University of Surrey

Understanding Reading
Comprehension amongst Maltese Speaking Children

By

Louisa Grech

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Abstract

This thesis investigated reading comprehension levels amongst Maltese bilingual students. A total of 428 participants, aged between 8 and 13, from state schools across Malta, were tested and the results of five studies presented. The primary purpose underlying the research was to inform the development of assessment procedures that can be used in the identification of children who have specific difficulties in reading within the Maltese context. Initially, the suitability of reading comprehension measures currently used in Malta was assessed. Given the potential problems identified with these measures for the dominant Maltese language population in state schools in Malta, passages and comprehension questions were developed in Maltese appropriate for this population. Conclusions from this work argue for the need for assessment tools, particularly targeting reading comprehension, that incorporate linguistic and cultural aspects of the cohorts targeted by the tools – recommendations for practice, therefore, were a focus of the discussion of the work presented. The developed reading comprehension measure focused on reading aloud to allow reading accuracy and rate to be included in assessment procedures, and the evidence from the work reported in this thesis suggested that this procedure would show similar results to a silent reading comprehension measure. A further aim of the thesis was to investigate cognitive/linguistic predictors of reading comprehension in normally developing Maltese readers and also in Maltese-speaking children with dyslexia. These data argued for younger or less experienced readers (those with dyslexia) to show greater influences of word level processes on reading comprehension than older able readers, who mainly showed influences of language processes, such as syntactic awareness, vocabulary and listening comprehension. These latter findings were considered in terms of theoretical views on the development of reading comprehension across orthographies and to inform procedures designed to identify underlying reasons for particular performance characteristics in literacy assessments.
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Statement of originality

This thesis and the work to which it refers are the results of my own efforts. Any ideas, data, images or text resulting from the work of others (whether published or unpublished) are fully identified as such within the work and attributed to their originator in the text, bibliography or in footnotes. This thesis has not been submitted in whole or in part for any other academic degree or professional qualification. I agree that the University has the right to submit my work to the plagiarism detection service TurnitinUK for originality checks. Whether or not drafts have been so-assessed, the University reserves the right to require an electronic version of the final document (as submitted) for assessment as above.

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Chapter 1:
Overview of work

The work reported in this thesis comprised primarily an investigation of reading comprehension amongst Maltese-English speaking children. The main aims of the work were to inform the assessment of reading comprehension amongst populations of Maltese children and to identify potential factors that are predictive of Maltese reading comprehension in typical readers and those with dyslexia.

The ultimate objective when reading any written piece of work is to understand the message conveyed in the text. Reading for meaning involves an array of processes that need to be used and developed for successful understanding. The ability to understand verbal language is a natural part of human development whereas understanding any form of written text is not; the latter skill has to be acquired via appropriate learning and development. The success of understanding printed text can be driven by factors related to the individual and those related to the environment in which learning is taking place. In the present work, the focus is on the individual child. However, individual factors that may influence reading ability will be investigated within an environment of bilingual learning. One of the aims of the work is to determine if this learning environment affects the way in which the skills/abilities that the child brings to successful understanding is different from that predicted by the literature that has mainly been derived from monolingual English-language populations.

For example, the abilities to decode words and to recognize spoken language have been seen as essential skills to predict reading comprehension (see discussion in the next chapter on the Simple Model of Reading; Gough & Tunmer, 1986; Hoover & Gough, 1990). Decoding refers to the skill of being able to link a particular sound to its letter and use these sounds to recognize words in a fluent and rapid manner. On the other hand, understanding spoken language involves the mastering of a number of other skills, some being: semantic knowledge, vocabulary acquisition and syntactic awareness. Difficulty in either basic skill (decoding or/and linguistic comprehension) will result in poor reading comprehension abilities. Readers who have high levels of understanding skills may show poor reading comprehension levels because of poor decoding proficiency. These individuals, typically, have been described as students
with dyslexia (see next chapter). On the other hand, a child may have suitable decoding skills but lack the ability to understand spoken language appropriately, which would also lead to poor reading comprehension levels: these children may be described as poor comprehenders, hyperlexic or as having a specific language impairment, depending on the features of the difficulty. However, the basic point here is that having a deficit in either decoding or linguistic understanding would be predicted to create a difficulty for adequate reading comprehension.

Research on reading difficulties has often focused on problems with word-level reading or decoding. This has led to a focus on problems related to the development of accurate and fluent word reading and/or spelling (British Psychological Society, 1999) when considering the area of specific difficulty for the majority of children with literacy learning difficulties. Such specific literacy learning difficulties have an estimated prevalence rate of, on average, about 5% to 8% of a population within many different countries around the world (Smythe, Everatt & Salter, 2004). Data, mainly from English-language cohorts, suggest that such word-level literacy problems are related to specific cognitive/neurological deficits that are associated with language processing, particularly phonological processing (Gillon, 2004; Snowling, 2000; Stanovich, 1989). It is recognised also that good assessment practices, leading to appropriate educational support, are needed to overcome problems associated with this specific learning disability (see Edwards, 1994; Everatt & Reid, 2010; Miles & Varma, 1995; Riddick, 1996; indeed, the National Institute of Health in the U.S. classifies reading and related learning disabilities as a major challenge to public health and societal welfare). Therefore, objective assessment procedures and tools are essential to the educational practitioner in both their initial identification of those at risk and their formation of an education plan designed for the needs of the individual. Most current assessment tools have been developed for the English-speaking child. However, learning to read and write in one language is not necessarily the same as in another. Underlying cognitive factors related to literacy learning difficulties may vary between orthographies and aspects of the language or culture within which an individual is immersed may make an assessment measure inappropriate as a predictor of literacy skills. (See discussions in: Everatt, Smythe, Adams & Ocampo, 2000; Goswami, 2000; Katz & Frost, 1992; Leong & Joshi, 1997; Smythe et al., 2008; Ziegler et al., 2010). Therefore, the development of assessments appropriate for the
language(s) and culture within which the assessment is to take place can be seen as a vital component of work within the field of learning difficulties.

As indicated above, reading individual words is not the ultimate goal of learning to read. Although it has been widely accepted that decoding skills are highly related to reading comprehension, and therefore comprehension problems will follow poor decoding skills, a large proportion of those with reading weaknesses do not seem to exhibit word-level reading difficulties (see Cutting & Scarborough, 2006; Spooner, Gathercole & Baddeley, 2006). Such work suggests that some 10 to 15% of school age children exhibit comprehension difficulties despite demonstrating a good level of decoding skills. Furthermore, evidence shows that there are significant relations between decoding skills and comprehension skills in the early years of a child’s literacy development. However, this correlation decreases as the child matures (see Keenan & Betjemann, 2006). Such evidence calls for the need to acknowledge that a percentage of children will have reading difficulties due to reasons other than word decoding problems, which have been the focus of much reading disability research.

Evidence for a dissociation between decoding and comprehension skills (Oakhill, 1994) reveals that problems exhibited in reading comprehension do not occur merely due to phonological and orthographic processing deficits (Perfetti, Landi, Oakhill, 2005). Therefore, a comprehensive assessment of literacy learning difficulties should include both assessments of word-level reading and reading comprehension.

