, still often perform poorly on English academic tasks as well as in psychological assessments (Cummins, 1991a). In South Africa, there are not many support programmes (such as bilingual education or “transitional programs” in the United States, as mentioned by Cummins, 1991a) for second-language learners in schools. Many of these individuals will not receive support even for conversational language development, and yet are expected to cope with complex classroom language. Basic proficiency in the language of the educational setting is not adequate, as second-language learners often have inadequate exposure to or poor knowledge of the vocabulary and context-specific language which is necessary in order to complete the more demanding tasks included in academic courses (Lewelling, 1991).

Importantly, anxiety and uncertainty should be considered as a factor in academic language proficiency. Certain studies, such as that by Elkhafaifi (2005), demonstrate that the anxiety of an individual within an environment with an unfamiliar language can in itself inhibit the learning of that language. If the language-learning process is affected, then how might the individual ultimately use the language in order to learn or develop cognitive skills? Additionally, individuals who are anxious may also underestimate their own abilities, which has been noted to cause poorer or decreased performance (Elkhafaifi, 2005). Although some studies have concluded that anxiety may in fact facilitate performance through causing individuals to work harder, the general consensus is that anxiety detracts from performance (Elkhafaifi, 2005). Anxiety has been specifically linked to poor or affected listening comprehension (Elkhafaifi, 2005), which is pertinent to the current study in that if second-language English speakers in a first-language English environment might have the potential to perform better than they actually do, due to increased anxiety.

An additional factor which has been found to affect academic language proficiency is that of continued input in the individual's first or home language. Often, when individuals are schooled in a second (or third) language, the majority of their day and language input will be spent at school with the second language (Lewelling, 1991). Consequently, input and stimulation in the first language become limited, which can, in some cases, inhibit second language development and cognitive academic growth (Lewelling, 1991). First-language proficiency has been ear-marked as a predictor of second-language development and its use in the academic context (Lewelling, 1991). Individuals who can systematically employ executive-control functions in their first language are more likely to do so in their second language too (Cummins, 1991b). Cognitive maturity, knowledge and experience reportedly transfer to second-language acquisition and usage (Lewelling, 1991).
Briefly, in terms of South African second-language learners, it should be acknowledged that many of these individuals attend school in their second-language from a very young age, thereby limiting their exposure to their home language. This could have implications for cognitive development which should ultimately be used for second-language use (for learning and academic growth).

Studies have been done to determine how long is needed for second-language speakers to achieve at comparable levels with native-English-speaking peers. Lewelling (1991) cites various studies, such as that by Cummins (1981), who found that Canadian immigrants, schooled in English from their arrival, took between five and seven years to catch up with grade norms of native-English peers. Collier (1987) and Collier and Thomas (1988) conducted a study on the "catch up" abilities of second-language speakers on standard achievement tests (Lewelling, 1991). These researchers found that for individuals between 4 and 16 years of age, who had been in the United States for 2-6 years and had received only English instruction, results were varied (Lewelling, 1991). Children who were less than 12 years old upon arrival and had two years of schooling in their land of origin managed to achieve the 50th percentile on factors such as reading, language, science, social studies and science tests five to seven years post arrival (Lewelling, 1991). In contrast, younger children (4-6 years) who had had no schooling in their native language did not reach the 50th percentile after six years and were additionally not

expected to do so, even after seven to ten years (Lewelling, 1991). Harley et al. (1990) mention studies which suggest that there is an interdependence or commonality across languages as related to context-reduced or academic sorts of proficiency. It was also found that adolescents beginning to study in the second language needed roughly seven to ten years to catch up with peers, and if academic pursuits did not continue after school years, then there was not enough time in order to fully catch up or match their peers in terms of cognitive academic factors (Lewelling, 1991). Lewelling (1991) cites such studies and others, and concludes that individuals who are taken into bilingual education programmes, where stimulation is provided in both first and second languages, tend to do far better in terms of progress in a shorter time than counterparts who study only in the second language with limited first language input. South African resources do not currently allow for such bilingual programmes and consequently, one might be concerned about children who are, by and large, schooled only in their second or third language. Additionally, there appears, within the South African context, to be a preference for English as a medium of instruction. As acknowledged within the study by Waner (2002), South African schools are divided into non-urban/rural schools, urban township schools, and urban suburban schools, all of which generally favour English as the main medium of instruction. This is even the case in urban township schools, where, although both teachers and students are unlikely to be first-language English speakers, instruction continues in English (Waner, 2002). In short, learners are mostly expected to learn within an English environment (Waner, 2002). As was pointed out above, children who have no schooling in their first language tend to do poorly in academic tests, even years after their initial entry into facilities which teach in an unfamiliar language. This appears to be because the individual is deprived of the time to develop cognitive skills upon which to base later learning. The child's time is taken up with learning a new language. In years to come, where assessment is largely in the form of academic tests, these individuals may be unable to cope as the cognitive skills, which were the foundation for the work which is imparted linguistically, are missing.

Comprehension in the classroom is also specifically related to written language comprehension (Jooste, 2003). One view of reading and learning to read, proposes that

learning to read is not entirely different from learning to speak (Bryant, 1995). One is exposed to written text as to spoken language, although there is an important difference (Bryant, 1995). The individual may be able to use their knowledge and understanding of spoken language and its rules in order to better decipher the text (Bryant, 1995). This view opposes the argument that children should first learn phonics, as only then will they be able to successfully decode written language (Bryant, 1995). For the purposes of this research, both views need to be applied. As young children, individuals probably best learn to read through the use of phonics and slow decoding of the written word. Also, if the child is taught to read using his/her own language system knowledge, semantic knowledge, personal experiences and concepts, then the process may be facilitated (Goodman, 1982). However, as children become older, the language, both in the classroom and in textbooks and tests will become more challenging and difficult to understand. If the adolescent is able to competently process complex spoken language, then perhaps their literacy skills regarding complex language will follow. However, if language skills are poor or weakly grasped, then it is unlikely that the individual will be coping with complex language in the classroom, and even less likely that he/she will be able to utilise their knowledge of spoken language to assist them in decoding complex written language.

As Jooste (2003) points out, "[w]ritten language uses a more explicit vocabulary, more complex syntax and a topic-centered organisation." (p. 28). This again relates to metalinguistic abilities, or conscious awareness of language (Jooste, 2003). There is a well-established link between language deficits and literacy skills (Bashir, Conte, & Heerde, 1998). If language is delayed, then there can only be an increased risk for future delay and difficulty, and learning tasks which are language-based and require application of linguistic knowledge will be affected (Bashir, Conte, & Heerde, 1998). This can be specifically related to adolescents. Expository-type texts have been found to be more difficult to process than (e.g.) narrative texts for learning disabled as well as average achieving students (Bashir, Conte, & Heerde, 1998). Therefore, we can see that the classroom is already demanding. If an individual has poor comprehension abilities, this

will make the classroom an impossible minefield with academic success a distant, if not completely unattainable, goal.

Jooste (2003) writes about the plight of second-language speakers, particularly within the South African context. Academic language proficiency is difficult enough to attain for first language speakers, and at the same time as second language speakers are attempting to acquire this proficiency, the former are not static, but are moving forward, making it almost impossible for the latter to catch up. She calls this a "moving target" (p. 103).

1.5. Complex sentence comprehension assessment in the current study

One standardised subtest of complex sentence comprehension was selected for use in this study, namely, the second subtest of the Test of Adolescent Language (TOAL) (Hammill, Brown, Larsen, & Wiederholt, 1980).

The TOAL was developed due to a paucity of standardised assessment material at the time of its creation (Hammill et al., 1980). Hammill et al. (1980) proposed that while children's language had been studied in-depth and numerous norm-referenced measures developed, no real work had been done in order to assess an older, adolescent population. According to its authors, the TOAL "was built to meet the obvious need for a highly reliable, multidimensional, nationally standardised, and experimentally validated assessment instrument" (Hammill et al., 1980, p. 5). The authors also point out that, often, various different tests are used to assess the different aspects of adolescent's functioning which need to be observed. However, different tests which are normed on different populations are often not comparable and may provide a distorted view of the adolescent's abilities (Hammill et al., 1980).

The TOAL was developed for four specific purposes. The first is to identify adolescents who are considerably below their peers in language proficiency and who might benefit from extra support or help. In the past, it is said that professionals were often forced to rely on their own subjective judgment of the adolescent's language as disordered or not. The available measures were seen to be inadequate as they looked at isolated constructs.

Also, subjective evaluation does not provide the level of difficulty which the adolescent is experiencing. The TOAL was designed as an integrated test of language ability, where the individual could be compared to age-mates and specific difficulties identified and focused on in an assistive programme (Hammill et al., 1980). Secondly, it is meant to identify specific language-related strengths and weaknesses in any tested individual. The TOAL is not merely meant to identify disordered language, but also to identify intra-personal strengths and weaknesses which may have clinical utility (Hammill et al., 1980). It is thirdly intended to be used as a method of documentation once an identified individual enters an intervention programme (Hammill et al., 1980). Finally, it is designed to serve as a measurement device for researchers who are attempting to study the language behaviour of adolescents. This is because research often requires standardised tests which are used to study the relationship of language abilities to performance in certain academic arenas, they are used to demonstrate the efficacy of specialised interventions, and they are used in looking at the effects of language proficiency on finding and keeping productive employment (Hammill et al., 1980).

The authors of the TOAL acknowledge that to develop one all-encompassing test of adolescent language ability would be impossible, and so restricted it to various areas deemed important in terms of representative language abilities. It assesses the forms of spoken and written language, the features of semantics and syntax, and the systems of receptive and expressive language (Hammill et al., 1980). Hammill et al. (1980) say that the features of morphology and phonology would, for example, influence the strict area of syntax, and therefore they elected to call syntax "grammar", and semantics "vocabulary". This particularly suited the intentions of the current research in that the purpose was not to identify what syntactic structures were specifically understood by the participants, but to determine what complex sentences, such as might be utilised within the academic context in terms of complexity and minor variation, might be comprehended by learners within the high school setting.

Briefly then, the TOAL consists of three dimensions (forms, features and systems) which are all cross-matched in order to form the following eight subtests:

- Listening/Vocabulary
- Listening/Grammar
- Speaking/Vocabulary
- Speaking/Grammar
- Reading/Vocabulary
- Reading/Grammar
- Writing/Vocabulary
- Writing/Grammar (Hammill et al., 1980).

Due to the specific focus of the current study, only the Listening/Grammar subtest was employed. It is described later in the Methodology section. Once formats for each subtest were created and deemed appropriate to the purpose (trial-and-error experimentation with various formats for each subtest), a large number of potential items were created and administered to a sample of adolescents in order to discern the "better" items (Hammill et al, 1980). Item analysis was utilised for this purpose (Hammill et al., 1980). Hammill et al. (1980) concluded from their analyses that the items of the TOAL have acceptable difficulty and discriminating power in the grades investigated. It was standardised on a sample of 2,723 individuals in 17 of the United States and three Canadian provinces.

The TOAL was seen as an appropriate form of sentence comprehension measurement because, as outlined by the authors (Hammill et al., 1980), it is capable of quantifying language performance of adolescents, as compared with their peers, and it is also specifically suggested as a research tool when investigating adolescent language behaviour. A drawback is that the test is normed on a different population and this might bring in issues related to reliability and validity. On the other hand, there are no similar, specific South African tools for the assessment of an adolescent population. Also, certain sentence structures and academic proficiencies will be necessary in order for adolescents to cope with the increased academic and linguistic demands of the classroom, independent of whether that classroom is in the United States or in South Africa. In addition, throughout the world, there is a relative lack of standardised adolescent assessment tools (Johnson, Taback, Escobar, Wilson, & Beitchman, 1999), making the pool of possible tests from which to draw for the current study particularly small.

Standardised, or norm-referenced, assessments are often mis-used or abused in the quest for accurate evaluation and remediation of an individual (Wiig, 1995). Normative information can be misinterpreted if it is used for a target population different to that of the test (Johnson, et al., 1999; Murphy & Davidshofer, 2001). Also, if grade or age-norms are used, it is important to remember that the result of the test represents the individual's functioning only in that specific area and that their abilities in other areas may be at different levels (Murphy & Davidshofer, 2001). It is argued that standardised tests are unable to fully predict ability in a naturalistic context as the nature of the test is somewhat artificial (Scott & Stokes, 1995). The use of norms can be affected by the size of the test's original normative sample group and change over time (Murphy & Davidshofer, 2001). However, within the current investigation, these may not be of great consequence as the measure is meant to determine academic language proficiency, or the ability to comprehend the complex language of the classroom, which is, itself, not usually in context or naturalistic. Also, only one isolated area of functioning is to be determined, as influenced by other factors, and therefore the error of determining overall function of the participants will not be applicable. It is acknowledged that the nature of the assessment in the current study is fairly artificial; however, it is felt that this is concurrent with other kinds of formal assessment which the participants may have been exposed to. Finally, change over time of abilities could affect the use of the test, although, the availability of appropriate tests for use in the current study was limited, and the need for an up-dated version of the test was not deemed necessary. The original was used, as the TOAL-2 appeared to have the same aims, use and purpose as the original, the only main difference being in the addition of various "easier" items for some of the subtests (Tibbits, 1988). The TOAL-2 was normed on fewer individuals than the original, typing errors were omitted from the tester's manual, standard scores replaced scaled scores, percentiles were added, and the lower end of the age-range was extended (Tibbits, 1988). Even the TOAL-3 appeared to have similar items and was merely updated through the extension of the norms to include post-secondary school individuals (Hammill, Brown, Larsen, & Wiederholt, 1994).

The sample for which the TOAL was to be used here remained, age-wise, within the range of the original test norms, and it was considered that the post-original changes did not warrant seeking out the newer tests. The fact that the test was normed on a different population was considered prior to its use. It was decided that, because there do not appear to be locally available equivalent assessments, and because such a large population was to be tested, to design one would change the focus of the study. Consequently, the test was chosen and the caution of different population norms kept in mind.

1.6. Working memory

Gathercole and Baddeley (1993) point out that working memory is related to the comprehension of complex spoken language. Often, individuals experience the feeling of labouring to construct meaning, even after the speaker has finished speaking. As more information is provided, it can be added to previous meaning and an overall or complete meaning constructed (Gathercole & Baddeley, 1993).

Gathercole and Baddeley (1993) cite two influential models of the role of working memory in language comprehension. The first was proposed by Clark and Clarke (1977), which is a four step model (Gathercole & Baddeley, 1993). Firstly, a phonological representation of the message is created within working memory. This representation is then used for the identification of the content and function of the pieces of the message. Following this, the underlying propositions are used in order to build a hierarchical sentence structure. Lastly, the raw form of the message in working memory is lost and the individual has the meaning of the message, rather than its exact representation. This model therefore assumes that the working memory representation of this unprocessed linguistic message is vital to language comprehension (Gathercole & Baddeley, 1993). It is said to correspond to the phonological loop component of working memory (Gathercole & Baddeley, 1993). Gathercole and Baddeley (1993) say that the strongest form of this model needs to be rejected, as a major portion of language processing occurs in an "on-line" fashion, negating the possibility that all heard information is processed in this way. These authors do, however, concede that this function is not *never* used. In fact,

it is useful to be able to process off-line or directly after the spoken message, as back-up when higher-level linguistic interpretation is necessary, and for recognition of certain words at a later point in the sentence (Gathercole & Baddeley, 1993).

A second model, cited by the above authors, was created by Kintsch and Van Dijk (1978, 1983). Within this model, the linguistic message is processed in cycles (Gathercole & Baddeley, 1993). Each cycle is regarded as a "chunk" which is made up of various propositions (Gathercole & Baddeley, 1993). A short-term memory buffer stores as many of these chunks as it can, comparing them to incoming or overlaid chunks (Gathercole & Baddeley, 1993). When matching chunks are identified, the message is regarded as coherent (Gathercole & Baddeley, 1993). If certain chunks do not match, then long-term memory stores need to be searched for additional information in order for the listener to be able to make inferences (Gathercole & Baddeley, 1993). This obviously creates a large demand on processing resources (Gathercole & Baddeley, 1993). Short-term memory will have limitations on its capacity, and the more complicated the message, the more space will be devoted to processing, rather than storage (Gathercole & Baddeley, 1993). The final conclusion is that, dependent on the syntactic and semantic complexity of the message, the amount of working memory assigned to the processing will vary (Gathercole & Baddeley, 1993).

For the purposes of the current research, the initial model of working memory's involvement in language, where some portions of information need to be processed following their perception, seems quite important. The study focuses on academic language, which may require additional processing after verbal presentation (usually learners might be given the opportunity to ask questions about taught material), and the language task requires individuals to hold three sentences in memory and analyse which two have the most similar meaning. This could be labeled "higher-level linguistic interpretation" (Gathercole & Baddeley, 1993, p. 203), for which working memory appears to be necessary.

Gaulin and Campbell (1994) mention research which has found that working memory is associated with performance on a variety of language tasks. King and Just (1991), as cited by Gaulin and Campbell (1994) found that individuals with less working memory capacity or poorer working memory were likely to show poorer comprehension of syntactically complex sentences than individuals with high capacity. Poor working memory has also been implicated in disordered language development (Gaulin & Campbell, 1994).

It has been hypothesised that some people may have larger working memories than others, and also that some individuals may be more skilled at making the best possible use of their available working memory, rather than having a larger storage or buffer space (Greene, 1987). Regardless of the capacity of working memory, even on an individual basis, and the theories of how it works, working memory capacity is limited (Greene, 1987). Thus, the current study needed to determine that the natural limits of working memory, which have been said to be necessary for accurate language comprehension and for reaching judgments about such linguistic information, were not impacting on the results of the test. The use of the working memory measure was therefore two-fold: it had to be determined that working memory was in fact not having a deleterious effect upon the results of the comprehension test, and it further had to be determined that the students tested fell within an average range as related to the skill of working memory use. The use of the memory test was merely a cross-check.