The general aim of the work presented in this thesis is to support the development of such assessment procedures for use within the specific language/cultural context of Malta. As will be discussed in the following chapters, assessment procedures to identify children with literacy learning difficulties do exist in this context (see Firman, 1994; 2007). However, these either focus on English-language assessments or do not include formal reading comprehension assessments when measures in the Maltese language are used. The research reported in this thesis, therefore, focuses on Maltese reading comprehension measures to inform the development of such assessment procedures. Initially, it focused on using a measure of English reading comprehension, since given that the educational system and social context of Malta is bilingual in nature it could be that text understanding levels of Maltese children can be determined in either of the official languages of education; i.e., Maltese or English. However, given that Maltese is the first (home) language of many Maltese children,
an aim of the current work was to develop measures appropriate for use in Maltese. Therefore, in the total of five studies reported in this thesis, the work focused on: (i) determining reading comprehension levels in English amongst Maltese/English bilingual state school children using a standardised measure of English text comprehension commonly used in Malta; (ii) the creation of Maltese reading comprehension passages which can be used as the basis of assessing text comprehension levels amongst Maltese speaking children; (iii) identifying differences between Maltese reading comprehension when reading silently versus aloud; (iv) understanding what elements are predictive of Maltese text comprehension based on current reading comprehension models; and (v) comparisons of text comprehension levels, and predictors thereof, between students with and without an official recognition of literacy learning difficulties (dyslexia).

The school groups targeted for much of the work reported in this thesis were Years 5 and 6 from primary schools and Form 1 from secondary schools. Typically, Year 5 children were approximately 8 to 10 years old, Year 6 children were approximately 10 to 11 years old and Form 1 children were approximately 11 to 13 years old. These school levels were chosen due to the expectation that comprehension will be becoming more sophisticated (i.e., beyond the word level) during this period of development. The reading comprehension model of Wilson and Rupley (1997) was the primary source of this prediction. In this model, the acquisition of reading comprehension skills is based on three developmental stages that the child experiences. The first stage takes place when the child is aged between seven and nine. During this stage the reader comprehends written material because of a phonemic knowledge and an understanding at word level. At a later stage and between the ages of eight to ten, a reader strengthens understanding through the use of background knowledge. At a still later stage, from the age of 10 upwards, a child is able to comprehend by making use of the knowledge derived from different strategies. Hence, the period of focus of the present work coincides with this potentially important developmental period.

It was decided that a quantitative approach would be used. The main reason for this decision was that the interest in this thesis was to gather data regarding reading comprehension levels from a large number of participants. Relations and comparisons
between measurements and different age groups were viewed as essential procedures. Therefore statistically analyses that could quantify the participants' scores were needed to produce accurate and reliable results.

The five studies conducted as part of the thesis work will be reported in the following chapters. Before presenting these studies, chapter 2 outlines findings from studies reported in the literature in the area of reading comprehension that are relevant to the current work. In addition, it will cover some of the main theories developed about reading and reading difficulties that formed the rationale to the current work. This chapter will also provide background information about the Maltese Language, the influence of bilingualism on literacy and cognitive development, and the Maltese educational system to give the reader a basic understanding of the context of the current work. Further background information will be provided in the following chapters when related specifically to the aim of the study reported. However, this chapter should provide enough detail for the reader to follow the aims of, and rationale behind, the work conducted. Therefore, this chapter will end by discussing the issues covered in each of the study chapters and describing how these issues will be tackled.

The first study will be reported and discussed in chapter 3. This focused on the assessment of comprehension levels of Maltese children in the English language. Initially, the relevant literature related to bilingualism and English assessment in the Maltese context will be discussed to provide the rationale for considering English-language reading comprehension assessment in this group of children. The Neale Analysis of Reading Ability (NARA; Neale, 1989) provided the measures used in this study as it has been used frequently within Malta to assess English literacy levels (Firman, 1994). In this test, children read passages aloud in English. The time taken to read and the number of reading errors was recorded. After each passage, a number of comprehension questions were asked about the passage just read. The number answered correctly was also recorded by the tester. These three scores were compared against predicted scores based on the standardization norms for the test. The data were collected in two parts (study 1a and 1b), with N=40 Year 6 students comprising the first cohort tested on Form B of the NARA and N=93 children from Years 5 and 6 and Form 1 comprising the second cohort who took Form A of the NARA. Form B of
the NARA proved to be very difficult for these Maltese bilinguals, with their performance being well below expected levels based on the norms for the test. Similarly, the performance of all three year groups (Years 5 and 6 and Form 1) given Form A was well below their chronological age based on the standardization data. Despite this, these latter three school year/form groups followed a sequential pattern in which they progressed in reading and comprehension level according to increased school experience, and children who performed well in one measure of the NARA were likely to perform well in another. Hence, the test may be identifying true variability in ability, but the norms derived from a monolingual English population do not reflect ability levels of the Maltese population of Years 5, 6 and Form 1. These data argue that assessment measures used to identify children under-performing in English text reading need to treat carefully standardization data derived from other country cohorts. The present work interprets these findings as indicating that monolingual English-language norms are not appropriate to determine expected reading-age levels in a bilingual, predominantly Maltese first language, group such as that comprised by the majority of children in state schools in Malta. Given that these children will also need appropriate assessment procedures to identify cognitive-based literacy learning problems, the data argue either for the need to develop better standardised English language measures for the population or for the need to develop assessments that include first language (Maltese) tests.

Hence study 2, reported in chapter 4, was performed with the primary aim of developing a series of oral reading comprehension passages in the Maltese language that could form the basis of assessment targeted at Maltese children. Passages considered the formats used in English-language assessment, of the Neale (Neale, 1989). Adaptations involved the use of reading books that formed part of the Year 6’s Maltese syllabus in order to develop passages appropriate for the target population. Following pilot work with N=57 children, the eleven passages initially developed were reduced to six. The number of words and level of difficulty progressed gradually from one reading passage to the next, the first passage being the easiest and the last passage being the most difficult. Questions that assessed the degree of comprehension ranged from 4 to 8 for each passage. Answers could be found in the details reported in the passage or required an inference to be derived from the passage details.
(Appendices are provided that present the measures developed as part of the work reported in this thesis.)

Once the passages had been developed, study 2 concentrated on assessing the level of Maltese reading comprehension produced by typical state children on these passages. A total of 126 participants took part in this study. Their ages ranged from 8 years 11 months to 12 years 5 months (school Years 5 and 6 and Form 1). The six passages were used and all had to be read aloud by the children. After reading each passage, the child was asked the comprehension questions related to the passage. The researcher recorded the number of reading errors and the time taken to read the passages as well as the number of correct answers given to questions. The results indicated that there was a clear distinction between the scores achieved from the three different school year groups assessed. The greatest number of questions answered correctly came from the eldest group, while the youngest group answered the least amount of questions correctly. This result shows that the passages created for the participants were easier or more difficult depending on age. Cronbach Alpha was used to measure the internal consistency and indicated reliability scores of .73, .76 and .73 for Year 5 and 6 and Form 1 respectively, suggesting a suitable level of reliability.