The memory test selected was the Competing Processing Language Task, as created by Gaulin and Campbell (1994). According to Gaulin and Campbell (1994), prior efforts to measure verbal memory have utilised the verbatim repetition of either sentences or lists of numbers, letters or words. They go on to say that these particular measures are merely predictors of static memory capacity, which are, in turn, not good at predicting success on tasks which need efficient allocation of limited resources in order to achieve integrated processing of linguistic input. It is suggested that these kinds of tasks do not place sufficient demands on the processes which are linked to language comprehension. As a result, Gaulin and Campbell (1994) created the Competing Processing Language Task in

order to estimate verbal memory capacity. It is meant to take into consideration the "dynamic nature of working memory in language performance" (p. 56).

1.7. Other factors investigated within the current study and their importance

The various factors which were considered in the case history/information form which participants were required to complete are briefly considered here. Each factor is then described in more detail, along with its measurement and exact wording, in the Methodology section.

The participants were asked about their daily habits, with regard to communication, literacy, and preferred processing style in the classroom. Some of the questions and ideas were gleaned from the researcher's personal experience, thoughts and reading; some were based on literature in the field, as related to academic language proficiency; and others were contributed by various speech-language therapists and professionals working within the field who have also had contact with teachers.

The questions asked participants how much time they spend reading for school each week, how much time they spend reading for personal enjoyment/enrichment each week, and what kinds of materials they enjoy reading. This is because, as mentioned previously, literacy is related to academic language proficiency and language skills generally. It could then be postulated that individuals who read more than just school-related literature, may do better in terms of academic language proficiency in comparison to their peers.

Related to this, the form goes on to ask how many television programmes each individual watches every week, and how long they may spend playing computer and video games each week. Some individuals within the profession felt that some cultures are changing from a more auditory modality to a more visual-centered approach, which may account for some changes within the abilities of South African adolescents.

In addition, participants were asked about their "favourite" subjects at school, and what their English and overall report average marks were.

Finally, one professional, on presentation of the proposal for this project, queried whether cell-phones might have any effect on poor sentence comprehension skills or decrease

academic language proficiency. As a result, this factor was included in the questionnaire. As mentioned previously, these points are all expanded upon within the Methodology section with measurement and phrasing of the variables on the questionnaire.

1.8. Summary

To re-cap, this study aims to determine the complex sentence comprehension abilities of a sample of mainstream South African adolescents. These abilities will be considered in relation to numerous variables, as discussed above. The main variables hypothesised to have an effect include grade level, gender, and language. Additionally, other relationships between variables are to be considered, as is the effect of working memory.

2. METHODOLODY

2.1. Aims of the study

2.1.1. *Aim 1.* The main aim of the study was to explore the complex sentence comprehension abilities in different groups of adolescents. This was to be achieved within the South African context, in order to determine the standard abilities within this adolescent population, as a basis of comparison for clinical populations. This aim incorporated the determination of significant differences between male and female participants; between first- and second-language English-speaking participants; and between junior and senior phase participants (i.e. grade differences). Additionally, the complex sentence comprehension results were examined in relation to the other variables investigated within the study, in order to discern any significant relationships or influences.

2.1.2. *Aim 2.* A secondary aim, utilised mainly as a cross-check, was to determine the effect, if any, of working memory on the complex sentence comprehension test score. Also, the results obtained on the working memory test were examined in relation to the other variables considered in the study, in order to determine the existence of any relationships.

2.1.3. *Aim 3.* Additionally, it was hypothesised that other factors examined in the questionnaire might be affected by either grade, gender or language. These other factors included: how much reading is done for school each week; how much reading is completed recreationally each week; number of television programmes watched each week; amount of time spent playing computer or video games each day; learning style (i.e. auditory, visual or both); most recent English mark; most recent school report average; learning style 2 (i.e. individual versus group learning); and amount of short message signals sent.

2.1.4. *Aim 4.* The final aim was to correlate all variables in order to determine any relationships which might account for findings.

2.2. Research design

The study adopted a cross-sectional research design, as various different age groups (these are called cohorts) were studied, based on one or more variables, at roughly the same point in time (Welman & Kruger, 2001).

This research design incorporates a typical group design (rather than an individual subject design), as this is said to reliably permit the average performance of a group of participants to be determined (Silverman, 1977). It provides data attached to the behaviour of a "typical" member of a group, and purports that most of the participants within the experimental group will respond in the same way (Silverman, 1977). This is particularly relevant in the current research, as the aim is to discover how typical South African adolescents, of varying age-groups, will perform, given tasks of complex sentence comprehension. Also, it is said that there are well-developed statistical procedures for assessment of the reliability of findings (Silverman, 1977). However, if combined with individual subject design, characteristics of individual participants can be collected, and any variability noted within the data may be attributed to individual differences (Silverman, 1977).

It is pointed out, by Silverman (1977), that participants may not always respond in a typical fashion. However, use of a group allows the mean or median group member to be used to predict the most probable behaviour of a mean member of the larger population in response to the same task (Silverman, 1977).

In terms of participant sampling strategy, although it is acknowledged that probability sampling is the most recommended form, the current research had to make use of non-probability sampling. It is said that this kind of sampling is usually used for the purpose of convenience or economy (Welman & Kruger, 2001). It was necessary due to, amongst others, time constraints. Although these are important issues, it should be acknowledged that within the this study, the population to be studied was also largely unidentified and therefore, the use of sampling frames, simple or stratified random sampling, systematic

sampling, or cluster sampling was precluded (Welman & Kruger, 2001). This is mainly because one cannot guarantee, within the scope of the current study, that all of the individuals meeting participant criteria are identified and therefore available for probability sampling strategies. Also, due to the number of participants needed, gaining access to many different individuals as an anonymous researcher posed difficulties, especially within the South African context, where people are wary of anyone unfamiliar, due to crime and other related factors.

As a result of the above considerations, non-probability sampling was selected for the purposes of the current research. Some members of the target population may have had no chance of being selected (Welman & Kruger, 2001). However, a combination of two non-probability sampling strategies was proposed. Firstly, purposive sampling was chosen as it does, to a degree, suit the nature of the current research. In order to obtain a purposive sample, the researcher has to rely on their ingenuity, previous experience, or research (Welman & Kruger, 2001). This is so that they "deliberately obtain units of analysis in such a manner that the sample they obtain may be regarded as being representative of the relevant population" (Welman & Kruger, 2001, p.63). This was useful in the current study, as the participants could be specifically selected, in order to ensure that criteria for inclusion were adhered to in the strictest possible way. A problem with this kind of sampling, which should be noted at the outset, is that different researchers will use different methods to obtain such a sample, and it is thus difficult to determine whether the sample is indeed representative of the population being investigated (Welman & Kruger, 2001). Additionally, quota sampling was used in conjunction with the above method of purposive sampling. In other words, the researcher attempted to obtain approximately equal numbers within each age range, as well as equal numbers of males and females within these groups. As seen below, this was not always possible, however, the groups were deemed large enough for inclusion in analysis. For quota sampling, Welman and Kruger (2001) recommend that a minimum of 15 individuals are used, but say that a group of more than 25 is optimal.

Non-probability samples are further useful when a pilot study must be included within the research (Welman & Kruger, 2001), as applied to this research.

2.3. Pilot Study

A pilot study on two individuals was performed prior to the actual data collection procedure, in order to determine that the chosen assessment tools were appropriate and could be completed. Informed consent was obtained from the volunteers, and in the case of one participant (legally a minor), parental informed consent was obtained. The two volunteers were of different high-school ages and completed the tests individually with the researcher. Although this was seen as a potential disadvantage, as tests were ultimately administered in the group situation, it was felt to be necessary to acquire individual feedback on the nature of the assessments from the pilot participants. These individuals were able to comment on test items, and although their consensus was that various aspects were challenging, the assessments were entirely possible for high-school participants to complete. Also, through their completion of the questionnaire and multiple choice/true-false portions, more acceptable lay-out patterns were discovered (to make responses easier to record). In terms of the questionnaire, more acceptable wording for the population to be included in the study was discussed and clarified. As a result of the pilot study, the presented material was altered to be more applicable and easier to use. The researcher was also able to learn appropriate presentation speed and ways of answering questions in conjunction with test regulations.

2.4. Participants

2.4.1. Selection Criteria

The following criteria were used to select adolescents for inclusion in the study:

Inclusion criteria

i. Each participant was required to be attending high-school, as the study's focus was upon this particular population, and focused upon abilities necessary within this context.

ii. The high-school attended by participants needed to have English as its primary medium of instruction (even if the participant was a second-language speaker, as this was one of the variables under consideration).

iii. Participants had to fall within one of the pre-selected grade groups, and had to fall between the ages of 13 and 19 years.

Exclusion criteria

i. Participants were excluded if they had any notable medical history, as relating to speech, language or hearing problems (for example, head injury).

ii. Participants could not be currently attending speech or language therapy and should not have done so in the past. If individuals experience speech or language difficulties, then it is entirely possible that they would not be good candidates for data collection on normative linguistic patterns/behaviours (Newcomer & Hammill, 1985; Peters & Guitar, 1991; Smith & Leinonen, 1992).

iii. Participants could not be hearing impaired. This criterion is crucial, as the pattern of communicative function development is different in individuals with hearing loss as opposed to those without (Grant Nicholas, 2000).

2.4.2. Selection Procedure and Permission for the Study

Permission for the study was initially obtained from the Committee for Research on Human Subjects (Non-Medical), Faculty of Humanities, University of the Witwatersrand [Protocol number: H050605]. Please see Appendix A.

A request was officially submitted to the Department of Education for permission to conduct research in government schools. Please see Appendix B for permission as granted by the Gauteng Department of Education.

School representatives were then contacted in order to ask permission to conduct research. It was decided that one high school would be used, as it was representative of a large sample (in excess of 1500 students attend this school) and incorporated many different kinds of learners (with regard to socio-economic status, home language, and so on). For permission, as granted by the school representative, please see Appendix C.

Letters containing information regarding the study, as well as a consent form, were given to each potential participant for them and their parents to read. Each participant filled in their name and signed and dated a list, whereby they were informed that they would be allowed to withdraw from the study at any point.

2.4.3. Description of Participants

A sample of 613 adolescents participated in the study. 149 participants' results were not used as they either filled in the questionnaire incompletely or incorrectly, or met exclusion criteria for the study. There were 264 females and 200 males, 347 of whom were first-language English speakers, and 117 of whom were second-language speakers of English. Individuals participating as second-language speakers of English reported their first languages on the questionnaire. There was great variety, which included the following languages: Afrikaans; Chinese; Flemish (Dutch); French; German; Greek; Lebanese; Mandarin; Northern Sotho; Polish; Portuguese; Sipedi (Pedi); Sotho (Sesotho); Southern Sotho; Spanish; Tswana (Setswana); Turkish; Venda; Xhosa; and Zulu. This is typical of language demographics of South African schools, particularly in Gauteng. In other words, this diversity is commonplace within today's society and educational settings.

The participants were also sub-divided into junior and senior phase groups for some of the analyses. This is because, as argued by Mitchell (1979; cited in Larson & McKinley, 1993), adolescence spans too much of an age range and encompasses too much development to be considered holistically. It should in fact be considered in stages. Mitchell (1979, cited in Larson & McKinley, 1993) suggests three groups. However, these three groups do overlap, both in terms of age and in terms of skill. Consequently, it is recommended that a definite distinction be made between early and late adolescence. It is emphasised that the differences between early and late adolescence are profound, and that professionals should treat these differences with reverence (Larson & McKinley, 1993). The junior split consisted of participants in grades 8 and 9, while the senior group contained individuals from grades 10, 11 and 12. Finally, although the original intention of the researcher was to include equal numbers of males and females as well as equal

numbers of first- and second-language English speakers, due to the demographics of the school, the numbers were not evenly balanced.

Nineteen classes from Grade 8 to Matric participated (Grade 8 = 5 classes; Grade 9 = 6 classes; Grade 10 = 1 class; Grade 11 = 6 classes; and Grade 12 = 1 class). A break-down of the participants, in terms of age, gender and junior/senior phase, can be seen in Table 1, Appendix H (page 96).

2.5. Data collection and research procedure

2.5.1. Instrumentation

In terms of instrumentation, two types of formal assessment were used, in addition to a questionnaire, which included both biographical and other personal information about participants. Each instrument is described/discussed below:

2.5.1.1 Test of Adolescent Language (TOAL) – Listening/Grammar subtest

The TOAL was created by Hammill, Brown, Larsen and Wiederholt (1980). It comprises eight subtests, of which only the Listening/Grammar one was used, as the information to be yielded was of interest in the current study. The sentences, along with the instructions are provided in Appendix D.

Listening/Grammar is the second subtest of the TOAL, and allows the participant a choice of three sentences to which they must attend/listen (Hammill, et al., 1980). Two of the sentences must be matched for similar meaning (Hammill, et al., 1980). This was done by providing each participant with an answer sheet with three choices for each question (i.e. A, B, and C) (Hammill, et al., 1980). The answer sheet used in this research can be seen in Appendix E. The students were instructed on how to answer the questions, according to the test's instructions and a practice item was given, also according to the test's guidelines (Hammill, et al., 1980). The sentences may be repeated once only, and if repetition is required, all three sentences must be repeated (Hammill, et al., 1980). The test was amenable to group administration, thus decreasing the amount of time necessary for data collection, and allowing for the collection of a wide range of data in the time allotted by the school. The sentences in the TOAL are said to be highly subordinated,

even though they are not exceptionally long (Scott & Stokes, 1995). This subtest is also said to require knowledge of a broad range of forms which characterise higher level academic discourse (Scott & Stokes, 1995). This is particularly relevant, as it will then be accessing specific skills related to academic language proficiency, which are required in the classroom environment. Previously, the concept of memory was mentioned in relation to complex sentence comprehension. This test covers that factor, in a way, because the individual must hold the sentences in working memory before deciding which of the three complex sentences are in fact similar (Scott & Stokes, 1995).

2.5.1.2. The Competing Language Processing Task

In addition to the above, The Competing Language Processing Task, as compiled by Gaulin and Campbell (1994) was used to further test verbal working memory and thereby rule out difficulty with this aspect versus difficulty with the language task itself. The test items and instructions are provided in Appendix F. It was predicted that the adolescents, being in an average high-school, would not have difficulties such as learning disorders and associated memory difficulties, but it was also felt that the memory test should be performed additionally as a fail-safe. This test was based on an adult working memory test developed by Daneman and Carpenter (1980, cited in Gaulin & Campbell, 1994). The test was developed for children up to twelve years of age, but was considered challenging enough for use with the proposed group of adolescents, as children of twelve years or younger were not found to obtain 100 percent. Related to this, Gaulin and Campbell (1994) reported that word recall ability increased up until the age of ten years. They say that simultaneous processing improves with age until a certain point. Also, the sentences contained three words (example: subject-verb-modifier) with simple vocabulary and unambiguous content (Gaulin & Campbell, 1994). This was further reason for its inclusion as an assessment procedure. The research was aiming to look at adolescent's ability to understand complex sentences, and this addition was merely to rule out memory as a factor. Individuals (for example second language English speakers, or any individuals who have difficulty with language subjects at school) who might show poorer language test results, would, in the presence of complex sentences in the memory task, show a deficit here as well, making working memory and language impossible to

differentiate. The test requires that the participants semantically analyse and verify the truth of certain sentences, whilst simultaneously holding the final word of each sentence in working memory for recall at the end of a group of sentences (Gaulin & Campbell, 1994). The groups become gradually longer, finally requiring participants to recall up to six words following their judgments of the accuracy of the statements (true/false answers) (Gaulin & Campbell 1994). Although the test is usually used verbally, it was used in group context and administered at the same time as the language task, making it necessary to use written responses for marking and scoring later. The response sheet can be found in Appendix E with the TOAL response grid. This is a potential weakness, as a test may be altered through changing response modality. However, the change was deemed necessary, as individual administration of the test within the time-period allotted by the school would not have been possible.

The test yields two scores. The first is the Percentage Correct, or the amount of true/false judgments correctly made, while the second is the Percentage Word Recall score, which is the percentage of words correctly remembered by the participant. The latter is also the measure used within the current research (Gaulin & Campbell, 1994). Gaulin and Campbell (1994) reported varied minimum and maximum achievement levels. They did not, however, provide levels which were deemed low enough to constitute a working memory deficit.

2.5.1.3. Case history/questionnaire forms

An example of this one-page questionnaire can be found in Appendix G. The biographical details included the individual's date of birth, grade, gender, first/home language, attendance at Speech Therapy, hearing status, and any significant medical conditions. These were merely for classificatory purposes for data analysis, and for inclusion/exclusion criteria.

In addition, participants were asked various questions about their daily habits, with regard to communication, literacy, and preferred processing style in the classroom. Some of the ideas in the form were gleaned from the researcher's personal experience and thoughts,

and some were based in the literature, as related to (e.g.) academic language proficiency, while others were contributed by various speech therapists and professionals working within the field who have also had contact with teachers. The factors included were mentioned in the Introduction section. Further detail pertaining to the selection of questions and the measurement of variables is provided here.

Factors which were deemed important in relation to complex sentence comprehension, school achievement and academic language proficiency are listed below, with the accompanying question, as it appeared on the form, and a brief discussion and rationale. The factors investigated are by no means exhaustive. The ones considered most pertinent to the current investigation were included.

For the purposes of the research and the completion of the aims and statistical analyses, data, as gained from the questionnaires (and the above-mentioned tests) was entered onto spreadsheets, either as raw values, or coded (where necessary). These values were then used for analyses and reported on in the easiest or most sensible way. The way in which data was gathered and used is discussed for each individual variable below.

- *Time spent reading for school each week.*

How much time do you spend reading for school every week? You can give an estimate in hours/minutes

This question was asked because, as mentioned previously, literacy is related to academic language proficiency and language skills. Although there has been said to be a link between language deficits and literacy (Bashir, Conte, & Heerde, 1998), this could also work in reverse, and this is based on Westby's (1994) contention that as children grow older, they read to learn. In other words, if the adolescents, as they were growing up, did not learn to read adequately, and did not begin to enjoy the experience of reading, they will probably not read extra material for pleasure (as the task is a chore). As a result, their language will become delayed, which again feeds into poor literacy skills. It could then be postulated that individuals who read more than just school-related literature, may do better in terms of academic language proficiency in comparison to their peers.

As can be seen from the phrasing of the question, individuals were invited to report on the amount of time in either hours or minutes, whichever they preferred or found easier. Upon analyzing the data, the researcher used minutes as the basic unit of measure. Therefore, where time was reported in hours and minutes, it was converted to minutes for ease of calculation (i.e. means and standard deviations made more sense in this format). The results are reported within this report in terms of minutes and have additionally been converted to hours in the tables and discussion.

- *Time spent reading recreationally each week.*

How much time do you spend reading over-and-above schoolwork every week? You can give an estimate in hours/minutes

It is noted that reading is a cornerstone skill, not necessary only for academic success, but for success and fulfillment in life generally (Gallik, 1999). Recreational reading has been found to positively affect reading comprehension, writing style, vocabulary, spelling and grammatical development (Gallik, 1999). The reasons provided above for inclusion of reading for school in the questionnaire may also be considered as related, and additional rationale for this question.

Again, individuals were given the option to report the amount of time spent per week in hours or minutes. Minutes were used as the basic measurement unit, and following analyses, were converted to hours within the tables and discussion pertaining to this factor.

- *Kinds of reading material preferred by participants*

What do you like to read?

An additional question, related to the above, was the kinds of reading material individuals might enjoy. This was not used for statistical analysis, but as a descriptive variable. Individuals were merely required to write down the sorts of things that they liked to read.

- *Number of television programmes watched per week*

How many television programmes do you watch every week?

Some speech-language professionals feel that cultures are changing from the use of a more auditory-based modality to a more visual-centered approach. In other words, younger generations are more dependent on the visual stimulation of (e.g.) the television to complement and supplement the auditory input, than perhaps their parents were. This question may also show that those individuals who read less watch more television or play more computer/television games.

Participants merely had to write down the number of television programmes they thought they were inclined to watch every week. This number was entered into the spreadsheets, as reported. Each class, upon completion of the form, was advised that different episodes of various serials and programmes had to be counted separately, as did films/movies.

- *Length of time spent playing computer and video games each week.*

How long do you spend playing computer games or video games every day?

The rationale for the inclusion of this variable is similar to the above factor. Again, individuals reported on the amount of time in either hours or minutes, these were converted to minutes for analysis, and back to hours for the reporting of the variable.

- *Preferred learning style - auditory, visual, both*
  - group or individual

How do you learn best at school? Do you prefer to listen and take notes, or do you prefer to have the work on the board or overhead and copy it down?

Do you prefer to work in groups at school or on your own?

The preference for auditory or visual modality learning will, in part, be related to the prior questions. Additionally, an important facet of education in South Africa has been the introduction of Outcomes Based Education (OBE) (Olivier, 1999). It would be valuable to discern any possible links between the changing curriculum and other experiences, be these to do with literacy, preferred learning style, or school achievement. However, specific questions related to OBE are not included in the questionnaire and any kind of "link" may be pure postulation

To extend on these points, the participants were asked whether they prefer their teachers to present work visually or to teach it verbally while they take notes. The questions are

then tapping both the individual's preferred learning style and whether this is related to the newer educational system (i.e. are children who prefer the interactive portions of the teaching more inclined to have better/poorer literacy). It is thought that these questions might show some relationship. Overall, however, only participant's general responses to OBE will be considered. Individual learning styles and strategies have been linked to performance and language learning, especially in second-language learners (Lewelling, 1991). It has been proposed that peer interaction learning may be superior to other methods (Durkin, 1986).

Both of these variables were coded with numbers (0=auditory, 1=visual, 2=both; and 0=group learning, 1=individual learning), entered onto the spreadsheet, and statistical results interpreted accordingly.

- *Favourite school subjects*

What are your favourite subjects at school?

Participants were asked about their "favourite" subjects at school, in order to discern whether there were any relationships between the kinds of subjects individuals were partial to, and the kinds of marks they were receiving. Also, it was postulated that there might be a relationship between these and the results on the comprehension subtest.

These were coded according to the individual preferring language subjects, math, or other subjects.

- *Previous/most recent English mark*

What was your last English mark? (you can just give a symbol: A, B, C, D, etc)

As complex sentence comprehension has been demonstrated to be related to academic achievement, it was considered necessary to determine if results on the TOAL subtest were in fact related to these marks. Also, these questions could then be correlated with other factors investigated in order to determine their influence or their tendency to be influenced.

The symbols reported on by the participants were coded according to numbers, placed in the spreadsheets, and the results interpreted with this coding in mind.

- *Previous/most recent school report average*

What is your school report average? (again, just a symbol)

This question had a similar rationale to the above question. Both were included, along with the question concerning "favourite" school subjects in order to discern any links between performance on the comprehension test and the kinds of subjects that individuals enjoy (for example, the participant performs poorly on the comprehension test and English or school report average, but this is correlated with technical or math-related subjects being preferred to language subjects).

- *Presence of cellular telephone*

  Do you have a cell-phone? YES/NO

  This question was merely to determine whether the participant had a cell phone and was coded 0 or 1, depending on whether the answer was yes/no. Obviously, if the response was negative, the rest of the questions did not apply and were not, therefore completed by participants.

- *Major use of cellular telephone and the short message signal (sms) function*

If you do have a cell-phone, do you tend to make phone calls or communicate via sms the most?

How many sms's do you think you send per day?

One professional, on presentation of the proposal for this research, queried whether cell-phones might affect sentence comprehension skills or decrease academic language proficiency skills in any way. As a result, this factor was included in the questionnaire. The intent was to determine whether adolescents have cell-phones and to what extent they utilise the short-message-signal (sms) function. It was postulated that perhaps impaired complex sentence comprehension could be related to the short messages and reduced grammar usually involved in sending sms's. It was argued that perhaps advanced knowledge of grammar was necessary for the reduction of a message into sms format (and expansion of meaning once it is received). However, a valid point was also made at this meeting: if sms's are being used from an age before which complex sentence

comprehension and expression is expected to be fully formed, then this is a possible contributor to poor sentence comprehension and grammar development in this population. In terms of measurement, the predominant mode of communication was coded 0 or 1, dependent on whether the individual made phone calls or sent sms's the most, and the number of sms's was recorded on the spreadsheet according to the number reported on by the participants.

2.5.2. *Testing and procedure*

The school allowed the researcher access to Life Orientation periods for a fixed duration, with certain teachers. A timetable was drawn up to take advantage of a maximum number of classes. The researcher was introduced to each assigned class, at which point, the general purpose of testing and what would be required, was explained. Each class was given some time to begin completing the questionnaire, and following this, they were read the instructions for the Listening/Grammar subtest of the TOAL (Hammill et al., 1994). These standard instructions can be found in Appendix D, along with the test items. The practice item was then completed verbally with the class and any questions regarding the testing procedure clarified (questions were generally similar in all classes, and usually merely required repetition of some portion of the instructions). The researcher conducted all testing for consistency. The question item sentences were read and the class either asked for an item (all three sentences, as per test rules) to be repeated, or the researcher moved on to the next item. The second test (Competing Language Processing Task for working memory - Gaulin & Campbell, 1994) was performed directly after the first, due to time restrictions of the lessons assigned for conducting the testing. The directions were read for the second test, an example item was done with the class, and then questions clarified (similar to above). Standard instructions and practice items can be found in Appendix F. Common questions tended to include the clarification of whether all words should be written and whether the true/false blocks could be high-lighted instead of crossed. Once the test was completed, the class was asked to finish filling in the questionnaire if they had not already been able to do so. At this point, the bell signaling the move to the next class (for both the students and the researcher) usually rung. Forms were collected, and participants were thanked for their co-operation.

In the weeks following the actual data collection, the researcher was able to score the tests in preparation for data analysis.

2.6. Data analysis

Each test was scored according to the method prescribed by its authors. The TOAL subtest yielded raw and scaled scores, while the working memory test gave percentage correct on the true/false portion and percentage word recall. The questionnaire information was coded and placed into spreadsheets, along with the test information, and various Analysis of Variances were run. Additionally, correlations, t-tests, and chi squared tests were performed on the data where it was deemed appropriate. The data was analysed according to the aims, in order to ensure that the main questions underlying the investigation could be addressed. As a result, the following is the broad structure of data analyses (aims are summarized):

2.6.1. *Aim 1*. The main aim of the study was to explore the complex sentence comprehension abilities in different groups of adolescents, according to grade, gender and language. A sub-aim here was to determine any relationship/s between the complex sentence comprehension score and the other variables investigated within the study.

- A three-way Analysis of Variance (ANOVA) (Howell, 2002) was completed for the major interaction effects (grade, gender and language status).
- Correlations and t-tests (Howell, 2002) were performed in order to identify significant relationships between the complex comprehension score and other variables considered.

2.6.2. *Aim 2*. To determine the effect, if any, of working memory on the complex sentence comprehension test score.

- A correlation (Howell, 2002) between the comprehension subtest and working memory scores was performed in order to achieve the above aim.

The sub-aim was to establish any links between the results on the working memory test and the other variables considered in the study.

- Three-way ANOVA's, correlations and t-tests were utilised in order to achieve the sub-aim in this instance.

2.6.3. *Aim 3*. Additionally, it was hypothesised that other factors examined in the questionnaire might be affected by either grade, gender or language.

- Three-way ANOVA's (Howell, 2002) were run for each of the factors in order to determine if grade, gender or language had any significant main or interaction effects upon any of these variables.

2.6.4. *Aim 4*. The final aim was to correlate all variables in order to determine any relationships which might account for findings.

- Consequently, correlations, 1-way ANOVA's, t-tests and chi-squared tests (Howell, 2002) were utilised in order to uncover any significant relationships.

2.6.5. Descriptive statistics (means, ranges, standard deviations and sample sizes) were calculated for each of the factors considered in the aims and provided in tables. These are referred to within the relevant sections.

2.6.6. For all of the analyses, tables are referred to or provided within the body. Where sample size differs, it is merely because some individuals did not answer some questions. In any one case, the sample size is not significantly decreased due to "no responses", however, sample sizes are provided in each instance for the information of the reader. Also, it should be noted that all values have been rounded to two decimal places.

2.6.7. All analyses were completed using the The SAS System (SAS, 2004).

3. RESULTS AND DISCUSSION

This section consists initially of the overall results obtained upon the two major tests utilised within this study. Thereafter, specific results are reported on in accordance with the aims.

Generally, participants were noted to score within the average ranges of the TOAL Listening/Grammar subtest. Although there were some outliers, results mainly fell within normal limits, as established by the test. The ranges of scaled scores, as used by Hammill et al. (1980), as well as within the current study, which determine whether individuals fall within average, above average, or below average ranges are outlined here:

- 18-20 = superior
- 14-17 = above average
- 7-13 = average
- 3-6 = below average
- 0-2 = poor

10 (2.16%) of the participants achieved in the poor range; 94 (20.26%) obtained below average scores; 322 (69.4%) were average, according to the subtest; 38 (8.19%) were deemed above average; and no participant fell within the superior range. These figures show that approximately 78% of the participants achieved at least average scores on the complex sentence comprehension assessment.

In terms of the Competing Language Processing Task for working memory assessment, percentage recall scores appeared to be relatively high and were not considered to affect the results. 5 (1.08%) individuals obtained less than 50%; 14 (3.02%) fell between 50-60%; 58 (12.5%) learners scored between 61-70%; 95 (20.47%) of the sample achieved scores between 71-79%; 124 (26.72%) individuals had scores between 80-89%; and 168 (36.21%) of the participants demonstrated scores of 90-100%. As no normative data were supplied regarding poor performance on the test, or failure criteria, it was decided that the maximum scores for the older groups in the Gaulin and Campbell (1994) study would be used as rough guidelines. The two oldest groups were not said to differ statistically

significantly, and Gaulin and Campbell (1994) postulated that perhaps memory skills begin to plateau as individuals become older. 387 (83.41%), or the majority, of the participants in this study achieved greater than 71% on the Competing Language Processing Task, and only 5 individuals obtained less than 50%. Increased ability to allocate resources may occur with age (Gaulin & Campbell, 1994), thus accounting for the high scores obtained. Also, these results may be seen as positive, showing that working memory was not a major difficulty, interfering with complex sentence comprehension.

3.1. Complex sentence comprehension results according to grade, gender and language status.

When looking at the effect of grade, gender, and language on the dependent variable of language score, only the main effect of gender was significant [$F(1;463) = 7.39$; $P < 0.01$]. The female participants tended to out-perform the male participants. The TOAL subtest of Listening/Grammar provides both raw and scaled scores. For the purposes of this interpretation, and the ones which follow, scaled scores were used in the calculations. Table 2, as seen on page 41, provides the scaled scores for each group of participants. Overall, females had an average scaled score of 9.74 (n=264), and males an average score of 8.36 (n=200). Also, the female scores appear to fall within similar ranges to the males, although they often have higher minimum and maximum range scores. Although the difference was proven to be significant, both male and female scores fall within the "average" range of the test interpretation.

Table 2 contains the means, ranges, and standard deviations for the test, followed by the sample sizes. Sample size was full for each group, as each participant completed all testing. Scaled scores are used and are interpreted according to Hammill et al (1994). In other words, the ranges and accompanying labels (poor, below average, average and above average) are utilised.

Table 2: Scaled scores on the Listening/Grammar subtest of the TOAL by Grade, Gender and Language

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	8.32 range=1-14 S.D.=2.78 n=85	9.45 range=2-16 S.D.=2.84 n=113	8.55 range=3-14 S.D.=2.36 n=65	10.68 range=4-16 S.D.=2.88 n=84
Second lang.	7.75 range=1-15 S.D.=3.61 n=28	8.46 range=1-14 S.D.=3.15 n=41	8.68 range=2-14 S.D.=2.64 n=22	9.96 range=4-16 S.D.=3.47 n=26
Overall	8.18 range=1-15 S.D.=3 n=113	9.19 range=1-16 S.D.=2.95 n=154	8.59 range=2-14 S.D.=2.42 n=87	10.51 range=4-16 S.D.=3.03 n=110

Males and females are expected to differ in the scores that they receive in terms of academic aptitude (Murphy & Davidshofer, 2001). Schutte (1998) mentions that through the converging evidence of the fields of cognition, neuropsycholgy and neuroanatomy, it has been noted that gender differences do in fact occur in terms of cognitive competence, hemispheric specialization and interhemispheric relationships. Generally, females tend to have better verbal abilities, and males better visual-spatial abilities (Halpern, 1992; Tartre, 1990). This is not to say that girls or boys are restricted in their abilities, but these are noted as general trends within groups of females and males (Halpern, 1992). Similarly, it is additionally reported that boys are usually superior in skills involving visuospatial skills and mathematics, while females perform better in tasks requiring verbal fluency, perceptual speed and manual dexterity (Schutte, 1998; Westen, 1999). These kinds of gender differences have been documented in many countries and, although there has been a big move toward equality of the sexes, the differences have not reportedly decreased with time (Westen, 1999). This phenomenon has therefore led researchers to debate whether the discrepancies in performance might be partially based on differences in the brains of males and females (Westen, 1999). In other words, it is basic genetic make-up which predisposes individuals to be better at certain tasks, rather than social bias. Another effect can be cultural, as noted by Westen (1999). It has been argued that females may have less hemispheric specialisation than males for language and spatial

processing (McKeever, 1987). In order to optimise both language and spatial functions, it would be necessary to have the former lateralised to the left hemisphere, and the latter to the right hemisphere (McKeever, 1987). However, it is hypothesised that while some aspects of language may be mediated by the right hemisphere in bilateralised language functions, thus augmenting language skills, the opposite, in terms of spatial skills is not true (McKeever, 1987). Apparently, the right hemisphere can assist with some language functions, but the left is far less capable of assisting with right hemisphere functions (McKeever, 1987). In addition to these arguments though, "the hypothesis of greater female bilaterality of language processing is perhaps deduced from the already established pattern of differences between the sexes" (McKeever, 1987, p. 268). Therefore, based on these fairly circular findings and arguments, it may be sufficient for the purposes of this investigation to acknowledge a gender difference, recognise that similar patterns have been previously identified, and to look at this in relation to other variables under scrutiny. Certainly, McKeever (1987) believes that there are no simple gender differences in cerebral organisation, although differences do exist.

How males versus females are treated or encouraged, within their home culture, may be partially responsible for areas of strength, and by extension, the discrepancies in male/female performance (Westen, 1999). Another reason for so many gender differences as outlined by Murphy and Davidshofer (2001) in their discussion of the Strong Interest Inventory, is that males and females may simply have different areas of interest overall. They do caution that this is not a sweeping generalization, but a possible general trend. It is this general trend which one might hypothesise accounts for statistically significant differences in results on (example) test scores in various domains.