The Maltese language reading comprehension measures developed in study 2 followed the format used in the NARA of asking children to read aloud, which enables assessments of reading errors and speed in addition to comprehension. However, in normal everyday situations, comprehension of written text rarely involves reading aloud; it is more often accomplished by reading silently. Hence, assessments of reading aloud may not represent the normal comprehension skills of the child when reading silently. The study reported in chapter 5 focuses on measures of reading comprehension when reading was performed silently versus aloud. Study 3, therefore, involved the production of parallel reading comprehension passages. Students between the ages of 9 years 3 months and 13 years 2 months participated. The aim was to determine whether the students' performance would be different in aloud versus silent reading conditions to assess the generalisability of the findings from the current work, which had a focus on performance in reading aloud tasks. In particular, it may be that assessment methods that use reading aloud in order to measure error and fluency of word reading may underestimate comprehension levels that can be achieved in silent reading conditions. In contradiction to this hypothesis,
the findings of study 3 indicated little evidence of significant performance difference between aloud and silent reading conditions, with the mean scores among the students being very similar for both conditions. These data argue that a reading comprehension measure in which the child is asked to perform the reading task aloud can represent variability in performance when children read silently.

Chapter 6 reports the findings from study 4 that focused on understanding what processes are predictive of Maltese reading comprehension. The measures chosen as potential predictors were: non-word reading, verbal short-term memory, rapid naming, syntactic awareness, listening comprehension and non-verbal ability. These measures were chosen based on current models of reading (particularly the simple model of reading) which have been derived primarily from English language data, though they also incorporate measures that cross-language data have identified as potentially useful when dealing with an orthography that is more transparent than English (see Wimmer, 1993). Since currently there are no tests in Maltese available for assessing non-word reading, syntactic awareness, rapid naming and listening comprehension, these tests were developed based on existing measures in the literature. The verbal short-term memory test was a digit span task and was derived from measures already in use in Malta as part of intelligence assessment tools. Regression analyses indicated that, overall for the whole cohort, syntactic awareness and listening comprehension were the best predictors of Maltese reading comprehension. However, predictors varied across the three school year groups tested. For the youngest Year 5 group, reading comprehension was best predicted by the non-word reading accuracy measure, whereas for the two older groups, listening comprehension was the best predictor. The findings indicate that for the youngest grade, text comprehension is somewhat restricted by decoding skills, whereas for the older groups, verbal understanding seems to be the more important skill in reading comprehension. Taken together, the data are consistent with a simple model viewpoint within a context of developing literacy skills.

Chapter 7 presents the final study that formed the new work performed as part of this thesis. Study 5 focused on children with a formal assessment of dyslexia from the Maltese education system, therefore the chapter starts with an introduction to the relevant literature related to dyslexia. The work involved an evaluation of reading comprehension levels, and reading-related skills, amongst participants with dyslexia
and groups of children without any known problems with literacy learning (i.e., control groups). The aim was to discern differences between these groups in reading and reading-related skills and to determine whether reading comprehension amongst students with dyslexia was predicted by similar skills as amongst students without dyslexia. A total of 26 students with a recognised assessment of dyslexia was included in this study and their results were compared to a group of control children in Form 1, who acted as chronological age matched controls, and a group of control children in Year 5, who were reading comprehension matched controls. All groups were required to read the six reading comprehension passages and answer the comprehension questions related to those passages. Additionally, they were given measures of non-verbal ability, non-word reading, syntactic awareness, rapid naming and listening comprehension. The results indicate that reading comprehension levels and speed of reading were similar to the younger group without dyslexia (i.e., those children in year 5) consistent with these groups being at a similar reading level. Additionally, in contrast to their age-matched peers (Form 1 children) the children with dyslexia produced correlations with comprehension levels that focused on word-level decoding skills and non-verbal ability. This focus on word decoding abilities rather than understanding-based skills was even more pronounced than their read level match peers (the year 5 group). These results argue for word-level difficulties to be the basis of comprehension problems amongst this cohort with dyslexia. These data were interpreted as arguing for similar difficulties associated with dyslexia in a Maltese/English bilingual population as that found in English-language based models of dyslexia.

The final general discussion chapter provides an overview of the findings from the studies as well as a discussion of the implications of these on assessments of reading levels, particularly text comprehension levels, in Malta. It highlights the limitations of the study and proposes recommendations for future work. The general conclusion is that the findings reported from these studies were consistent with conclusions in the literature. Although this Maltese-English bilingual population requires measures specifically developed for it, the evidence suggests that it shows features of reading comprehension characteristic of populations from which current models of reading development and literacy learning difficulties have been developed. These findings
should support the development of appropriate assessment tools and inform our theoretical understanding of reading processes.
2.1. Comprehending written text

In most cases, successful reading means that the reader is able to decipher the message conveyed by the writer. Reading for meaning forms part of a developmental timeframe that gradually leads to suitable levels of reading comprehension. Studies over the years have tried to clarify what cognitive features are present, and how these features interact, during reading comprehension (e.g. Kintsch, 1988). Understanding printed text can be driven by factors both internal (processing efficiency, experience, interest) and external (text complexity, discourse type, the writer’s message) to the individual. According to Alderson (2000), the very first step in achieving comprehension relies on the purpose that the printed text has on the reader. For example, reading for pleasure and reading for an exam are distinct. The levels of interest and personal gain differ greatly. Strategies adopted and approaches taken are influenced by the reason and importance which a piece of work has. Additionally, Lipson and Wixson (1991) propose that reading comprehension is dependent on three related factors: the person who reads, the way the material is presented and the framework of the passage being read. Lazarus and McKeena (1994) also argue that reading comprehension relies on three factors. In their model, these are explained as (i) the way in which the information is integrated, (ii) the reader’s existing knowledge and (iii) the method in which the text is organised. Moreover, Paris, Wasik and Turner (1991) state that the use of reading strategies is a prerequisite during the process of understanding. Such strategies do not appear suddenly but rather form part of a developmental course. According to Paris et al., such strategies are either taught or emerge naturally during the child’s learning cycle between the ages of seven and thirteen. Lack of the development of strategies will result in poor reading comprehension ability (Palincsar & Brown 1984; Ryan, 1981, in Kozminsky & Kozminsky, 2001).

Passage comprehension is a dynamic activity that involves a range of cognitive functions. In the early stages of the development of reading comprehension, the average child will have a lower level of language acquisition. However, as the reader matures, his/her comprehension skills move to higher levels, where the reader is better
able to infer and predict from a given situation in a text (Cain, Oakhill, & Bryant, 2004). A proficient reader is capable of automatically decoding words and simultaneously adapting the use of metacognitive properties. This enables the reader to scrutinize and organize what is read in a coherent and structured manner (Kolic-Vehovec & Bajsanski, 2007). According to Sahu and Kar (1994), the ability to comprehend what is written and the ability to read orally (i.e., pronounce written words) involve two separate cognitive procedures. The former’s primary function is in understanding the meaning that the author is attempting to put across, whilst the other procedure is related to the way in which the reader transforms grapheme symbols into phonemes to create a word.