Based on the above, the test of language comprehension involved in this study would therefore, by its nature, have predisposed females to perform superiorly. If females have a natural aptitude for language-related tasks, then they would be expected to perform well. However, this has consequence in other areas of scholastic achievement. As mentioned in the literature review, most school subjects require the understanding and manipulation of complex language. If females are outperforming males in this area, then they should be

receiving higher marks in many subjects, especially those which utilise (complex) language as a major teaching tool (and assessment method). As can be seen in the subsequent portions of this section, females do in fact do statistically significantly better in terms of English mark averages and school report averages than do the males. This creates a potential difficulty for males generally, as the general method of academic assessment is through language rather than any other skill. This sort of trend is consistently reported on, even within popular media, such as newspapers (example, The Star, Jasson Da Costa, 2005). A survey of 34 000 grade six pupils for the Education Department showed that girls were doing better in terms of languages and natural sciences (Jasson Da Costa, 2005).

Although no other significant differences were found, it is interesting, and perhaps pertinent to note other trends within the data. Junior phase females obtained a mean score of 9.19 (n=154) in comparison to the junior phase males, who obtained 8.18 (n=113). A similar pattern is evident for the senior phase females and males. The former demonstrated a mean score of 10.51 (n=110), and the latter a mean score of 8.59, which although markedly different, still fall within the "average" range as suggested by the test. This shows that the difference determined above between males and females overall holds within junior and senior phase groups. It does not seem to matter what educational stage the participants are at, females obtained consistently higher scores, although all scores were found to be within the average range. Overall, the senior phase students were noted to obtain a higher average result than the juniors, by roughly one point. However, again, both scores are "average" according to Hammill et al (1980).

Again, when looking at the differences between first- and second-language English speakers, second-language English speaking participants tended to score, on average, one point below the first-language English participants (apart from senior phase males). Although the difference was not determined to be statistically significant, and the scores all fall within the average range, this is still cause for comment. The fact is that second-language English speakers within this sample appear to be achieving well (i.e. within the same average range as their peers). However, their scores are consistently lower,

indicating that they have not quite reached the proficiency of their peers. The effect of being schooled in a second (or perhaps third) language is still evidencing an effect. This might be related to the earlier discussion that, even after a certain amount of time and exposure to the second language, exact catch-up and equality with peers in proficiency is not always seen (Lewelling, 1991).

3.2. Relationship between complex sentence comprehension scores and other variables investigated within the study

The methods used to determine the significance (or insignificance) of relationships within this sub-section included correlations and t-tests.

The participants' performance on the TOAL subtest was the major focus of the study. It should therefore be noted that the relationships between the TOAL score and time spent reading for school, number of television programmes watched per week, and the amount of sms's sent per day, were minimal or insignificant.

The complex sentence comprehension score was, however, found to be significantly related to certain factors. These relationships are discussed below.

Amount of time spent on recreational reading and *the TOAL subtest language comprehension score* ($r = 0.165$; $P < 0.01$). A weak positive correlation was found between these two variables, indicating that perhaps additional input in terms of literacy (and ultimately, by extension, language), over-and-above what is required for school, may be expanding these individual's skills and abilities, especially when it comes to performance on language tests. As related to the literature review, then, it was said that better language skills may facilitate literacy and reading comprehension. Extra reading can then, as a result, be used in order to expand language. More individual reading can then be easily related to better complex sentence comprehension skills. Conversely, individuals who performed better on the comprehension test might have better overall language and/or comprehension skills, which may link to the decision to indulge in more recreational reading. Indeed, it is said that stronger oral performance in a language

(assuming expression and comprehension) leads to better reading and writing skills (Merrifield, 1998).

Amount of time spent playing video/computer games and *the TOAL listening comprehension score* ($r = -0.199$; $P < .0001$). A weak negative correlation was found between these two factors. In other words, increased time playing games correlates with weaker/lower TOAL scores. It could be hypothesised that individuals who are more exposed to computer or video games are not interacting with others during these times and are therefore not refining their language or interaction skills. As a result, it might be expected that these individuals perform more poorly in language comprehension because they have less exposure to or practice with language and comprehension during regular interactions.

Most recent English mark and *the TOAL listening comprehension score* ($r = 0.28$; $P < .0001$). A moderate positive correlation was found between these two variables, which might be intuitive. Individuals who have greater academic linguistic performance and, presumably, skill, will perform better in terms of complex sentence comprehension. Also, it might be assumed that individuals who performed better on the task of complex sentence comprehension would do better in academic language work. This is the premise on which the current study is based. Individuals with better or more well-developed academic linguistic proficiency will do better within the high school classroom which utilises complex language to communicate points and information (Westby, 1994; Wiig, 1995). The correlation between most recent English mark and the TOAL subtest score also confirms the validity of having used the TOAL Listening/Grammar subtest in assessing academic language proficiency.

Most recent school report mark and *the TOAL listening comprehension score* ($r = 0.27$; $P < .0001$). Again, this weak to moderate positive correlation suggests that individuals who are achieving well (or better) academically, are likely to have higher complex sentence comprehension scores. This could be related to the premise that in order to do well academically in high school, one needs to have good academic linguistic proficiency in

order to process and utilise complex taught material. According to this correlation, individuals who score better on the comprehension test are doing better academically, as evidenced by their school report marks. Conversely, better school report averages seem to be linked to better performance on the complex sentence comprehension test. In other words, individuals with greater academic linguistic proficiency are likely to do better in school because they are well able to make use of the information taught in class through their ability to comprehend the complex language with which the material is often presented. This is seen to further confirm the validity of the use of the TOAL Listening/Grammar subtest.

Learning style and *standard scores on the TOAL subtest* [t-value = - 3.15, $P < 0.01$]. There is a significant relationship between learning style and the Listening/Grammar subtest of the TOAL. Group-style learners had a mean of 8.73 and individual-style learners had a mean of 9.63. Therefore, although both groups fell within the average range of the test, individuals who prefer to learn on their own are likely to do much/significantly better. This could again be linked to the fact that people who prefer to function alone will probably do better in assessments or situations where their sole input is required. In other words, if solo work is the individual's preferred style, then little adaptation to the requirements of an assessment situation is necessary, allowing the person to perform optimally.

3.3. The effect of working memory on the complex sentence comprehension test score

The data pertaining to percentage word recall on the Competing Processing Task for working memory can be found in Table 3, on page 48.

A correlation between the TOAL listening comprehension score and the percentage recall on the working memory assessment was performed. This result may be found on Table 17, Appendix H (page 106), with the other correlation results. It showed that there is a weak-moderate positive correlation between these two factors ($r = 0.243$; $P < .0001$), indicating that the higher or better the complex sentence comprehension score, the higher

the percentage recall score, and vice-versa. It is possible that better working memory accounts for the individual's ability to hold the three sentences from the TOAL subtest far easier, making the matching of two of the sentences easier as well. This correlation is entirely expected, as it has been found that there is an association between working memory and language task performance (Gaulin & Campbell, 1994). Indeed, it is postulated that different individuals may have differing working memory capacities, or that different individuals may possess differing amounts of skill in their manipulation of working memory capacity in order to perform complex language tasks such as the above comprehension one (Greene, 1987). King and Just (1991) hypothesise that working memory capacity does not only store intermediate and partial products, but that it also possesses a flexibly deployable pool of operational resources which are necessary for the performance of symbolic computations. They further go on to conclude that the differences in working memory capacity observed from one person to the next may be the result of a difference in the pool size, varied efficiency in the symbolic computation processes, or both of these.

Table 3: Percentage word recall - Competing Language Processing Task for working memory
(Gaulin & Campbell, 1994)

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	82.73 range=28.57-100 S.D.=13.41 n=85	84.99 range=52.38-100 S.D.=10.76 n=113	81.87 range=50-100 S.D.=10.84 n=65	86.53 range=28.57-100 S.D.=12.89 N=84
Second lang.	80.78 range=26.19-100 S.D.=15.98 n=28	78.05 range=52.38-100 S.D.=12.95 n=41	73.81 range=47.62-92.86 S.D.=14.23 n=22	78.66 range=61.90-100 S.D.=9.41 N=26
Overall	82.25 range=26.19-100 S.D.=14.04 n=113	83.14 range=52.38-100 S.D.=11.75 n=154	79.83 range=47.62-100 S.D.=12.22 n=87	84.67 range=28.57-100 S.D.=12.57 N=110

The percentage of words recalled is meant to provide an indication of the efficiency of the allocation of limited processing resources (Gaulin & Campbell, 1994). Individuals were not, overall, found to perform particularly poorly on the working memory test and generally achieved scores above 70%. Although junior males tended to have a wide range, with some particularly low scores, these scores appear to have been outliers which did not have an overall detrimental affect on the data. Their scores were ultimately included in the analyses as a range of skills will be a truer reflection of the overall functioning of a selected group. In the original creation of the test, on younger individuals, the authors did not find significant differences between the older age-groups that they compared. In a similar trend, no significant differences were found in the two grade groups compared within the current study (this is discussed in the following section).

Conversely to the above discussion, comprehension might affect working memory. This is a factor which needs to be considered, as the statistical procedure performed was a correlation. Correlations do not determine directionality of a relationship, but rather determine that a relationship exists (Howell, 2002). If working memory does indeed have limited capacity, or is affected by the individual's skill in utilizing it (Greene, 1987), then it may be affected by comprehension. Consider an individual who has poor language comprehension abilities: a great deal of effort will be focused on decoding the sentence/s, requiring that these are possibly held for longer within working memory in order that they may be decoded. This would ultimately either effectively reduce working memory capacity, or would cause the sentences (for example in this task) to be incorrectly decoded or matched as working memory will not be able to hold the information indefinitely.

King and Just (1991) provide several reasons for the relationship between sentence processing and working memory. A linear sequence of words is transformed into an hierarchical or non-linear syntactic structure during processing (King & Just, 1991). This requires temporary storage (King & Just, 1991). Linguistic parsing models have used working memory capacity limitations to account for preferences for interpretations in temporally ambiguous sentences (King & Just, 1991). Ultimately, though, the point is the

same: “individual differences in effective working memory capacity can cause systematic differences in the processing of complex syntactic structures” (King & Just, 1991, p. 596). Also, the complexity of the processing to be performed may have an effect on the individual’s working memory, in the assignment of resources. Therefore the above correlation, which showed a link between working memory and complex sentence comprehension is confirmed by other literature in the field and further serves as a good cross-check in the current investigation.

3.4. Links between working memory scores and other variables considered in the study.

These significant and insignificant relationships were determined through the use of t-tests, three-way ANOVA’s, and correlations.

The *percentage word recall* result was found to be unrelated to *Learning style* [t-value = 0.80, P = 0.4236]. There is therefore no relationship between these two variables. Individuals of one learning style or another are not inclined to have poorer recall.

Percentage word recall, as related to grade and/or gender and/or language

Data concerning this variable may be found in Table 3, on page 48. Although no statistically significant differences were found, the clearest pattern within the scores for percentage word recall show that second-language English speakers performed more poorly on the working memory task than first-language English speakers. This could potentially be related to processing burden. In other words, second-language English speakers may be using additional resources for interpretation and understanding of the language aspect, allowing less possible allocation of resources for use of working memory and therefore, in the quest to process the language itself, the content and memory thereof may be affected. As Cummins (1991b) points out, processing of second-language is less automated than first-language processing. Generally, also, females tended to do better than males in this respect.

Most recent English mark and *percentage recall on the working memory assessment* ($r = 0.135$; $P < 0.01$). A weak positive correlation between these factors suggests individuals with better academic language abilities (as determined through academic testing and results) will also have better working memory ability, and vice versa. Those with better working memory capacity may perform better within the academic language arena.

Most recent school report mark and *percentage recall on the working memory assessment* ($r = 0.186$; $P < .0001$). This weak positive correlation is similar to the correlation of memory with English mark. Working memory is likely to be better in the presence of a better school report average and vice-versa. Better working memory, or increased ability to allocate working memory resources (King & Just, 1991) may enable the individual to process information more accurately and deeply, ensuring more effective learning, and in all likelihood, better academic performance.

The number of sms's sent per day and *the percentage recall on the working memory assessment* ($r = 0.261$; $P < .0001$). There is a weak positive correlation between these two factors. It is possible that individuals who send greater quantities of sms's have better working memory, as the sms requires the individual to respond to previous messages, and hold the current response in mind whilst it is typed in. Also, the number of characters which can be sent in one sms is limited, possibly forcing the individual to edit a message which is too long. This process requires the individual to adjust the message, while still conveying the intended meaning. The shortened message should then be compared to the intended meaning, held in working memory, before it is sent. Possibly, sms's sent are also dependent on working memory capacity. Individuals with poorer working memory might send less sms's due to greater effort involved. However, caution is advised when considering these factors, as other influences might be present, such as finance (for example, some sms- sending is limited by a pay-as-you-go system, implemented by parents to control phone bills).

3.5. Effects of grade and/or gender and/or language on other factors.

Grade was chosen instead of age because, as is pointed out by Schutte (1998), a correlation between age and educational standard cannot be assumed. Often, individuals have failed grades or are in a higher grade than would be commonly predicted by age because (for example) they began school early (Schutte, 1998). Schutte (1998) also found, in her study, that neuropsychological test scaled scores were significantly related to grade, rather than to age. Consequently, it makes sense to look at grade level as related to performance, rather than age-level. Performance may be correlated with successful completion of various levels of education, rather than with age. Murphy and Davidshofer (2001) state that grade-related norms are popular when reporting the results of school children, and Nippold, Schwarz, and Undlin (1992) further say that, in adolescence, language changes occur more slowly than in early childhood, making changes or differences in (example) language obvious only when nonadjacent age groups are compared (for example 13-year-olds versus 16 year-olds). This latter point would indicate that comparisons of grade are further justified when looking at subtle differences which may be expected in complex sentence comprehension abilities.

Three-way ANOVA's were run for each of the factors in order to determine if grade, gender or language had any significant main or interaction effects upon any of these variables. Insignificant statistical effects were found for percentage word recall and recreational reading time and these two variables are therefore only discussed briefly. However, significant effects were found for the other variables, and these are discussed below, according to factors investigated on the questionnaire, and in the same order. Additionally, it should be noted that the statistically significant results are discussed initially in each section, followed by comments on any trends within the data.

3.5.1. *Time spent reading for school each week*

When looking at the effect of grade, gender and language on the dependent variable of how much reading individuals do for school each week, only the main effect of gender was significant [$F(1;450) = 4.35$; $P < 0.05$]. Data concerning this variable can be found in Table 4, Appendix H (page 97). Female participants spend more time reading in aid of

school-work each week than their male counterparts. Their average is 337.60 minutes, or 5.63 hours, per week (n=254). In contrast, males tend to spend an average of 205.06 minutes (3.42 hours) per week. Although the outcome is for recreational reading, it has been shown that girls read more than boys, consistently, at every age (Gallik, 1999). This is consistent with the observations (made below) for recreational reading, but could also tie in with reading for school. If females are inclined, generally, to read more, then it might follow that time spent reading for school is greater for females than males. Reading might be classed a more language-related task, tying in with female aptitude in language arenas.

It should be noted that although the researcher clarified with each class that the time spent reading for school should include only after-school or homework time, the high ranges of time reported may actually include reading done during the school day. In these situations, the individuals concerned perhaps did not understand the requirement. Conversely, some participants reported doing absolutely no reading or zero minutes, which cannot be true in every instance.

Junior phase girls read on average 4.49 hours (n=153) a week for school and the boys 3.05 hours (n=111) a week. The senior phase girls average 6.67 hours (n=101) of school-related reading per week, while the boys average 3.89 hours (n=86). Interestingly, second-language speakers appear to read more than first-language English speakers. This could be hypothesised as an attempt to cope with the linguistic demands in the classroom, or could merely be due to difficulty in reading in an unfamiliar language, which would therefore take longer. Also interesting to note, the senior phase reading time, for all groups (first- and second-language males and females), is greater than the time spent by individuals in the junior phase. This might be due to a greater linguistic and general school-work load in the later grades, as discussed previously in the literature review. These last points are comments only, as grade and language were not significantly related to school reading time.

3.5.2. *Time spent reading recreationally each week*

Table 5 in Appendix H (page 98) shows the figures related to this variable. It seems that there is a trend consistent with other results identified, although no statistically significant results were gleaned from the ANOVA. It appears, through observation of the values/results, that females are reading more than males. As mentioned above, females are generally more inclined to read than males (Gallik, 1999). Types of reading material reportedly read recreationally by female participants included teenage dramas; magazines (e.g. Saltwater girl, Bike SA/Quad SA); fiction; comedy books; science fiction, fantasy (e.g. Harry Potter); non-fiction; romance; fairy tales; comics; thrillers; newspapers; horrors (e.g. Stephen King); Bible; Christian books; spirituality books; biographies; poems; short stories; autobiographies; self-help books; medical books and mystery.

Male participants reported reading fiction; magazines; comedy; science fiction; fantasy; adventure; comics; newspapers; science articles; Quŕaan; horrors; history books; action; thrillers; biographies; sport books; inspirational books; money-making books; motivational books; and short stories.

Additionally, senior phase individuals are reportedly reading more for recreational purposes than their junior counterparts. Gallik (1999) reports that the amount of time individuals spend reading for pleasure tends to decline in middle-school years. This is perhaps linked with the junior phase individuals doing less reading than their senior comparison group. Within the current study though, it is noted that the amount of time increases in the senior phase. Finally, second-language English speakers appear to be spending far more time reading for recreation than first-language English speakers.

3.5.3. *Number of television programmes watched each week*

Data for this variable can be found in Table 6, Appendix H (page 99). The effect of grade, gender, and language on the dependent variable of number of television programmes watched per week by participants yielded a first order interaction effect of language and gender [$F(1;448) = 5.23$; $P < 0.05$]. The data for this first order interaction can be found on page 55 in Table 7.

Table 7: Number of television programmes watched per week

(first- and second-language English male and female participants)

	First-language English	Second-language English
Male	18.74 range=0-237 S.D.=24.74 n=148	17.09 range=0-60 S.D.=14.09 n=47
Female	14.53 range=1-100 S.D.=14.95 n=191	33.39 range=1-330 S.D.=62.28 n=62

It can be seen from the above table, which provides means, ranges, standard deviations and sample sizes, that the individuals who are most likely to watch a greater number of television programmes are second-language English-speaking females. The average is 33.39 programmes per week. In contrast, other groups appear to watch significantly less, with first-language English males having the next largest mean of 18.74 programmes. Second-language males had a mean of 17.09 programmes, while first-language females showed the lowest (14.53 programmes) per week. It has been found that television-watching time has decreased in recent years, and that the amount of television watched is not linked, in any way, to the amount of reading done by learners (Gallik, 1999). This is consistent with the results of the current investigation.

3.5.4. *Time spent playing computer or video games each day*

Table 8, Appendix H (page 100), shows details for this factor. Two main effects were also noted when considering the effects of grade, gender and language on the dependent variable of amount of time spent playing video or computer games per day. These were grade [$F(1;450) = 4.56$; $P < 0.05$] and gender [$F(1;450) = 32.84$; $P < .0001$]. Table 9, on page 56 shows the main effect of gender.

Table 9: Time spent playing video or computer games daily, junior versus senior

Junior	Senior
60.99 (1.02 hrs) range=0-360 (0-6 hrs) S.D.=77.22 n=260	44.58 (0.74 hrs) range=0-600 (0-10 hrs) S.D.=80.39 n=190

Data showing mean, range and standard deviation (in minutes), as well as sample size. Means and ranges are converted to hours in brackets

It can be noted from the data in Table 9 that younger individuals are reportedly playing more video or computer games on a daily basis. They are playing 16.41 minutes more per day, amounting to almost two hours more than their senior counterparts, per week. Mere postulation suggests that this difference may lie in the possibility that the younger individuals receive less homework each day which frees up larger quantities of time for such recreational pursuits. Some of the estimates of time, up at the top of the ranges translate to ten hours a day. While this is not possible, as the participants go to school and would not have a spare ten hours per day, many of the learners (particularly males) asked if they might estimate the time over the week by including the time spent over weekends, as well as over holidays. Many were noted by the researcher to take out calculators and work out exactly how much time they were averaging, per day, given that they spent differing amounts of time, dependent on the time of week or year.

In terms of the main effect of gender, as can be seen in Table 10, page 57, males predominantly spend a great deal more of their time playing computer or video games each day. Males spend, on average, 88.68 minutes per day, in contrast to females who appear to spend approximately 27.72 minutes per day. Over a week, then, males may spend up to 426.72 minutes (just over seven hours) longer in this pursuit than their female classmates.

Table 10: Time spent playing computer/video games each day, males versus females

Male	Female
88.68 (1.48 hrs) range=0-600 S.D.=94.53 n=195	27.72 (0.46 hrs) range=0-360 S.D.=50.50 n=256

Values are given in minutes, and means, ranges, standard deviations and sample sizes are provided. Means are converted to hours in brackets.

This holds with previously identified trends, which have shown that boys can spend twice as much time playing video games as girls (MediaLiteracy, 2004), because games are predominantly marketed for boys rather than girls (Media Scope, 2005). In the U.S.A, video games are the fourth most dominant media, displacing print media for young adult and adolescent males (MediaLiteracy, 2004). This would tie with other results found here, which have shown that adolescent females are more likely to read for school and recreationally than their male counterparts (who indulge more in computer and video games).

Although this was not an interaction effect, it can be seen that junior phase males (both first- and second-language) are spending more time on computer and video games per week than senior phase males. The same trend is apparent for the female groups.

3.5.5. *Learning style 1 (auditory, visual, both)*

The main effect of gender was again the only significant effect when observing the effects of grade, gender and language on the dependent variable of learning style, i.e. auditory, visual, or both modalities [$F(1;456) = 4.88$; $P < 0.05$]. Table 11 in Appendix H (page 101) shows data for Learning style 1. In terms of preference for the auditory presentation of work, 48.45% of males and 42.21% of females preferred this. In contrast, almost equal numbers of males and females prefer the visual presentation of work (male=47.42; female=47.53). Finally, female participants seemed to prefer dual modalities (i.e. visual and auditory), with 10.27% versus the male's 4.12%. It can therefore be seen that, while the male participants were more inclined towards the

auditory modality, female participants were more inclined to the visual modality. Also, a greater amount of females than males tended to prefer dual modalities of presentation.

3.5.6. *Most recent English mark*

Information concerning this variable may be found in Appendix H, Table 12 (page 102). When observing the effect of grade, gender and language on the dependent variable most recent English mark, results of an ANOVA showed two main effects (i.e. grade [$F(1;461) = 24.85$; $P < .0001$] and gender [$F(1;461) = 4.99$; $P < 0.05$]), as well as a first order interaction effect of grade and gender [$F(1;461) = 6.35$; $P < 0.05$].

In terms of grade, junior phase participants appeared to outperform seniors. Their English marks were higher overall (3.14 versus 2.67). Marks were coded according to symbol (0-5), where a higher coded number represents a better mark. This shows that juniors obtained marks between B and C symbols, indicating an average range between 60-79%, while seniors had marks between 50-69%. This might be expected. As already discussed, language and school demands increase significantly with progress through the high school years (Westby, 1994). In this way, individuals may cope more easily in the earlier high school grades and begin to perform more poorly with greater linguistic load and demand. Also, the effect of gender showed that female participants were more likely to outperform male participants (3.15 versus 2.67). This means that females predominantly had English marks of B's and C's (between 60-79%), and males had marks between C's and D's (50-69%). Again, this holds with previous studies which have determined that girls appear to be more proficient in languages than males (McKeever, 1987; Murphy & Davidshofer, 2001; Schutte, 1998; Westen, 1999). In both main effects, there is about a 10% difference between the performances of the groups discussed.

Table 13, located on page 59, shows the first order interaction effect of grade and gender on English mark.

Table 13: First order interaction effect of grade and gender on English mark

(means, ranges, standard deviations, sample sizes).

	Junior	Senior
Male	2.97 range=0-5 S.D.=1.05 n=112	2.28 range=0-4 S.D.=0.9 n=87
Female	3.27 range=1-5 S.D.=0.85 n=154	2.98 range=0-5 S.D.=0.99 n=109

The interaction effect shows that junior females performed the best in terms of most recent English mark obtained. The order then proceeded as follows: senior females, junior males and senior males.

3.5.7. *Most recent school report average*

In looking at the effects of grade, gender and language on the dependent variable of last school report average, three main effects of grade, gender and language were evident. Grade [$F(1;453) = 25.62$; $P < .0001$], gender [$F(1;453) = 8.07$; $P < 0.01$], language [$F(1;453) = 4.10$; $P < 0.05$]. Table 14, Appendix H (page 103), holds the data as related to this factor.

Again, the junior phase participants generally obtained higher school report averages than senior phase participants (3.22 versus 2.69). Results are reported here initially in terms of the coding used for the different symbols (i.e. 0=F, 1=E, 2=D, 3=C, 4=B, and 5=A). It can be seen, then, that the closer the value is to 5, the higher the average mark. They are then interpreted, in order to demonstrate the difference in results received by the various groups proved to be statistically different. Also, girls tended to do better than boys in terms of school report averages (3.22 versus 2.70). These results are again noted to parallel other results in the literature. This could be attributed to the observation that many subjects and nearly all assessments are language-based. Girls who appear to have a "natural aptitude" for language would then be expected to do better overall. Finally, the main effect of language showed that first-language speakers were apt to outperform

second-language speakers in school-report averages. The average was 3.06 for first-language English speaking participants, and 2.80 for second-language English speaking participants. This is in line with the hypothesis that individuals who are not schooled in their home-language may perform more poorly in language-related subjects, such as the language of the school which they attend. It might also relate to a point made by Spack (1998). Although this author writes about literacy and academic writing, the points made are relevant to the current findings. Even English speaking individuals may struggle, as their social situation and previous training can hamper performance. Individuals do not therefore suffer from innate inability, but are socially and culturally not predisposed to academia (Spack, 1998). The gap can therefore be wider for second-language speakers, as even if they have the basic skills of native speakers, and are highly proficient in their own first language, they will be unaware of some linguistic and cultural differences in their second language (Spack, 1998). In other words, "[t]he students' lack of L2 linguistic and cultural knowledge can stand in the way of academic success." (Spack, 1998, p. 86). Therefore, the tendency for first-language speakers to perform better than second-language speakers in terms of school report average may be tied to the latter group's difficulty in adjusting to the linguistically and culturally different school environment in which they find themselves.

Overall, the trend showed that junior participants, female participants and first-language participants were all likely to out-perform their counterparts by approximately 10%.

3.5.8. *Learning style 2 (groups versus alone)*

Using grade, gender and language effects on the dependent variable of learning style (i.e. group learning versus independent learning) yielded one main effect of gender [$F(1;445) = 11.85$; $P < 0.001$]. The data pertaining to Learning style 2 can be located in Table 15, Appendix H (page 104).

Males tended to state preference for group learning (65.28%), while the majority of females stated that they preferred learning on their own or individually (51.78%). It has been acknowledged that girls and boys both enjoy group interactions and form groups of friends (Measor & Sikes, 1995). However, boys prefer larger groups, while girls will

form smaller groups, usually with a maximum of four individuals (Measor & Sikes, 1995). This could translate to the trend noted here. In other words, boys may continue to prefer group interactions, even in the academic environment, while girls may study and work alone or in very small groups. It is interesting to note that the group that prefers to learn alone is also inclined, as already discussed, to do better in terms of English and school report averages.

3.5.9. *Amount of sms's sent per day*

In considering the effect of grade, gender and language variables upon the dependent variable of amount of short message signals (sms) sent by participants per day, a main effect was found for gender [$F(1;401) = 9.25$; $P < 0.01$]. Data for this variable may be located in Table 16, Appendix H (page 105).

It is apparent that females send more sms's, on average, per day, than males. Girls are likely to send 15.1 per day, and males 13.21. The ranges are very similar, as are the standard deviations.

3.6. Correlation between variables

This section required the use of correlations, 1-way ANOVA's, t-tests and chi-squared tests in order to uncover any significant relationships.

Pearson's correlations were used in order to measure the degree of relationship between the selected variables (Howell, 2002). One would usually look for correlations of around 0.5 and upward for strong correlation to be assumed (Howell, 2002). However, in a real-life situation, where not every individual of a certain age may be included, range restriction occurs (Howell, 2002). Also, age range is limited due to the population being studied. When range restriction does occur, correlations are instantly lowered (Howell, 2002). This does not mean that they are insignificant, but merely that the values are reduced (Howell, 2002). Therefore, in cases where the r-value is significant, correlations are discussed, even if they are weak or moderate. Another factor, which is also in effect in the current research, which may reduce the values within the correlations, is heterogeneity of the sample (Howell, 2002). The individuals in the sample, although all

from the same school environment will have various additional individual factors which cannot be controlled for. The correlations can all be found in Table 17, Appendix H (page 106).

Significant relationships were found for the following:

3.6.1. *Amount of time reading for school each week* and *most recent English mark*. A weak positive correlation was found here ($r = 0.134$; $P < 0.01$), showing that individuals who appear to spend more time reading for school or homework each week are more inclined to perform well in terms of the outcome related to English. It is speculated that more time spent on homework and learning might influence results positively. Also, better marks obtained for a subject may be positive motivation to work harder in terms of outside reading and work for that subject.

3.6.2. *Amount of time reading for school each week* and *time spent on recreational reading each week*. There was a weak-moderate positive correlation between these two factors ($r = 0.284$; $P < .0001$). It is possible that individuals who spend more time reading and exposed to additional literature (presumably English literature), will do better in English as English school-work is often based on reading and comprehension. If the individual's exposure and stimulation is greater then they may perform better due to an increased repertoire. Conversely, individuals who receive better results in the language classroom may feel more positively toward reading and additional "work" outside the classroom and homework environment and may consequently be more inclined to indulge in recreational reading. A simpler explanation is that those learners who enjoy reading (or who do more reading for one or the other) are more likely to read more overall.

3.6.3. A weak positive correlation was found between *amount of time spent on recreational reading each week* and *most recent English mark* ($r = 0.118$; $P < 0.05$). Again, individuals who do better in languages might be more inclined to read outside of school or homework requirements merely because they enjoy doing so. Alternately, the additional reading which these individuals are completing might be assisting them with

schoolwork, as more practice will sharpen their skills, making them more adept at the tasks involving language at school. It has been found that a statistically significant correlation exists between recreational reading and cumulative grade-point averages in the United States (Gallik, 1999), which ties in with both the finding that increased recreational reading is related to better English marks (just discussed), and that the correlation between recreational reading and the TOAL comprehension score, reported below. It has been hypothesised that recreational reading, as affecting school performance, may be able to be used in predicting future academic success, that more reading is related to better academic skills, which leads to aforementioned success, and that an individual who engages in recreational reading probably has a good capacity for sustained attention and concentration which is also necessary for academic success (Gallik, 1999).

3.6.4. *Amount of television programmes watched* and *most recent English mark* ($r = -0.138$; $P < 0.01$). There was a weak negative correlation between these two variables, suggesting that more television programmes watched will be tied to lower English marks. Also, the better the English results, the less television programmes will be watched on average by that individual (and vice-versa, worse results indicate more television exposure). It is interesting to note here that a survey, undertaken by the Kaiser Family Foundation (2005) found that children and adolescents are spending increased amounts of time using "new" kinds of media, such as computers, Internet and video games, and are not concurrently cutting back the time they spend using "old" media, which includes television, music and print (MediaLiteracy, 2004).

3.6.5. The only pairing which showed a strong positive correlation was *most recent English mark* and *most recent school report mark* ($r = 0.6$; $P < .0001$). However, it might be assumed that individuals who do well academically overall (i.e. report average), are likely to perform fairly well in each individual subject. Conversely, the likelihood of doing well in only one subject, such as English, and poorly in all the rest (thereby pulling the report average down) with a good average report mark, is not great. We might

therefore have assumed that success in one aspect might be indicative of success in other aspects.

3.6.6. One-way ANOVA's were performed in order to determine whether Learning style 1 and learner's favourite subjects were related to any of the other variables under discussion.

Learning style 1 was found, through one-way analysis of variance, to have no significant relationship with *percentage recall on the working memory test, complex sentence comprehension score,* or *the most recent English mark received*.
Learning style 1 was however, as an independent variable, found to have a statistically significant effect on the *number of sms's sent per day* [$F(1;432) = 3.33$; $P < 0.05$].

The data for individual's favourite school subjects can be found in Table 18, Appendix H (page 107). The independent variable of *favourite subject* is not related to *percentage recall on the working memory assessment,* or *to the complex sentence comprehension score.*
Individual's *favourite subjects* at school are linked to the *number of sms's sent per day* [$F(1;436) = 3.17$; $P < 0.05$].
When looking at the effect of *favourite subjects* on the dependent variable of *English mark*, a significant effect is noted [$F(1;459) = 4.86$, $P < 0.01$]. Therefore, the kind of subject preferred by an individual will effectively be linked to the English mark they receive.
It is noted that overall, there is a definite preference of males for math. Concurrently, females are far more interested in language subjects, and the preference for "other" subjects (i.e. not math and not a language) are roughly equal. These observations appear to be in line with Tartre's (1990) finding that boys seem to be better at math (which might mean that they enjoy it more), and Halpern's (1992) postulation that girls are better at verbal skills and related tasks. Additionally, then, these preferences link with the fact that females statistically outperformed males in terms of the complex sentence comprehension task, read more for school, and showed better English and school report

marks than the males. Conversely, though, if one were to perform a study related to mathematical prowess, in this sample, one might find the exact opposite pattern.

3.6.7. The variable of Learning style 2 (group versus alone learning) is dichotomous and it was therefore determined through the use of t-tests as to whether this factor was related to any of the other variables.

Individual learning style was significantly related to *most recent report mark average* [t-value= - 4.82, P < .0001]. Individuals who prefer working within a group have an average of 2.8, which would be between a C and D symbol, while individuals who like to learn alone had a mean score of 3.23, which equates with a B-C average. The statistical significance of this test suggests that individuals who prefer to learn alone outperform group learners by approximately ten percent. However, most marks are based on tests and assessments which require individuals to respond individually. Therefore, individuals who like to work alone habitually might be expected to perform better on measures which require them to work alone and respond individually. Durkin (1986) points out that it has been found in educational research that peer interaction, rather than other modes of instruction (and learning), is advantageous. If this is the case, then Durkin (1986) recommends that it is important to discover how knowledge and language obtained in such contexts contributes to educational or cognitive gains. The results of the above correlation argue against cooperative or group learning assisting individuals in doing better within the academic arena. The same pattern can be seen below in the correlation of group learning with most recent English mark.