The next section of this thesis will outline the major theories that have been associated with reading comprehension. The initial models to be mentioned are the stage/phase theories of development. Here the importance of understanding age milestones for appropriate assessment is essential. However issues of how we actually approach the reading process that leads to understanding the meaning of written text are also discussed. This thesis included lexical versus non lexical methods to reading to identify whether words are read using decoding strategies versus reading words using contextual cues. Additionally the orthographic depth hypothesis was included to discuss whether different languages (and therefore different orthographies) can influence reading comprehension attainment. Each theory is explained individually to create a situation where the reader can understand each model, yet, it is crucial to identify that each model cannot be seen in isolation, but rather as an interaction of processes that take place during the development of reading comprehension.

2.2. Theories of reading and reading comprehension

Different theories have documented the progress of reading in a number of individual stages/phases. At each stage/phase a developmental achievement is reached. This sequence of developmental achievements is a key characteristic of the reading process, thus enabling this procedure to be dynamic in nature. Internal and external reasons are both influential in the progression to the subsequent developmental stage/phase. Cognitive or linguistic competences are associated with internal causes. These competences involve the ability to obtain letter knowledge, phonological awareness, memory and language skills (Rack, Hulme, & Snowling, 1993), whereas
methods of instruction are related to external factors. The role of assessment is essential to determine whether a child has adequately achieved mastery of a particular stage. This will guide educators to understand what level a child is at and whether it is sensible to move to the next stage. Furthermore, it can guide decisions about the type of instruction methods that can aid in progression.

The influence that developmental theories have had on reading is important for the purpose of this thesis for a number of reasons. Primarily it is necessary to have an idea of the milestones that a child should go through during his or her reading development. The children that are participating in the studies are aged between 8 and 13, an age where the child should have mastered a number of skills leading to reading and understanding. The progress from one stage to the next highlights the capacity to read more complex, technical, and abstract material. Delays in expected developmental signs indicate that something might be wrong with the maturational progress of a particular child. Few developmental theories have focused primarily on reading comprehension; the vast majority concentrating on word recognition/decoding. As mentioned previously word reading and reading comprehension are related and many theorists believe that one cannot occur without the other. Therefore, major theories of reading development, such as those presented by Ehri (1995) and Chall (1991) will be covered briefly in this thesis. These two viewpoints were chosen as they are widely quoted and representative stage-type theories in the literature. Both are covered given the different focus of the two models: i.e., Ehri (1995) discusses the stages involved in word decoding in young children whereas Chall (1991) covers meaning processing right up to adulthood. The importance of both Ehri’s and Chall’s reading developmental theory is the perspective that as the child matures the skills and abilities that she or he possesses matures with them. This developmental process should be the same in cross-language contexts and, therefore, is likely to apply to both English and Maltese. Improvements in cognitive and language skills lead to increases in reading levels. Another important implication of developmental theories is that identifying milestones in the early years of development can prevent further difficulties in later growth. One of the purposes of the work reported in this thesis was to determine whether these reading models derived from English-language studies might be suitable to help understand reading development in the Maltese context.
In contrast to the stage models, other models argue for specific processes being involved in reading and reading comprehension. These processes are not necessarily linked to specific developmental points. Given that there is not an agreement on which theory constitutes the best explanation of reading comprehension, a range of models relevant to the present cross-language work are discussed. For the purpose of this thesis, the processes models that have been selected comprise those which focus on the means by which a child retrieves words and meaning via lexical and non-lexical routes, theoretical differences between scripts or orthographies that may lead to differing processes being required across languages, the combination of decoding and comprehension skills and the potential processes underlying both, and the need to consider background knowledge when focusing on comprehension levels.

2.2.1. Ehri’s phase model theory of reading
Ehri (1995) has put forward a four phase model of reading where each child experiences a developmental process by recognizing words through sight and through decoding. The mastery of the phases will lead to a number of interconnections between skills such as reading, spelling, meaning and pronunciation.

The first phase in Ehri’s model is named the pre-alphabetic phase. During this stage a child has the ability to remember visual features associated with a word which enables identification of that word. Additionally, word identification is possible through a method in which the child is able to deduce words from the information offered by the context within which the words are placed.

The second phase is the partial-alphabetic phase which involves phonetic cue reading. During this phase the child has the ability to identify a number of letters of the alphabet and to make out some sight words through familiarity with these letters within a context.

The third phase is the full-alphabetic phase. During this stage the child has gathered grapho-phoneme knowledge and uses this knowledge to decode different written symbols into associated sounds, then blend these sounds together to form pronunciations of both familiar and unfamiliar words. During this phase, children are also able to read a number of sight words and retrieve meaning from these words.
Phase four is the consolidated-alphabetic phase in which the child has enough knowledge of word decoding/properties to read and spell words. This enables fluency and automaticity, thus offering an opportunity for reducing memory load.

2.2.2. Chall's developmental theory of reading

A similar phase-based model was proposed by Chall (1991) who outlined six major stages in the development of reading. However, whereas Ehri focused on word decoding in young children, Chall considers the processing of meaning right up to adulthood. Movement through Chall's stages is required due to increases in complexity of the reading material from one stage to another. Later stages follow from text including higher numbers of unfamiliar or low-frequency words, sentence structures that are typically longer and more complicated and therefore result in syntax structures and language that are more demanding and more abstract ideas. To cope with the different stages, language/cognitive skills need to improve. In general, a reader is able to understand more words than he/she can read. For example, children aged between 6-7 years who are able to comprehend approximately 6,000 words when verbally spoken, can usually only read around 300 to 500 of those words by the end of that scholastic year. When children are aged between 7-8 years of age, reading improves toward the level of listening. Nonetheless only about one-third of the words known from listening can be read. It is only when a child is between the ages of 9-13 (stage 3) that reading and listening comprehension appear to be at similar levels.

The most efficient way to summarize the key principles of the stages in this model is to divide the main aspects of reading into two sections. The first includes the means by which the message is being conveyed. This usually occurs from birth till age 8. This would include word recognition (alphabetic writing that corresponds to the sounds of words). The second aspect involves reading for meaning, a process that takes place from the age of 9 onwards. The shift occurs gradually over the years where initial decoding and phonological principles learnt in the early stages move steadily to a mature development in learning where increase in vocabulary, syntactic knowledge and abstract thinking are necessary for successful understanding.

Prior to reading learning, sometimes considered as stage 0 which occurs from birth till the age of 6, the child learns a number of different skills that are seen as an expansion of familiarity and application of language. This includes the enlargement of
vocabulary with an initial basic notion of syntactic rules and sound structures of words.

Stage 1 takes place from grade 1 to 2 (around the age of 6-7 for a USA child) in a child’s school life. This stage is distinguished by the ability to associate letters of the alphabet with the sounds of the language. Children at this stage learn how to decode words and have a preliminary understanding of the spelling/sound structure.

Stage 2 occurs around grades 2 to 3 (age 7-8 in the USA). Here, the child is seen as strengthening stage 1 by slowly starting to read individual words and short stories. Gradually, reading becomes more fluent and automatic, leading to increased ability to process meaning since less attention is devoted to decoding.

Stage 3 (around ages 9-13) is categorized by the increase of vocabulary and association of background knowledge. The child is able to cover a variety of reading material that ranges from simple books to magazines. The improvement lies in the ability to focus on more than one topic. The material in the initial phases of this stage are more focused but as the child gets older s/he is able to understand print from different viewpoints, form opinions and use this knowledge to argue in favour or against context.

Stage 4 (age 14-18) is represented by the strengthening of the higher-level processes that were forming in stage 3. The individual is able to go into depth with a number of concepts and facts, as well as to interpret and argue for or against many theoretical concepts. This stage is developed with the help of reading practice.

Stage 5 (age 18 and above) is categorized by the mastery of all the former stages. Students can read fluently and automatically while simultaneously selecting material, deciphering meaning and forming judgments about the context. They are able to form ideas and form opinions about these ideas. Whereas stage 4 is considered as the initiation of the process where a child is learning how to take a stand and form an opinion, this skill has not yet become internalized and automatic. It is only when the child reaches stage 5 that he/she would have conquered this skill, arguing for the word reading and understanding process becoming automatic in more-or-less their entirety.

In a nutshell the stage/phase theories create an opportunity to appreciate that children go through a developmental journey during reading. This begins at the early stages of
literacy development that gradually mature and move to higher level strategies, where
the individual becomes a fluent, independent reader. From the developmental
perspective our concern is to realize whether a child has reached a specific target.
Moreover, our interest in this thesis is not only to identify what target should be
achieved but also to understand what methods have been proposed to achieve reading,
and whether these methods are language specific. Therefore, the next section will
describe theories that have been suggested to explain lexical (reading through
orthographic properties) and non-lexical (decoding) strategies of reading, as well as
parallel and serial means of processing.

2.2.3. Lexical versus non-lexical access to meaning

One predominant theory of lexical and non-lexical routes to reading and meaning has
been the dual route theory. According to the dual route theory proposed by Coltheart
(1978), a reader is able to decipher a word by using two routes. The first route is
considered non-lexical, by which the reader uses phonological attributes to decode a
word. This path is usually used when words are unfamiliar. The use of the non-lexical
route would involve the decoding of non-words and real words that ultimately follow
a grapheme-phoneme rule. The use of a non-lexical route will result in reading and
spelling errors if used to decode words that do not follow the grapheme-phoneme rule.
A common way to measure decoding skills is through a non-word reading measure
since this method is the only way to be sure that novel words are read from a non-
lexical route. On the other hand, with words that are familiar, the reader uses a lexical
route, whereby the reader accesses the word directly from its orthographic features. A
store, or lexicon, of representations of written words is envisaged to provide the basis
on which the word is recognised, pronounced and its meaning accessed.

Dual route models are seen to form an influential theoretical framework when taking
into consideration reading and spelling skills. It has offered ways to identify particular
problems experienced by individuals with reading and spelling difficulties. One
example could be the inability to read irregular words or decode non-words by an
individual suspected of having a learning difficulty such as dyslexia (Rapcsak &
Beeson, 2004). However, studies suggest also that a number of poor readers who have
comprehension weaknesses but who are able to read words using a non-lexical route,
nonetheless have difficulty using a lexical path. During the process of speaking, the
semantic structure is activated automatically, yet the role of word meaning is not seen as a key component for accurate oral reading. Nation and Snowling (1999) compared two groups of students who were matched for phonological ability, chronological age and non-verbal abilities. Their findings indicate that the greatest deficit when reading words, and that is commonly shared amongst poor comprehenders, was in the area of semantics.

However, for this model to work, we need to consider the processes that go into letter recognition to support word identification, and add further views to consider how text comprehension occurs. Hanson-Smith (2003) suggested a serial letter recognition model. This model emphasizes a simple process in which reading is accomplished through identifying each letter in an orderly serial sequence. The more accepted model is a parallel model. This model supports the view that when reading takes place, letters and letter information are recognised concurrently as a whole chunk, with individual letters being organized in parallel. Different word alternatives are scanned in parallel until the correct word is selected. One example could be with the word 'rats'. Initially the word could be recognised as 'ruts', 'rots', 'cats', and 'rats'. Once the item that corresponds most closely to the perception is identified, it will be selected.

The comparisons between serial and parallel processing have also been made in terms of sentence comprehension. The problem here is to explain how accessing the meaning of individual words (for which the dual route model was developed) is transformed into the understanding of whole sentences. For example, more than one interpretation, on both a conscious and unconscious level, may be available for a given sentence. Again, two processes have been suggested (Coltheart, 1994). The first option includes the serial model. As mentioned above, a serial process selects only one alternative from the different possible choices. Clearly, there is no certainty that this selection will be correct. If it does not match other processes/information (e.g., it is syntactically inappropriate or semantically unlikely, or it does not match with meanings derived from previous sentences or concur with the type of discourse within which that the text fits), then another alternative is selected. The advantage of this model is that if the first choice is correct, then it is quick and efficient. On the other hand it can be very time consuming if the choice is not correct. The second option is processing the information through a parallel method of selection, which will
simultaneously offer a range of alternatives from which the correct meaning should be accessed. The advantage here is that processing can be speeded. The disadvantage is that it may take a lot of processing capacity.

However, models related to the dual route model may be criticised as focusing on comprehension difficulties as emerging problems from word processing. Although it has been widely accepted that decoding skills are highly related to reading comprehension, data also suggest that some 10%, and possibly as many as 25%, of poor readers do not exhibit decoding or single word reading difficulties (Cutting & Scarborough, 2006). For example, in a UK-based study conducted by Spooner, Gathercole and Baddeley (2006), 10-15% of school age children exhibited comprehension difficulties, despite demonstrating a good level of decoding skills. Furthermore, evidence shows that there are significant relations between decoding skills and comprehension skills in the early years of a child’s literacy development. However, this correlation decreases as the child matures (Catts, Hogan, & Adolf, 2005). Such evidence calls for the need to acknowledge that a percentage of children have comprehension difficulties due to reasons other than word decoding problems. Evidence for a dissociation between decoding and comprehension skills (Oakhill, 1994) reveals that problems exhibited in reading comprehension do not occur merely due to phonological and orthographic processing deficits (Perfetti, Landi, & Oakhill, 2005).

Finally, simple dual route models have been criticised (Ehri, 1999) for not taking appropriate developmental factors into account. According to Ehri the beginning of word recognition using a whole word, sight words approach, cannot be done through the use of rote memory as indicated in the dual route theory. Her view is that both irregular and regular words follow a recoding rule rather than learning the words by sight through visual cues. Additionally, as the child matures so do methods of reading, since the child learns how to chunk words in subword units. Her criticism is that the dual route theory cannot explain reading development, especially with the explanation of a lexical route to reading. She insists that reading cannot be completely separated from decoding strategies.