Learning style was also related to *most recent English mark* [t-value = - 3.91, P < 0.001]. The value is less than 0.001, which suggests that there is a statistically significant relationship between learning style and most recent English mark. Again, individuals who like to work and learn alone tend to do better by approximately ten percent or one symbol, than their classmates who prefer to learn in groups (mean of 3.16 versus 2.79). Similar reasons as to those above might be implicated in this relationship.

Learning style and the *amount of time spent playing computer or video games each day* [t-value = 0.86, P = 0.3922]. The p-value is greater than 0.05 which indicates that there is no significant relationship between the two variables. Neither group- nor individual-preference learners are likely to show an effect in terms of how much time they spend playing computer or video games. This is interesting as the phenomenon of playing computerized games appears to be far-reaching, no matter the style of learning one prefers. It could also be linked to a fairly recent trend in the availability of such equipment. Computers especially have become far more accessible to the average individual or family and it would follow then that with increased accessibility comes increased usage.

Learning style and *number of television programmes watched* [unequal variance, therefore use Satterthwaite; t-value = 1.45, P = 0.1552]. There is no significant relationship between learning style and the amount of television programmes watched. Both individual and group learners are likely to watch a similar amount of television, again indicating a global trend.

Learning style and *amount of time spent reading recreationally* [unequal variance, use Satterthwaite; t-value = 0.08, P = 0.9323]. This t-test indicates that there is no statistically significant relationship between individual learning style and time spent in the pursuit of recreational reading. This is unusual, as one might hypothesise that individuals who prefer learning on their own might spend more time in solitary endeavours, such as recreational reading. This is, however, not the case.

Learning style and *amount of time spent reading for school* [t-value = - 1.93, P = 0.0538]. The P-value is just too big for the difference between the learning styles to be statistically significant. This means that, as for recreational reading, individual and group learners are not likely to differ in the amount that they spend reading for school each week. It appears that being a certain kind of learner does not predispose one to necessarily having different literacy exposure or experiences.

Learning style shows a statistically significant relationship with the *number of sms's sent per day* [t-value = 2.16, P = 0.05]. The mean amount of sms's for group-oriented learners is 16.02, while that for individual learners is 12.6. Possibly individuals who tend towards groups prefer to interact and communicate more than their counterparts. Consequently it might be correct to assume that this trend carries over to other forms of keeping in touch with people, such as through sms.

3.6.8. Finally, chi squared analyses were used for categorical variable data analysis (Howell, 2002). No significant relationship was found between *Learning Style 1* and *report mark*, meaning that learners preferring auditory, visual or both modalities were not likely to differ in terms of school report mark. Also, *learning style 1* was not related to *favourite school subjects*, indicating that auditory, visual or combined style learners are not likely to have subject preference according to style. Finally, *report mark average* was not related to *favourite subjects*.

In terms of significant relationships as determined by chi squared analyses, *learning style 2* (group versus alone) was related to *individual's favourite subjects*, and was also related to *learning style 1*.

For the former, learning style 2 was statistically significantly related to reported favourite school subject [chi squared(2) = 10.52; $p < 0.01$], indicating that individuals who enjoyed language or math subjects the most were fairly evenly divided as to their preferred learning style (be this in a group or alone). However, individuals who reportedly had other preferred subjects (not specifically language or math related), were more inclined to prefer working in groups. Almost twice as many individuals who enjoyed other school subjects also preferred learning in groups as opposed to alone.

For the latter, learning styles 2 and 1 were related [chi squared(2) = 10.55; $p < 0.01$]. Here, the auditory style learners and the auditory-visual learners seemed fairly evenly divided as to whether they preferred group or individual learning. In contrast, visual preference learners seemed to have a definite leaning toward group learning.

3.7. Summary and general discussion, grouping factors and trends

The first main area to mention is complex sentence comprehension, as measured by the TOAL Listening/Grammar subtest (Hammill et al., 1980). The main outcome of this test and its results was that scores fell generally within the normative ranges or limits of the test, refuting the postulation that mainstream adolescents are performing below the expected standard. It was also found that this subtest/skill was significantly affected by gender, showing that females are more adept than males in tasks of complex sentence comprehension. Also, related to the complex sentence comprehension task, however, were working memory percentage recall scores, recreational reading, time spent playing computer or video games, English mark, and school report mark. The factors mentioned here were all positively correlated with the sentence comprehension score, apart from the time spent playing computer or video games, which was alone in its negative correlation with the score.

Importantly, most of the variables investigated within the study showed gender differences (as opposed to language or grade differences). Gender affected the time spent reading for school each week, time spent playing computer or video games, learning style 1 (auditory versus visual), English mark, report mark, learning style 2 (group work versus individual learning), and the amount of sms's sent per day. Statistically significant differences were noted for grade only for the variables video or computer games, English mark, and report mark. Similarly, significant effects as determined by language were noted only for one variable. This was report mark. Finally, two interaction effects were noted for the variables. Grade and gender interacted to affect English mark, while language and gender together affected the number of television programmes watched.

Over-and-above the significant grade/gender/language effects mentioned, certain variables were correlated (apart from those mentioned which were linked to the comprehension score). The type of correlation (+ or -) is indicated after each variable. Reading for school was correlated with English mark (+) and recreational reading (+); learning style 1 with sms's sent (+); English mark with recreational reading (+), television programmes watched (-), favourite school subjects (+), percentage recall on the

working memory test (+), and school report mark (+); report mark with percentage recall on the working memory test (+); and sms's sent with percentage recall (+).

Additionally, variables found to be related to each other included the following: Learning style 2 (group versus alone learning) was linked to report average, English mark and amount of sms's sent per day; Learning style 2 was also found to be related to favourite subjects and Leaning style 1; Learning style 1 was itself related to the amount of sms's sent per day; and favourite reported school subjects were linked to sms's sent per day and English mark.

The factors investigated in the current study seem to be inter-twined. An example could be found in looking only at the complex sentence comprehension results, correlations and influencing factors. Females tend to perform better on the test, and the scores are correlated with working memory score, recreational reading, video and computer game playing, English mark, and school report mark. These can be seen as inter-linked because males are more likely to play electronic games (which is correlated negatively with sentence comprehension) and less likely to read for school (which is positively linked with academic success). Reading for school is in turn correlated with English mark and recreational reading, and is statistically more of a "girl domain". Therefore, girls are doing better on language comprehension because they are more likely to engage in pursuits which are related to academic and language success. Girls are seen to have better English and report marks (according to the current study), further indicating that they may have more academic success than their male classmates.

Other general trends which can be determined from the above findings are discussed here. Newer technologies are becoming more readily available all the time. The effects of these are evidenced in the results of this study. Television watching is having a negative effect on school results (such as English marks), and the playing of computer or video games is causing poorer performance in complex sentence comprehension/receptive language as determined by the TOAL. Conversely, however, cellular telephone technology appears to have the opposite effect to the detrimental effects noted for other technologies. The

number of sms's adolescents reported sending per day is an example. Although these did not appear to affect learning or academic achievement outcomes (only working memory score was affected by sms), some interesting trends were produced. Sms's are related to learning styles (auditory, visual, both, and group, alone), and to favourite school subjects.

Finally, all of the academic or school-related subjects and individual characteristics seemed to be inter-related, as would be intuitively expected. The complex sentence comprehension scores have already been discussed. However, English marks were correlated with * recreational reading (which in turn correlated with sentence comprehension and reading for school),

* reading for school,

* favourite school subjects ,

* percentage recall (correlated with sentence comprehension, school report mark),

* sentence comprehension (correlated with school report mark),

* learning style 2 (correlated with report mark, favourite subject, learning style one), and

* school report marks.

Correlations are not repeated, but as can be seen from the above, the academic areas probed within the study are linked to at least one other factor, which is in turn related to its own network of factors.

4. LIMITATIONS OF THE STUDY

It should be noted that only one school was used for the collection of data. This may have limited the kind of individuals who were sampled, in terms of socioeconomic status or school experience. Using various different schools around Gauteng may have made data more generalisable. Also, differences in socio-economic status could not be controlled for. The tests were administered in a group format rather than individually, due to time constraints. The tests were recommended (by their various authors) to be administered individually, but a pilot study and careful assessment of the items demonstrated them to be useful in a group setting.

Participants may have become fatigued due to having to complete the tests and questionnaires within a restricted amount of time. This was again unavoidable, due to the time limits imposed. The school only allowed the researcher a certain amount of time for data collection, as learners could not miss school time. This was the reason for using the assessments in a group setting and in a short space of time. In this case, although these are limitations, the procedure allowed for a larger sample size.

5. STRENGTHS OF THE STUDY

Although only one school was utilised, the sample size was large. The study was also preliminary, therefore making the large sample size an asset and lending to the credibility of results. Observations of first- and second-language speakers of English were made, which are relevant to the South African context. Through the use of various groups (i.e. different stages of high-school education, males and females, and first- and second-language English speakers), differences, similarities and trends were detected.

6. IMPLICATIONS OF THE STUDY

- Working memory is related to language processing tasks, which needs to be considered when assessing and treating clinical populations. As Gaulin and Campbell (1994) point out: "[p]rocedures that clarify the relationship between working memory and language performance could have important clinical and research implications".

- Language performance is not necessarily on the decline, as was previously hypothesised. Results for all ages, genders and languages indicated performance within the average range of the Listening/Grammar subtest of the TOAL.

- Tests which have been normed elsewhere, in the area of adolescent language, may be more applicable than previously believed, as the participants within the current study performed within the boundaries put forward by the authors of the TOAL. Also, perhaps, the requirements in terms of academic language proficiency are similar regardless of the area from which the individual comes – a certain level is necessary in order to complete and cope with work at the high school/secondary school level.

- Although there were generally no statistically significant differences between first- and second-language English speakers on the complex sentence comprehension measure, it should be noted that the performance of the latter is consistently marginally lower. This is a factor which should be taken into account in the assessment of clinical populations who are second-language speakers of their educational language. The ramifications for diagnosis, remediation and monitoring of clinical populations could be large.

- Studies performed in other parts of the world appear to have gleaned information similar to that in the current research, suggesting that development and use of complex sentence comprehension and academic language proficiency are similar all over the world.

- As there is a paucity of data showing how South African adolescents perform in terms of complex sentence comprehension, a base of data is necessary. This baseline needs to be established so that therapists may better assess and treat clinical populations of South African adolescents. Without normative data on what these adolescents are currently capable of within this context, it is difficult to assume relevant and reasonable aims within the context of therapy. The current research has made the initial attempt to begin to establish a baseline of data. Although it looks only at complex sentence comprehension, as has been discussed, this is important for academic success and is therefore particularly relevant to any population of adolescents (clinical or mainstream, South African or other).

7. SUGGESTIONS FOR FUTURE RESEACRH

- Although the TOAL Listening/Grammar subtest has been found to generally apply to a sample of mainstream adolescents within South Africa, this is not to say that the other subtests will reveal similar results. Also, it has not been attempted with language impaired adolescents within the South African context. The global applicability of the test to South Africa should only be commented on after the full test has been considered, in addition to the consideration of language-impaired adolescent populations.

- More tests should be researched within the South African context in order to determine their applicability, as the TOAL subtest used within this research has been demonstrated to be useful in assessing adolescents in the mainstream.

- This study should be replicated in different socio-economic areas. The current study looked at a middle-class, government school (previous Model C school). Future research might look at poorer and more affluent settings in order to compare academic language proficiency at similar levels.

8. CONCLUSION

This study has shown that, within various groups of adolescents, complex sentence comprehension is not generally delayed, as was initially hypothesised in light of the report of Cape school children (Lewis, 2004). It is however, linked to working memory, suggesting that the greater the individuals' ability to allocate memory resources, the greater their performance on the complex sentence comprehension task was likely to be.

Significant differences were found in terms of gender, where females were inclined to outperform males in many areas. They achieved better in the complex sentence comprehension test, which is consistent with a great deal of literature which demonstrates that females do indeed tend to have superior verbal skills. Linked to this were the findings that females were also likely to have better English and school report marks, spend more time reading for school, send more sms's and prefer to learn alone. Boys, on the other hand, play more computer or video games than girls and prefer to learn in groups. It would, however, be an error to make sweeping generalizations regarding the abilities of girls versus boys. The implications which could arise from a complete split in academic prowess are large. It should be noted that although the general trend is for girls to have better verbal skills and boys to have better visuospatial and math skills, this is only a trend. There were boys who did achieve superiorly in the test of complex sentence comprehension, and girls who conversely did extremely poorly.

In second-language English speakers, the complex sentence comprehension skill was not found to be outside the normative range. Also, second-language learners did not often yield significant differences in the variables investigated. However, it is noted that second-language English speakers' scores (for the complex sentence comprehension task) did fall consistently marginally below those of first-language speakers, thus alluding to Jooste's (2003) notion of the "moving target" for second-language learners. In other words, as second-language learners are developing and using their skills, so are first-language learners, effectively creating a fluid goal, which it is difficult for second-language learners to attain, as their movement is paralleled by the first-language speakers' development.

Grade was also generally found to have no real effect on the variables investigated. In other words, language and grade showed very few statistically significant effects, further confirming that gender appears to be the over-riding factor involved in most variables associated with school work and performance.

Lastly, various factors, such as developing technologies and their uses are affecting (positively and negatively) cognitive academic proficiency and language comprehension abilities, as suggested by this research. Obviously, the factors should be further investigated, but the findings are a starting point, an indication of variables which are involved in today's adolescents' lives. These variables may be helping or hindering their language development and consequently their academic performance.

This research has shown that complex sentence comprehension abilities within adolescents are not, in fact, declining, but that they are affected by and related to certain variables. Being a first-language English speaker, and being a female appear to be two factors that cause individuals to have the "edge" over peers in terms of complex sentence comprehension, and, by extension, academic language proficiency and classroom performance.

South African Speech-Language Pathologists are indeed treating various clinical populations of adolescents. It is apparent from this study that general abilities are not declining (at least, according to the results of the TOAL Listening/Grammar subtest). We therefore have a clearer starting point in assessment and therapy for adolescents. It is obvious that various abilities (or difficulties) cannot be treated in isolation, and that pre-morbid abilities and habits should be taken into account (if the difficulty is acquired). This is, of course, a pre-established idea from, example, the adult literature. One needs to understand the client's personal pre-morbid functioning and level of skill (not just their peer-related expected level of skill) before they can be effectively treated. The current study has provided an indication as to the kinds of factors or variables which need to be considered in treatment of clinical adolescent populations, and with consideration, how

these factors could be linked or how they interact. This study is therefore a springboard, both for the necessary further and continuing research in the field of adolescent language and academic proficiency, and for Speech-Language Therapists to begin to understand the specific and complex factors related to adolescent language development and academic skills in South Africa. It is by no means comprehensive in terms of all expected skills, and does not claim to glean entirely new information. We already know the basis of adolescent skills and what appears to be necessary for academic success, based on research from other countries, other communities. However, within the cosmopolitan community in which the individuals of South Africa find themselves, the question is whether the findings in other parts of the world parallel the findings in South Africa. It seems that, to an extent, they do.

REFERENCE LIST

Bashir, A.S., Conte, B.M., & Heerde, S.M. (1998). Language and School Success: Collaborative Challenges and Choices. In D.D. Merritt & B. Culatta (Eds.). *Language Intervention in the Classroom* (pp. 1-35). Singular Publishing Group, Inc.: San Diego.

Bialystok, E., & Cummins, B. (1991). Language, cognition, and education of bilingual children. In E. Bialystok (Ed.). *Language processing in bilingual children* (pp. 222-232). Cambridge University Press: Cambridge.

Bryant, P. (1995). Phonological and Grammatical Skills in Learning to Read. In B. de Gelder & J. Morais (Eds.). *Speech and Reading. A Comparative Approach* (pp. 249-266). Erlbaum (UK) Taylor & Francis, Publishers: East Sussex, U.K. Diego.

Carrow-Woolfolk, E. (1999). *Test for Auditory Comprehension of Language* (3rd ed.). Pro-ed: Texas.

Carrow-Woolfolk, E., & Lynch, J.I. (1982). An integrative approach to language disorders in children. Grune & Stratton: New York.

Cummins, J. (1991a). Interdependence of first- and second-language proficiency in bilingual children. In E. Bialystok (Ed.). *Language processing in bilingual children* (pp. 70-89). Cambridge University Press: Cambridge.

Cummins, J. (1991b). Interdependence of first- and second-language proficiency in bilingual children. In E. Bialystok (Ed.). *Language processing in bilingual children* (pp. 70-89). Cambridge University Press: Cambridge.

Durkin, K. (1986). Language and Social Cognition during the School Years. In K. Durkin (Ed.). *Language Development In the School Years*. (pp. 203-233). Croom Helm: London.

Elkhafaifi, H. (2005). Listening Comprehension and Anxiety in the Arabic Language Classroom. *The Modern Language Journal, 89* (ii), 206-220

Gallik, J.D. (1999). Do they read for pleasure? Recreational reading habits of college students. *Journal of Adolescent and Adult Literacy, 42* (6), 480-488.

Gathercole, S.E., & Baddeley, A.D. (1993). *Working Memory and Language.* Lawrence Erlbaum Associates, Publishers: Hove (UK).

Gaulin, C.A., & Campbell, T.F. (1994). Procedure for Assessing Verbal Working Memory in Normal School-Age Children: Some Preliminary Data. *Perceptual and Motor Skills, 19*, 55-64.

Goodman, K.S. (1982). The Language Children Bring to School: How to Build on It. In F.V. Gollasch (Ed.). *Language and Literacy. The Selected Writings of Kenneth S. Goodman. Volume 2. Reading, Language & the Classroom Teacher.* (pp 33-38). Routledge & Kegan Paul: London.