However, taking the area of reading comprehension as an area that these theories need further consideration, Wilson and Rupley (1997) introduced a reading comprehension
model where each child experiences three developmental stages for reading comprehension to take place. The first stage takes place when the child is between seven and nine of age. During this stage the reader comprehends written material because of a phonemic knowledge and an understanding at word level. This stage may be most consistent with the ideas that are the foundation of the dual route model. At a later stage, though, possibly between the ages of eight to ten, a reader strengthens understanding through the use of background knowledge. At a still later stage, from the age of 10 upwards, a child is able to comprehend by making use of the knowledge derived from a range of strategies. These latter stages are less consistent with the dual route model and, therefore, may need incorporating into more comprehensive models of skilled reading. (The discussion will return to considering how different strategies may support reading comprehension when the introduction considers schema theories in a sub-section below).

So far chapter 2 has provided an explanation of the milestones that children are expected to go through (according to Ehri, 1995, and Chall. 1991) during the course of reading and reading comprehension. Additionally this chapter has also provided an outline of the models that focus on the processes involved with the achievement of reading and reading comprehension. The central aim of this thesis is to concentrate on Maltese participants, who from a very young age are taught in both Maltese and English, languages that are very different in orthography (information about the Maltese language, educational system and context are given further on in this chapter). It was deemed important at this stage to offer a clear account of current and past research about the role different orthographies have with regards to reading and reading comprehension. For this reason the next section in this chapter illustrates findings from the orthographic depth hypothesis (Katz & Frost, 1992).

2.2.4. Orthographic depth and reading levels

The influence that different writing scripts has had on learning how to read and write has been an important area of research over the years. The debate has focussed on whether different orthographies affect the way that children acquire adequate literacy skills. Alphabetic orthographies largely depend on the phonemic sound of the letter for the reading of words, particularly new or unfamiliar words. Nonetheless, different languages can be represented by either a single sound-grapheme representation or a
number of sounds for one grapheme. The former illustration is used in languages such as Spanish, Italian and Turkish. These languages are known to be transparent or shallow languages. Each letter represents a sound. Alternatively, languages such as French and English are considered to be more complex since there are different sounds that can be represented by a letter. These languages are known as having opaque or deep orthographies. According to the orthographic depth hypothesis (Katz & Frost, 1992), a reading task should be easier in transparent languages due to the ability to associate a sound with each grapheme during decoding. Therefore having an intact phonological awareness system would facilitate the reading and spelling process. On the other hand, reading achievement in deep orthographies is more difficult to attain since letter sound correspondence is more uncertain. A study conducted on first graders from thirteen different European countries found that 90% of familiar words and non-words were read with no difficulty in transparent languages, but that this was not the case with opaque languages such as English, French and Danish (Seymour, Aro, & Erskine, 2003). The view of Seymour et al. was that this was due to the complexity of the orthography of the language.

The deep orthography hypothesis proposes two options for how a person is able to read a word and this depends on whether the language concerned is considered as having a shallow orthography or a deep orthography. It has been speculated that there are two routes in which a word is read; the logographic route to reading and the alphabetic route to reading. The logographic route uses visual structure and is used to read words as a whole and it is this strategy which is more likely to be used in language such as English and French, whereas languages such as Spanish and Italian, that are shallow, are more likely to be read by using an alphabetic route (phonology) that simply decodes a word by matching the letter with its sound (Elahi, 1999; Katz & Frost, 1992). Therefore word recognition for transparent/shallow orthographies is purely through using phonological methods, while non-transparent/opaque orthographies retrieve words through the orthographic visual properties. Results from a large number of studies (e.g. Wimmer & Hummer, 1990, Goswami, Porpodas, & Wheelwright, 1997, Thorstad, 1991, Goswami, Gombert, & De Barrera, 1998), support the claims stipulated by the orthographic depth hypothesis. Their findings point out that learning to reading is easier for children from shallow languages than for children who were brought up with opaque languages, such as English and French.
A large scale study (Seymour, Aro & Erskine, 2003) that tested children’s word- and non-word-reading abilities from 13 European countries found that children from shallow language were more fluent, with 90% of the participants being able to read single words fluently by the end of their first year at school. This result was not similar for children who come from opaque languages. For example English language participants took double the time to learn how to read.

Maltese and English orthographies are rather distinct one from the other mainly due to the diversity that is found in the languages, morphology and syntax. English is described as a deep orthography and reading is acquired by the use of both lexical and non-lexical routes. On the other hand, non-lexical routes will be sufficient in transparent languages such as Maltese, since all words are decoded by matching the grapheme-phoneme correspondence. The latter point was confirmed on a sample of Maltese students who read words far better in Maltese using a non-lexical route than they did in English (Xuereb, 2009). One interesting discovery found by Xuereb was that students diagnosed with dyslexia displayed a smaller number of reading errors in Maltese (transparent language) than they did in English (opaque language). This proposes that assessment and intervention for literacy difficulties such as dyslexia may have separate underlying difficulties in different languages, making orthography a prerequisite to the study of reading and reading comprehension. Of course it is also possible that Maltese children have a greater cognitive knowledge of Maltese words because their vocabulary in Maltese is vaster than it is in English – so they find it easier to identify a word in a Maltese context.

Until now this thesis has summarized some of the major models that are relevant to reading and reading comprehension. It has focused on aspects as to when a child is supposed to reach certain literacy targets. It has explained what processes occur during reading and it has described differences between orthographic scripts. However the principal interest in this thesis is reading comprehension and therefore it is only natural to include the most predominant theories that have influenced current knowledge and ideas specifically for reading comprehension. Therefore the next sections will include the simple view of reading model, interactive models and schema-based theories.
2.2.5. Simple view of reading

According to Hoover and Gough (1990), the ability to decode words and the ability to recognize spoken language are both essential skills to predict reading comprehension. Decoding refers to the skill of being able to link a particular sound to its letter and use these sounds to recognize words in a fluent and rapid manner. On the other hand, understanding spoken language involves the mastering of a number of other skills, some being: semantic knowledge, vocabulary acquisition and syntactic awareness. Gough and Hoover sustain that difficulty in decoding or/and linguistic comprehension will result in poor reading comprehension abilities. A number of readers, who have high levels of understanding skills, have been found to suffer from weak reading comprehension abilities. One cause of this could be because of poor decoding proficiency. These individuals will be described as students with dyslexia in this work. On the other hand, hyperlexia is a term typically used to describe children who have suitable decoding skills but lack the ability to understand spoken language appropriately. This view suggests that having a deficit in either one would create a difficulty in adequate reading comprehension.

The simple view of reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) has gained high credibility over the years. Its principle is to give a simple explanation of the basic skills needed for reading comprehension. As mentioned in the simple view of reading, it has been suggested that with intact word decoding skills and listening comprehension abilities a reader will be able to comprehend written material. Therefore, if a reader is competent in both general skills, he/she will be able to understand written text. However, if the reader is poor in either of these, then comprehension will suffer: i.e., it is assumed that both skills need to be at a suitable level for comprehension to take place. One important implication from studies on the simple view of reading was that in the earlier stages of reading acquisition, reading comprehension is mainly described as being dependent on word recognition skills; however, as children get older and more linguistically proficient, the influence of listening comprehension increases (e.g. Catts et al. 2005).

The simple view of reading has been criticized by a number of researchers who thought that the model excluded some important processes that are fundamental for adequate comprehension. For example, Nation and Snowling (1998) feel that
orthographic skills in addition to phonological processing are necessary for adequate comprehension. Other researchers argue for literacy levels to be influenced by inference/integration processing, as well as working memory and attention. For example, results from studies conducted by Oakhill, Yuill and Parkin (1986) support the view that poor comprehension is more likely to demonstrate difficulty in integration abilities. This has been challenged by the premise that the primary cause of difficulty may be due to weak memory processes rather than integration deficits: the study by Spooner, Gathercole and Baddeley (2006) found that poor comprehension was not related to significant integration deficits but was influenced by memory demands.

One influential variable that has gradually gained importance is the role that fluency has in comprehension. The idea is that although it is necessary to read words accurately, the speed at which words are read is important also. In the last decade a number of studies found significant correlations between reading comprehension and fluency (e.g. Shinn, Good, Knutson, Tilly & Collins, 1992). Joshi and Aaron (2000) maintain that fluency is a unique predictor to the successful outcome of reading comprehension. In their study, naming speed accounted for 10% of exclusive variance in addition to decoding and listening comprehension, arguing for speed to be an independent predictor of reading comprehension levels. Additionally, further studies by Joshi and Aaron also proposed that as the child gets older, the effect of fluency will increase. These results were formed from a study carried out with 139 students, where students were given measures of reading comprehension, listening comprehension, non-word decoding, orthographic processing, irregular word reading, word reading speed, and vocabulary. When the different grades were analysed simultaneously, a high 65% was dependent on word identification and listening comprehension. However, the outcomes of the results were very different when each grade level was analysed individually. The findings showed that the lower grades depended largely on word recognition processes, whilst this dependence decreased substantially with the older grades, where comprehension was highly influenced by a speed factor. Clearly, these processes may interact: for example, the less fluent reader may have to put more weight on working memory processes to support comprehension.
2.2.6. Interactive models

A more interactive view of reading would consider that printed information is understood through the use of both graphical and contextual cues. Reading comprehension is explained through the interaction of bottom up (decoding) and top down (context) approaches, where lower levels of processing influence higher levels of processing and vice versa (Verhoeven & Leeuwe, 2008). At lower levels, skills such as phonological awareness, word identification, fluency, automisation and word vocabulary is required. At higher levels, the ability to infer, interpret, working memory capacity and the ability to monitor what was read are needed (Bensoussan, 1998). Higher level proficiency enables the reader to deduce and incorporate meaning from text. Proficiency in lower level skills facilitates the attainment of higher level skills (Cain & Oakhill, 2006). Reading comprehension involves a communication between the two, where, if difficulty is encountered at one level, the other level may be able to compensate (Smith, 1994), though a deficit in one skill may result in a lack of understanding.

Although these more interactive models seem to explain many of the complexities of literacy learning and processing, they too have their difficulties. Whereas more simple serial models (those going from basic word processing to more complex understanding levels have formed the main part of the discussion up to now) allow us to focus on the processes within special elements of literacy, the more interactive model argues for a level of complexity that potentially requires research to consider all things at the same time. This level of complexity leads to difficulties of interpretation: is an effect due to one thing or another, or the interaction between the two. Therefore, highly interactive models can be criticised for their lack of parsimony and explanatory power. However, reading is a complex skill and the interaction between elements of that skill would seem worth considering – the present work will consider both word level and understanding level processes.

2.2.7. Schema-based theories

Anderson and Pearson (1984) argue that prior knowledge held by the reader determines the level of successful comprehension. Such views are typically referred to as Schema theories. (Although alternative names have been used in the literature, this section will use this term for ease of discussion.) These theories state that the reader
associates what he/she has read with what he/she is already knowledgeable about. In turn this process will aid and establish the level of understanding and recall that a reader achieves. The newly acquired information is linked to existing information making understanding an easier process. This can also help to envisage outcomes of what is being read. Stanovich (1982) proposes the idea that the use of prior knowledge can serve as a means to overcoming other weaknesses when reading. One example could be that the reader may find difficulty in decoding a new word yet is able to understand the context due to existing knowledge.

According to Schema theory, existing knowledge that is used to enable understanding is generally derived from the content of what is being read, the age of the reader and level of text difficulty, cultural background and relevance that the content has for the reader. This ability to associate makes it possible for the reader to link new ambiguous written material with already existing knowledge, thus creating a facilitating effect. Nonetheless, the opposite effect can occur if the reader associates the new information with fragmented knowledge or inappropriate terms and concepts. This would result in a false understanding and a lack of the meaning of what is being read (Kozminsky & Kozminsky, 2001). Being too dependent on what is known may cause interferences in what is being read. In simple terms, the reader's familiarisation with a particular topic may result in addition, exaggeration or even omission of some information being read, thus creating a distortion of events and leading to flawed understanding (Hynd & Alverman, 1986). Situations occur in which confusion is created as to whether a student performs badly in a task due to lack of knowledge, or whether there is a low level of ability in reading skills (Kozminsky & Kozminsky, 2001). Nonetheless, Schema theory encourages educators to take into consideration the knowledge and cultural background of the individual being assessed (Paris & Stahl, 2005).

Brown (2001) proposed two types of schemas: content versus formal schematic. The former reflects what the individual knows about the world around him/her; for example, in terms of culture. The second type involves knowledge of discourse structure. As cited above, studies in schematic theory associate the ability to comprehend text by the amount of passage content shared in the passage with the reader. This does not solely involve content of a passage but also an understanding of the way text is put together in different contexts.
Gernsbacher (1990) came up with the term ‘structure building framework’ to describe her theory on comprehension. She states that in order for readers to understand written text it is necessary to have basic foundations of words and sentences before any further input can be added. Once these foundations have been established and have become mental representations in memory, automatic links are formed between input and pre-existing knowledge. The higher the number and overlap of pre-existing facts, the stronger and faster the connection will be. However, if new facts are introduced which do not form part of knowledge in memory, then the whole process starts over at a much slower speed.

2.3. A reading comprehension framework and the current work

Perfetti’s et al. (2005) proposed a framework of reading comprehension that amalgamates the different views within one general framework. Perfetti inter-relates recognition, comprehension and representation, showing how word knowledge supports all three. A word must first be seen visually before it can be represented phonologically. So, readers must first recognize letters before they can give meaning to a visual representation of a word. This process works because the recognition of words leads to, but also depends on, the process of comprehension, which then relies on the ability of the reader to use what s/he knows of word levels. This leads, in turn, to the full representation and inference of the meaning of the text, which would be impossible without the prior linguistic and general knowledge of the reader. Comprehension takes place when the reader is able to construct a representation in his/her mind of a written message being conveyed. The framework proposes that comprehension happens through an interaction at various levels across a language domain. These levels involve word level, (lexical processes), sentence level (syntactic processes), and text level. Together these processes contribute to the reader’s conceptual knowledge, generating a mental representation of written material. This framework, and many of the theories discussed in this introduction, points to two key events for the success of reading comprehension: the recognition of words, and the combination of language processes.