Grant Nicholas, J. (2000). Age Differences in the Use of Informative/Heuristic Communicative Functions in Young Children With and Without Hearing Loss Who Are Learning Spoken Language. *Journal of Speech, Language and Hearing Research, 43* (2), 380.

Greene, J. (1987). *Memory, Thinking and Language. Topics in cognitive psychology*. Methuen & Co. Ltd: London.

Grossman, M., Lee, C., Morris, J., Stern, M.B., Hurtig, H.I. (2002). Assessing Resource Demands during Sentence Processing in Parkinson's Disease. *Brain and Language, 80*, 603-616.

Halpern, D.F. (1992). *Sex Differences in Cognitive Abilities* (2nd ed.). Lawrence Erlbaum Associates, Publishers: Hillsdale, New Jersey.

Hammill, D.D., Brown, V.L., Larsen, S.C., & Wiederholt, J.L. (1980). *Test of Adolescent Language*. Pro-ed: Austin, Texas.

Hammill, D.D., Brown, V.L., Larsen, S.C., & Wiederholt, J.L. (1994). *Test of Adolescent Language (TOAL 3)*. http://www.agsnet.com/Group.asp?nMarketInfoID=42&nCategoryInfoID=2671&nGroupInfoID=a19060 (retrieved from the internet: 13/11/2005).

Harley, B., Cummins, J., Swain, M., & Allen, P. (1990). The nature of language proficiency. In B. Harley, P. Allen, J. Cummins, & M. Swain (Eds.). *The Development of Second Language Proficiency*. (pp. 7-25). Cambridge University Press: Cambridge.

Howell, D.C. (2002). *Statistical Methods for Psychology* (5th ed.). Duxbury: Pacific Grove, CA.

Hudelson, S. (1994). Literacy development of second language children. In F. Genesee (Ed.). *Educating Second Language Children. The whole child, the whole curriculum, the whole community* (pp.129-158). Cambridge: Cambridge University Press.

James, S.L. (1990). *Normal Language Acquisition.* Allyn and Bacon: Boston.

Jasson Da Costa, W. (2005). Girls outclass boys in the lower grades. The Star: Ekurhuleni.

Johnson, C.J., Taback, N., Escobar, M., Wilson, B., & Beitchman, J.H. (1999). Local Norming of the Test of Adolescent/Adult Language-3 in the Ottowa Speech and Language Study. *Journal of Speech, Language, and Hearing Research, 42*, 761-766.

Jooste, N. (2003). *Learning through a second language: A comparative study of the performance in reading comprehension and the cognitive-linguistic processes involved in reading comprehension between first-language English learners and second-language English, first-language isiXhosa learners at a Grade 5 level*. Unpublished Masters Dissertation: University of Cape Town.

Kempler, D., Almor, A., Tyler, L.K. Andersen, E.S., & MacDonald, M.C. (1998). Sentence Comprehension Deficits in Alzheimer's Disease: A Comparison of Off-Line vs. On-Line Sentence Processing. *Brain and Language, 64*, 297-316.

King, J., & Just, M.A. (1991). Individual Differences in Syntactic Processing: The Role of Working Memory. *Journal of Memory and Language, 30*, 580-602.

Larson, V.L., & McKinley, N.L. (1993). Clinical Forum: Adolescent Language. An Introduction. *Language, Speech, and Hearing Services in Schools, 24*, 19-20.

Lewelling, V.W. (1991). *Academic Achievement in a Second Language. ERIC Digest*. Washington DC: ERIC Clearinghouse on Languages and Linguistics. http://www.ericdigests.org/pre-9219/second.htm (retrieved from the internet 11/11/2005).

Lewis, F. (2004). Curriculum integration and curriculum innovation – challenges to the school speech-language therapist of today. *Communiphon*, 337, 36-37.

McKeever, W.F. (1987). Cerebral organisation and sex: interesting but complex. In S.U. Philips, S. Steele, & C. Tanz. (Eds.). *Language, gender & sex in comparative perspective* (pp. 268-277). Cambridge University Press: Cambridge.

Measor, L., & Sikes, P. (1995). *Gender and Schools*. Cassell, London.

MediaLiteracy (2004). Facts and Figures About Our TV Habit. http://www1.medialiteracy.com/stats_technology.jsp (retrieved from the internet: 12/05/2005).

Media Scope (2005). Girls and Video Games. http://www.mediascope.org/pubs/ibriefs/gvg.htm (retrieved from the internet: 12/05/2005).

Merrifield, S.R. (1998). Failure as Discrimination: One Professor's Response to a College-Wide Examination of Proficiency in Writing. In B.M. Franklin (Ed.). *When Children Don't Learn. Student Failure and the Culture of Teaching.* (pp. 116-133). Teachers College Press: New York.

Murphy, K.R., & Davidshofer, C.O. (2001). *Psychological Testing. Principles and Applications* (5th ed.). Prentice Hall: New Jersey.

Nelson, N.W. (1993). *Childhood Language Disorders in Context: Infancy through Adolescence*. Merrill: New York.

Newcomer, P.L., & Hammill, D.D. (1985). *Test of Language Development. Primary*. Texas: pro-ed.

Nippold, M.A., Schwarz, I.E., & Undlin, R.A. (1992). Use and Understanding of Adverbial Conjuncts: A Developmental Study of Adolescents and Young Adults. *Journal of Speech and Hearing Research, 35*, 108-118.

Olivier, C. (1999). *How to educate and train Outcomes-Based*. Pretoria: J.L. van Schaik Publishers.

Peters, T.J., & Guitar, B. (1991). *Stuttering. An Integrated Approach to its Nature and Treatment*. Baltimore: Williams & Wilkins.

Schutte, E.M. (1998). *The Suitability of Published Neuropsychological Test Norms for Urban Black South African Secondary School Students.* M.Ed. dissertation: University of the Witwatersrand.

Scott, C.M., & Stokes, S.L. (1995) Measures of Syntax in School-Age Children and Adolescents. *Language, Speech, and Hearing Services in Schools, 26*, 309-319

Silverman, F.H. (1977). *Research Design In Speech Pathology And Audiology*. Prentice-Hall Inc., Englewood Cliffs: New Jersey.

Spack, R. (1998). Initiating ESL Students into the Academic Discourse Community: How Far Should We Go? In V.Zamel, & R. Spack (Eds.). *Negotiating Academic Literacies. Teaching and Learning Across Languages and Cultures*. (pp 85-104). Lawrence Erlbaum Associates, Publishers: New Jersey.

Smith, B.R., & Leinonen, E. (1992). *Clinical Pragmatics. Unravelling the Complexities of Communicative Failure*. London: Chapman & Hall.

Tartre, L.A. (1990). Spatial Skills, Gender, and Mathematics. In E. Fennema, & G.C. Leder (Ed.). *Mathematics and Gender* (pp. 27-59). Teachers College Press: New York.

The SAS System. (2004). Release 9.13 (TS1M3) for Windows. SAS Site Licence at Wits University 30 November 2007 (expiry), SAS Institute Inc., Crary, NC, U.S.A.

Tibbits, D.F. (1988). Test of Adolescent Language-2 (TOAL-2). A Multidimensional Approach to Assessment. *Journal of Reading, 32* (2),178-181.

Waner, N. (2002). *The Understanding of Key Words in the Grade Seven Curriculum by ESL Learners in English and their Home Language.* MA. Speech-Language Pathology research report: University of the Witwatersrand.

Welman, J.C., & Kruger, S.J. (2001). *Research Methodology* (2nd ed.). Oxford University Press: Cape Town.

Westby, C. (1994). Communication Refinement in School Age and Adolescence. In O. Haynes and B. Shulman (Eds.). *Communication Development: Foundations, Processes & Clinical Applications* (pp. 341-383). Prentice-Hall: NJ.

Westen, D. (1999). *Psychology. Mind, Brain, & Culture* (2nd ed.). John Wiley & Sons, Inc.: New York.

Wiig, E.H. (1995). Assessment of Adolescent Language. *Seminars in Speech and Language, 16* (1), 14-31.

APPENDIX A:

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Academic and Research)

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R 14/49 Van Rooyen

CLEARANCE CERTIFICATE **PROTOCOL NUMBER H050605**

PROJECT TITLE Complex Sentence Comprehension Within a South African Adolescent Population

INVESTIGATORS Ms DS Van Rooyen

SCHOOL/DEPARTMENT Human & Comm Development/Speech Pathology

DATE CONSIDERED 05.06.07

DECISION OF COMMITTEE* Approved unconditionally

This ethical clearance is valid for 2 years and may be renewed upon application

DATE 05.06.15 **CHAIRPERSON** _____
(Professor MC Penn)

* Guidelines for written "informed consent" attached where applicable

cc Supervisor: Mrs H Jordaan

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **one copy** returned to the Secretary, Room 100015, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorised to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure, as approved, I/we undertake to submit a revised protocol to the Committee.

I/we agree to submit a yearly progress report.

This ethical clearance will expire on

UMnyango WezeMfundo
Department of Education

Lefapha la Thuto
Departement van Onderwys

APPENDIX B:

Date:	**12 July 2005**
Name of Researcher:	**Van Rooyen Danielle**
Address of Researcher:	[redacted]
	[redacted]
	[redacted]
Telephone Number:	[redacted]
Fax Number:	**N/A**
Research Topic:	**Complex sentence comprehension within a South African Adolescent population**
Number and type of schools:	**3 Secondary Schools**
District/s/HO	**Ekurhuleni East**

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

Permission has been granted to proceed with the above study subject to the conditions listed below being met, and may be withdrawn should any of these conditions be flouted:

1. ***The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.***
2. ***The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.***
3. ***A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.***

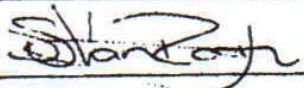
Office of the Senior Manager – Strategic Policy Research & Development
Room 525, 111 Commissioner Street, Johannesburg, 2001 P.O.Box 7710, Johannesburg, 2000
Tel: (011) 355-0488 Fax: (011) 355-0286

4. ***A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.***
5. ***The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.***
6. ***Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Senior Manager (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.***
7. ***Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year.***
8. ***Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.***
9. ***It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.***
10. ***The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.***
11. ***The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.***
12. ***On completion of the study the researcher must supply the Senior Manager: Strategic Policy Development, Management & Research Coordination with one Hard Cover bound and one Ring bound copy of the final, approved research report. The researcher would also provide the said manager with an electronic copy of the research abstract/summary and/or annotation.***
13. ***The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.***
14. ***Should the researcher have been involved with research at a school and/or a district/head office level, the Senior Manager concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.***

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

[redacted]

ALBERT CHANEE
ACTING DIVISIONAL MANAGER: OFSTED

The contents of this letter has been read and understood by the researcher.	
Signature of Researcher:	
Date:	AUGUST 2005

APPENDIX C:

I, [redacted], principal of [redacted] High (name of school) allow the researcher (D. Van Rooyen), to distribute informed consent forms and information sheets concerning her study, to the learners of my school. I further agree to allow her to conduct language testing with the learners whose parents provide consent for them to participate in the study (during convenient times, such as homeroom). I understand that any questions I have will be answered to the best of the researcher's ability. I understand that I can withdraw permission for this study at any time.

Signature [redacted] Date 6-9-05

[redacted] High School
Mrs. [redacted]
06 SEP 2005
HOD
Life Orientation

APPENDIX D:

LISTENING/GRAMMAR [TOAL]
Call attention to the test having three choices.
Instructions: I will say three sentences. Two of them mean almost the same thing. One of them means something different from the other two. Note that two of the sentences say almost the same thing. You must put a cross over the letters on your answer sheet that go with the two sentences that say almost the same thing. We will do an example first.

Example:

A. I appreciated Tom's being so prompt.
B. I appreciated how prompt Tom was.
C. Tom appreciated my being so prompt.

Test Items:

1. A. Do not begin until the signal sounds.
   B. The signal will not sound until you begin.
   C. Wait for the signal before begin.

2. A. It was proven that Shirley was the winner.
   B. Shirley was the proven winner.
   C. It was proven by Shirley who the winner was.

3. A. I suggested that she leave.
   B. I could suggest that she leave.
   C. I suggested her leaving.

4. A. For us to quit now would be a tragedy.
   B. How tragic it would be if we were to quit now.
   C. If there were a tragedy, we would quit now.

5. A. Many songs were being played by someone.
   B. Someone was playing many songs.
   C. Many people were playing songs.

6. A. If you work slowly, you make fewer mistakes.
   B. Slower work may mean fewer mistakes.
   C. Fewer mistakes make you work slowly.

7. A. You will understand this better, perhaps, if I give you familiar examples.
   B. If I give you familiar examples, perhaps your understanding will be better.
   C. If I am familiar with the examples, perhaps you will understand this better.

8. A. Should Vickie like it, we will buy it.
   B. We will buy it only if Vickie likes it.
   C. If we buy it, Vickie should like it.

9. A. In the hallway, Mary saw Becky.
B. Mary was seen in the hallway with Becky.
C. Becky was seen in the hallway by Mary.

10. A. Sally believes Greg to be poor.
B. Greg wants Sally to believe that he is poor.
C. That Greg is poor is believed by Sally.

11. A. Have the man thank you.
B. Tell the man, "Thank you."
C. Say, "Thank you," to the man.

12. A. The hamburger came with a free coke.
B. With a hamburger, the coke was free.
C. You get a free hamburger with a coke.

13. A. What was promised was that there would be a dance.
B. That there would be a dance was promising.
C. They promised to hold a dance.

14. A. If not Bill, then who told him?
B. Bill did not tell him.
C. It wasn't Bill who told him.

15. A. He is not someone I know.
B. I know someone who knows him.
C. Someone who knows him knows me.

16. A. To hear some new records, Susan came over to Sandy's.
B. Last night Susan and Sandy came over to hear some new records.
C. After Susan and Sandy came over last night, we heard some new records.

17. A. Who has more, Jim or Mike?
B. How many more has Jim than Mike?
C. How many less has Mike than Jim?

18. A. It does say that, doesn't it?
B. Why does it say that?
C. I'm not sure that it says that?

19. A. It is important in this task to pay close attention to the meaning of the sentences.
B. The importance of the meaning of sentences helps one pay close attention in this task.
C. Close attention to the task is important if one is to get the meaning.

20. A. Ask Jack to bring it here.
B. Tell Jack to bring it here.
C. Ask Jack what to bring here.

21. A. Try to do the first assignment by yourself.
B. Try to do the assignment by yourself first.
C. First, try by yourself to do the assignment.

22. A. It is impossible for us to dislike Kathy.
B. It is possible that we don't like Kathy.
C. Kathy is likeable.

23. A. Neither will be speaking to the other.
B. They plan never to speak to each other.
C. Either one or the other will be speaking.

24. A. My confusion is from knowing the right thing to do.
B. I'm confused about what is the right thing to do.
C. Knowing the right thing to do is what is causing me to be confused.

25. A. Pat is eager to go, so Howard should ask her.
B. Pat is eager to have Howard ask her to go.
C. Pat is eager to be asked to go by Howard.

26. A. The idea of Ginger's staying out late is absurd.
B. It is absurd to think that Ginger would stay out late.
C. The absurd idea of staying out late is Ginger's.

27. A. Ed distracted the man to whom Lee was speaking.
B. Ed was distracting Lee when he was speaking to the man.
C. The man Ed distracted was speaking to Lee.

28. A. If we leave, Carolyn will return.
B. We will leave when Carolyn returns.
C. If Carolyn returns, we will leave.

29. A. We met a boy who could speak Finnish.
B. The Finnish-speaking boy is the one we met.
C. We met the boy who was speaking Finnish.

30. A. He was almost unbeatable on the tennis court.
B. He was seldom beaten on the tennis court.
C. On the tennis court he was unbeaten.

31. A. You will finish it so I can help.
B. Could you finish if I helped?
C. In order to get it finished, I will help.

32. A. You should have arrived yesterday.
B. Could you have arrived yesterday?
C. Why didn't you arrive yesterday?

33. A. Jane did not make the grade because she didn't do her best.
B. Although Jane did her best, she did not make the grade.
C. If Jane didn't make the grade, it wasn't because she didn't try.

34. A. It is easy to see that he is afraid of the dog.
B. We know that the dog frightens him.
C. It is easy to see the dog frighten him.

35. A. It is the one we want if it is not put away.
B. If it is the one we want, put it away.
C. If it is not the one we want, do not put it away.

APPENDIX E:

Listen carefully to the three sentences for each option. Once you have decided which two sentences have similar meanings, then mark the two corresponding blocks (X).

				Please leave this column blank							Please leave this column blank
1	A	B	C			19	A	B	C		
2	A	B	C			20	A	B	C		
3	A	B	C			21	A	B	C		
4	A	B	C			22	A	B	C		
5	A	B	C			23	A	B	C		
6	A	B	C			24	A	B	C		
7	A	B	C			25	A	B	C		
8	A	B	C			26	A	B	C		
9	A	B	C			27	A	B	C		
10	A	B	C			28	A	B	C		
11	A	B	C			29	A	B	C		
12	A	B	C			30	A	B	C		
13	A	B	C			31	A	B	C		
14	A	B	C			32	A	B	C		
15	A	B	C			33	A	B	C		
16	A	B	C			34	A	B	C		
17	A	B	C			35	A	B	C		
18	A	B	C								

1	True	False	a._____		22	True	False	
2	True	False	b._____		23	True	False	
3	True	False			24	True	False	
4	True	False	c._____		25	True	False	i._____
5	True	False			26	True	False	
6	True	False	d._____		27	True	False	
7	True	False			28	True	False	
8	True	False			29	True	False	
9	True	False	e._____		30	True	False	j._____
10	True	False			31	True	False	
11	True	False			32	True	False	
12	True	False			33	True	False	
13	True	False	f._____		34	True	False	
14	True	False			35	True	False	
15	True	False			36	True	False	
16	True	False			37	True	False	k._____
17	True	False	g._____		38	True	False	
18	True	False			39	True	False	
19	True	False			40	True	False	
20	True	False			41	True	False	
21	True	False	h._____		42	True	False	
								l._____

% True/False _____

Word recall _____

APPENDIX F:

COMPETING PROCESSING LANGUAGE TASK:
Instructions: I am going to read you some true and false sentences. After each one, I would like you to mark on your answer sheet whether the sentence was true or false. Just put a cross over your choice. After we have finished a group of sentences, I would like you to write down the last word of each of the sentences from that group. Don't worry about getting them in the right order. There is a line provided on your answer sheet where you can write your answers. As we go on, the groups will have more sentences. I cannot repeat any of the sentences, so just do your best to remember the final words. Here are a few practice items.
Example:

A. Children can play
   Apples are black.
B. Ice is hot.
   Mice eat cheese.

Test items:

1. Trees have leaves.
   a. _____

2. Trains can fly.
   b. _____

3. Pumpkins are purple.
4. Buses have wheels.
   c. _____

5. Boys can eat.
6. Bananas are blue.
   d. _____

7. Carrots can dance.
8. Water is dry.
9. Sugar is sweet.
   e. _____

10. Buckets tell jokes.
11. Horses have tails.
12. Milk is white.
    f. _____

13. Feathers can tickle.
14. Babies drive trucks.
15. Birds can fly.
16. Cars build bridges.

g. _____

17. Snails have shells.
18. Chairs eat cake.
19. Giants are small.
20. Balloons can float.

h. _____

21. Shoes have ears.
22. Fire burns paper.
23. Robins eat worms.
24. Cars can race.
25. Hotdogs can bark.

i. _____

26. Horses have feet.
27. Dishes can whistle.
28. Fish pull wagons.
29. Roses have thorns.
30. Cars can talk.

j. _____

31. Apples are square.
32. Rabbits read books.
33. Houses can jump.
34. Pencils eat candy.
35. Airplanes can fly.
36. Balls are round.

k. _____

37. Fish can swim.
38. Clouds wear slippers.
39. Sheep eat lions.
40. People have eyes.
41. Dogs can run.
42. Lemons are yellow.

l. _____

APPENDIX G:
Questionnaire

Date of birth: _____ Grade: _____ Female/Male

First/home language: _____

Have you ever attended Speech Therapy? YES/NO [circle appropriate answer]

Have you ever had a hearing assessment? YES/NO

What were the results? If you have never had a hearing assessment, do you have any concerns regarding your hearing? _____

_____

Do you have any significant medical conditions? Please explain _____

_____

How much time do you spend reading for school every week? You can give an estimate in hours/minutes _____

How much time do you spend reading over-and-above schoolwork every week? You can give an estimate in hours/minutes _____

What do you like to read? _____

How many television programmes do you watch every week? _____

How long do you spend playing computer games or video games every day? _____

How do you learn best at school? Do you prefer to listen and take notes, or do you prefer to have the work on the board or overhead and copy it down? _____

_____

What are your favourite subjects at school? 1. _____ 2._____

What was your last English mark? (you can just give a symbol: A, B, C, D, etc) _____

What is your school report average? (again, just a symbol) _____

Do you prefer to work in groups at school or on your own? GROUPS/ALONE

Do you have a cell-phone? YES/NO

If you do have a cell-phone, do you tend to make phone calls or communicate via sms the most? _____

How many sms's do you think you send per day? _____

Thankyou for your assistance. Your cooperation is greatly appreciated! ☺

APPENDIX H:

Table 1: Age of Participants

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	177.06 (14.75 yrs) range=163-194 (13.58-16.17 yrs) S.D.=7.77 n=85	176.09 (14.67 yrs) range=164-190 (13.67-15.83 yrs) S.D.=6.99 n=113	206.78 (17.23 yrs) range=188-223 (15.67-18.58 yrs) S.D.=7.53 n=65	204.37 (17.03 yrs) range=183-217 (15.25-18.08 yrs) S.D.=6.76 n=84
Second lang.	177.61 (14.8 yrs) range=164-194 (13.67-16.17 yrs) S.D.=8.96 n=28	177.71 (14.81 yrs) range=159-207 (13.25-17.25 yrs) S.D.=8.74 n=41	206.64 (17.22 yrs) range=191-223 (15.92-18.58 yrs) S.D.=8.5 n=22	205.31 (17.12 yrs) range=187-228 (15.58-19 yrs) S.D.=11.38 n=26
Overall	177.19 (14.77 yrs) range=163-194 (13.58-16.17 yrs) S.D.=8.04 n=113	176.52 (14.71 yrs) range=159-207 (13.25-17.25 yrs) S.D.=7.5 n=154	206.75 (17.23 yrs) range=188-223 (15.67-18.58 yrs) S.D.=7.74 n=87	204.59 (17.05 yrs) range=183-228 (15.25-19 yrs) S.D.=8.04 n=110

Note:
The mean age, followed by the age range and the standard deviation occurs in each cell. Ages are given in months and converted to years for the mean and range in each case (values for years given in brackets).

Table 4: Time spent reading for school each week

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	162.05 (2.7 hrs) range=0-1500 (0-25 hrs) S.D.=256.41 n=83	291.02 (4.85 hrs) range=0-3000 (0-50 hrs) S.D.=402.3 n=113	174.75 (2.91 hrs) range=0-1680 (0-28 hrs) S.D.=277.08 n=64	378.92 (6.32 hrs) range=0-2700 (0-45 hrs) S.D.=529.43 n=78
Second lang.	246.04 (4.1 hrs) range=0-2880 (0-48 hrs) S.D.=560.58 n=28	310.88 (5.18 hrs) range=0-3000 (0-50 hrs) S.D.=497.2 n=40	403.32 (6.72 hrs) range=0-1440 (0-24 hrs) S.D.=390.39 n=22	472.83 (7.88 hrs) range=0-3120 (0-52 hrs) S.D.=788.76 n=23
Overall	183.23 (3.05 hrs) range=0-2880 (0-48 hrs) S.D.=357.05 n=111	269.21 (4.49 hrs) range=0-3000 (0-50 hrs) S.D.=427.5 n=153	233.22 (3.89 hrs) range=0-1680 (0-28 hrs) S.D.=323.44 n=86	400.31 (6.67 hrs) range=0-3120 (0-52 hrs) S.D.=595.21 n=101

Note:
The mean time, followed by the range and the standard deviation occurs in each cell.
Time is given in minutes and converted to hours for the mean in each case (value given in brackets).

Table 5: Time spent reading recreationally each week

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	154.88 (2.58 hrs) range=0-1260 (0-21 hrs) S.D.=206.65 n=81	173.27 (2.89 hrs) range=0-840 (0-14 hrs) S.D.=182.51 n=113	133.36 (2.22 hrs) range=0-960 (0-16 hrs) S.D.=179.29 n=64	230.54 (3.84 hrs) range=0-1620 (0-27 hrs) S.D.=284.48 n=83
Second lang.	165.71 (2.76 hrs) range=0-720 (0-12 hrs) S.D.=207.21 n=28	248.78 (4.15 hrs) range=0-960 (0-16 hrs) S.D.=265.23 n=41	191.58 (3.19 hrs) range=0-1200 (0-20 hrs) S.D.=272.08 n=19	274.38 (4.57 hrs) range=0-2400 (0-40 hrs) S.D.=472.6 n=24
Overall	157.66 (2.63 hrs) range=0-1260 (0-21 hrs) S.D.=205.89 n=109	193.37 (3.22 hrs) range=0-960 (0-16 hrs) S.D.=209.52 n=154	146.69 (2.44 hrs) range=0-1200 (0-20 hrs) S.D.=203.84 n=83	240.37 (4.01 hrs) range=0-2400 (0-40 hrs) S.D.=333.77 n=107

Note:
The mean time, followed by the range and the standard deviation occurs in each cell.
Time is given in minutes and converted to hours for the mean in each case (value given in brackets).

Table 6: Number of television programmes watched per week

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	18.22 range=0-237 S.D.=29.43 n=83	15.13 range=1-100 S.D.=14.89 n=111	19.4 range=1-100 S.D.=17.2 n=65	13.71 range=1-100 S.D.=15.08 n=80
Second lang.	14.88 range=0-49 S.D.=12.00 n=26	31.49 range=1-330 S.D.=54.1 n=37	19.14 range=0-60 S.D.=16.13 n=22	36.2 range=3-310 S.D.=73.86 n=25
Overall	17.42 range=0-237 S.D.=26.32 n=109	19.22 range=1-330 S.D.=30.55 n=148	19.33 range=0-100 S.D.=16.84 n=87	19.07 range=1-310 S.D.=39.04 n=105

Note:
The mean, range, and standard deviation for each age group are given. The participants were told that various episodes of the same programmes (for example a soap opera, watched on different days of the week) would have to be counted as separate programmes.

Table 8: The amount of time spent playing computer or video games each day

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	97.54 (1.63 hrs) range=0-300 (0-5 hrs) S.D.=83.94 n=83	35.64 (0.59 hrs) range=0-360 (0-6 hrs) S.D.=55.92 n=111	70.84 (1.18 hrs) range=0-600 (0-10 hrs) S.D.=99.08 n=63	20.07 (0.33 hrs) range=0-240 (0-4 hrs) S.D.=45.79 n=81
Second lang.	98.74 (1.65 hrs) range=0-300 (0-5 hrs) S.D.=100.25 n=27	29.23 (0.49 hrs) range=0-240 (0-4 hrs) S.D.=51.63 n=39	95 (1.58 hrs) range=0-360 (0-6 hrs) S.D.=110.16 n=22	15 (0.25 hrs) range=0-120 (0-2 hrs) S.D.=30 n=25
Overall	97.84 (1.63 hrs) range=0-300 (0-5 hrs) S.D.=87.74 n=110	33.97 (0.57 hrs) range=0-360 (0-6 hrs) S.D.=54.74 n=150	76.82 (1.28 hrs) range=0-600 (0-10 hrs) S.D.=101.96 n=85	18.88 (0.31 hrs) range=0-240 (0-4 hrs) S.D.=42.52 n=106

Note:
The mean time, followed by the range and the standard deviation occurs in each cell. Time is given in minutes and converted to hours for the mean in each case where applicable (value given in brackets).

Table 11: Preferred leaning style 1

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	0=51.22% 1=43.90% 2=4.88% n=82	0=38.05% 1=50.44% 2=11.50% n=113	0=50% 1=48.44% 2=1.56% n=64	0=44.58% 1=46.99% 2=8.43% n=83
Second lang.	0=38.46% 1=57.69% 2=3.85% n=26	0=39.02% 1=53.66% 2=7.32% n=41	0=45.45% 1=45.45% 2=9.09% n=22	0=57.69% 1=26.92% 2=15.38% n=26
Overall	0=48.15% 1=47.22% 2=4.63% n=108	0=38.31% 1=51.30% 2=10.39% n=154	0=48.84% 1=47.67% 2=3.49% n=86	0=47.71% 1=42.20% 2=10.09% n=109

Note:
Individuals were asked whether they preferred learning via the auditory of visual route. The option was also given for both. The following are results, in percentages for each group's preference, where 0=auditory; 1=visual; and 2=both.

Table 12: Most recent English mark

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	3.05 range=0-5 S.D.=1.00 n=84	3.35 range=1-5 S.D.=0.81 n=113	2.28 range=0-4 S.D.=0.91 n=65	3.1 range=0-5 S.D.=0.96 n=83
Second lang.	2.75 range=0-5 S.D.=1.17 n=28	3.05 range=1-5 S.D.=0.92 n=41	2.27 range=1-4 S.D.=0.88 n=22	2.62 range=1-4 S.D.=1.02 n=26
Overall	2.97 range=0-5 S.D.=1.05 n=112	3.27 range=1-5 S.D.=0.85 n=154	2.28 range=0-4 S.D.=0.9 n=87	2.98 range=0-5 S.D.=0.99 n=109

Note:
Individuals were asked to provide a symbol (A, B, C, etc) corresponding to their most recent English mark. These were then coded, where 0=F, 1=E, 2=D, 3=C, 4=B, and 5=A. The average coded number, along with the range, standard deviation and sample size are then provided. Percentages are discussed in the text, where necessary.

Table 14: Most recent school report average

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	3.1 range=1-5 S.D.=0.88 n=83	3.46 range=1-5 S.D.=0.82 n=112	2.35 range=1-5 S.D.=0.98 n=65	3.02 range=1-5 S.D.=0.87 n=81
Second lang.	2.69 range=1-5 S.D.=0.88 n=26	3.18 range=1-5 S.D.=0.91 n=39	2.27 range=1-5 S.D.=1.12 n=22	2.85 range=2-4 S.D.=0.78 n=26
Overall	3 range=1-5 S.D.=0.89 n=109	3.38 range=1-5 S.D.=0.85 n=151	2.33 range=1-5 S.D.=1.01 n=87	2.98 range=1-5 S.D.=0.85 n=107

Note:
Individuals were asked, in similar fashion to the previous table, to provide a symbol (A, B, C, etc) corresponding to their most recent school report average. These were then coded, where 0=F, 1=E, 2=D, 3=C, 4=B, and 5=A. The average coded number, along with the range, standard deviation and sample size are then provided.

Table 15: Preferred learning style 2

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	0=63.86% 1=36.14% n=83	0=39.45% 1=60.55% n=109	0=65.63% 1=34.38% n=64	0=55.56% 1=44.44% n=81
Second lang.	0=79.17% 1=20.83% n=24	0=56.10% 1=43.90% n=41	0=95.45% 1=4.55% n=22	0=50% 1=50% n=22
Overall	0=67.29% 1=32.71% n=107	0=44% 1=56% n=150	0=62.79% 1=37.21% n=86	0=54.37% 1=45.63% n=103

Note:
Individuals were asked whether they preferred to learn in groups or alone. Percentages are given. 0=group learning; 1=solo learning.

Table 16: Amount of short message signals sent per day

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	15.86 range=0-123 S.D.=21.04 n=78	17.28 range=1-125 S.D.=19.77 n=109	14.67 range=2-63 S.D.=12.05 n=64	16.63 range=1-75 S.D.=13.82 n=83
Second lang.	7.5 range=0-20 S.D.=6.01 n=22	9.89 range=0-35 S.D.=8.64 n=38	4.9 range=0-30 S.D.=7.08 n=21	9.08 range=2-30 S.D.=7.93 n=24
Overall	14.02 range=0-123 S.D.=19.08 n=100	15.37 range=0-125 S.D.=17.85 n=147	12.26 range=0-63 S.D.=11.78 n=85	14.73 range=1-75 S.D.=13.07 n=107

Table 17: Correlations

	% recall	Score, compr.	Sms's	Report Mark	Engl. mark	Video games	TV prog	Read rec.
Read school	0.069 0.1418 451	0.088 0.0618 451	-0.056 0.2507 426	0.083 0.0820 442	*0.134 0.0045 449	-0.024 0.6111 439	-0.046 0.3412 437	*0.284 <.0001 441
Read rec.	-0.020 0.6704 453	*0.165 0.0004 453	-0.029 0.5462 430	0.017 0.7217 444	*0.118 0.0119 451	-0.006 0.8985 440	0.037 0.4349 438	
TV prog.	-0.025 0.5998 449	-0.036 0.4449 449	0.071 0.1413 425	-0.083 0.0822 439	*-0.138 0.0034 447	0.027 0.5675 437		
Video games	-0.072 0.1261 451	*-0.199 <.0001 451	0.039 0.4153 428	-0.053 0.2706 441	-0.063 0.1854 449			
Engl. mark	*0.135 0.0037 462	*0.28 <.0001 462	0.088 0.0667 437	*0.599 <.0001 453				
Report mark	*0.186 <.0001 454	*0.27 <.0001 454	0.046 0.3449 431					
Sms's	*0.261 <.0001 439	0.047 0.3300 439						
Score, compr.	*0.243 <.0001 464							

Note:
First value: Pearson correlation co-efficients (r)
Second value: Prob > /r/ under HO: Rho=0 (p)
Third value: Number of observations (n)
* marks the correlations discussed in the text.

Table 18: Individual's reported favourite school subjects

	JUNIOR		SENIOR	
	Male	Female	Male	Female
First lang.	0=7.14% 1=41.67% 2=51.19% n=84	0=31.25% 1=21.43% 2=47.32% n=112	0=15.38% 1=27.69% 2=56.92% n=65	0=32.14% 1=14.29% 2=53.57% n=84
Second lang.	0=10.71% 1=28.57% 2=60.71% n=28	0=29.27% 1=12.2% 2=58.54% n=41	0=/ 1=50% 2=50% n=22	0=34.62% 1=19.23% 2=46.15% n=26
Overall	0=8.04% 1=38.39% 2=53.57% n=112	0=30.72% 1=18.95% 2=50.33% n=153	0=11.49% 1=33.33% 2=55.17% n=87	0=32.73% 1=15.54% 2=51.82% n=110

Note:
Participants were asked which subjects they enjoyed the most at school. The subject in the number one position was rated 0, 1, or 2, where 0=a language subject; 1=math; and 2=other (i.e. the subject was not math or a language). Results are provided in the form of percentages.