The main rationale for presenting the theories discussed in this introduction was to obtain a general holistic idea of what reading comprehension is thought to be. Included in this section were models that discuss word and/or semantic levels,
orthographic knowledge and background knowledge. Although other theories offer explanations, all theories that deal with reading comprehension could not be covered in the space available. Therefore, theories that a) deal with the way words are processed and meanings assessed, b) rely on background knowledge for understanding and c) show how different orthographic scripts might impact on the acquisition of reading for meaning were the focus of discussion. The first of these is found in almost all cognitive-linguistic-developmental models of reading (the field of research that the present thesis falls within). The latter two areas are particularly important to consider in cross-language studies and, therefore, should be considered in the language context (Malta) that is the focus of the current thesis (this point will be considered further in subsequent sub-sections).

The specific objective of the work reported in this thesis was to inform the development of reading comprehension assessments for use within Malta — and the principal purpose for including the theoretical framework presented in this sub-section was to present the basic ideas for why a child may be falling below the reading levels expected by them. Although the concept is a simple one (i.e., measure reading ability), the actual development of an assessment tool is much more complex than might be expected and a theoretical framework for understanding the concepts involved can be useful. For example, an assessment may be influenced by many factors, such as whether the individual being evaluated is monolingual or bilingual, uses a different orthographic script to that in which the measures used in the assessment are based, or the cultural experiences of the individual being assessed. Similarly, a test will require more than one skill in order to accomplish the required tasks — and the above framework should provide a model to consider these skills.

Given that informing assessment practices is the main objective of the current work, at this stage of the thesis it seems appropriate to outline assessment process, with special attention to assessments across different languages.

2.4. Assessment across language contexts

Reading is a complex process (as the above should highlight) and there may be many reasons why a child struggles with learning to read. Many within educational spheres have recognised the importance of early intervention when difficulties are
encountered (see Reid, Elbeheri, Everatt, Wearmouth & Knight, 2009; Snowling & Hulme, 2005). For early interventions to be implemented, there needs to be a process of identifying those who are having problems. One way is to assess the ability in which problems may be encountered: e.g., to assess formally reading comprehension levels. The other is to assess those skills considered necessary for reading comprehension to develop to appropriate levels (i.e., based on some theoretical framework for the skills underlying reading comprehension). Therefore, it is useful to understand how reading comprehension skills develop and what methods can be used to assess those skills. Additionally, the assessment of reading comprehension should not be viewed as a skill that can be measured along one dimension but rather at different levels. Specific tools require a design that takes into account cultural background, linguistics, higher (e.g. syntax) and lower (e.g. word level processes) language skills, speed of processing, storage and memory recall abilities. The rationale of this section was to stress the importance of the need of assessment tools that measure reading comprehension whilst taking into consideration the significance of diverse cultures and assessment across languages. Unfortunately, it may be the case that simply translating diagnostic measures from one language to another cause more problems than benefits. For example, researchers such as Sireci (1997) and Wainer (1999) have argued that such procedures result in measures that produce invalid scores and, therefore, inappropriate assessment conclusions. Additionally, assessment procedures are not only affected by the underlying theoretical framework, but also by the legislative demands of a particular country which may require certain skills to be assessed whether the tools for assessing those skills are available in a particular language or not. For example, it may be the case that a child who has English as a second language may have to be assessed in English since English-language measures are the only ones available that fit with the legislative requirements of the country where the assessment is taking place.

Furthermore, what might be considered important to include in an assessment procedure in one country may not be the same in another country (see Smythe, Everatt & Salter, 2004). For instance, if we take into consideration the assessment of learning difficulties, the identification process may have to vary across languages. Phonological processing weaknesses are seen by many as being the principal deficit that delays literacy learning (e.g. Snowling, 2000). Although there is evidence that
this may be a consistent deficit across different languages (e.g., Zeigler et al, 2010), variations in the prediction of literacy levels provided by measures of phonological processing mean that such measures may have to vary with the language background of the child (Wimmer, 1993; Elbeheri, Everatt, Reid & Al-Mannai, 2006; Smythe et al, 2008). This may vary due to the orthography of a language. For example, predictors of relatively transparent orthographies (e.g., German or Hungarian) usually focus on measures of fluency, whereas accuracy measures seem to be adequate for less transparent scripts such as English (Smythe & Everatt, 2000). On the other hand, languages that use Chinese characters (such as Chinese and Japanese) as part of the orthographic representation of the language may require assessments that focus on the visual characters of a word (see discussions in Smythe & Everatt, 2004). Therefore, the type of orthography may need to be taken into account when determining the methods used within, and content of, an assessment procedure.

Unquestionably the amount of interest in cross-linguistic studies has gained importance over the last few years. The central findings of many of these studies should influence how assessment is conducted in different languages, since variations have been identified across languages/orthographies in (a) the rate of reading acquisition, (b) knowledge and understanding of the structure of a spoken language, (c) what strategies are used to read and (d) amount and extent of reading difficulties (Joshi & Aaron 2000; Smythe, Everatt & Salter 2004). One interesting result from the studies of Joshi and Aaron was that students diagnosed with dyslexia whose first language is considered an opaque language have been found to encounter problems based on reading accuracy deficits, whilst those learning more transparent scripts seem to have greater difficulty with reading speeds. These findings should be considered also in terms of how they might affect assessments of bilingual children.

The lack of diagnostic materials for bilingual or non-English speaking individuals has resulted in a number of uncertainties as to whether the individual being assessed truly has a disability or whether they show deficits on assessment measures because of developing second language skills (Valdes & Figueroa, 1994). In some cases, this has led to a wait-and-see requirement in an assessment procedure, meaning that identification, and hence intervention, procedures will be delayed until the individual has gained enough English as a second language competence to be assessed (see discussions in: Cline & Shamsi, 2000; Everatt & Reid, 2010). Therefore, the
appropriateness of some current assessments procedures can be questioned both practically and ethically. Waiting for the child to fail should be avoided as it may not only damage their self-esteem but also makes subsequent interventions harder to implement and less likely to be successful. Assessments designed for the language context within which the assessment is to take place should reduce these negative consequences.

In addition to the problems associated with when to assess, there are opposing views of how learning a second language can influence a child's cognitive functions. On one hand, it may be that second language acquisition will pose risks to the child's later cognitive development. On the other, learning of a second language may strengthen cognitive processing, particularly in the area of phonological awareness which has been consider in most of the theories covered above as important for literacy acquisition. The phrase 'cross-linguistic' influence (see Sciriha, 2001) has been used to portray the interplay between earlier and later acquired languages suggesting that, in bilingual cultures, two languages will affect each other - though the results of these effects will not necessarily be equal. Transfer between languages will occur in the process of second language acquisition; however, the amount and type of transfer may vary according to several aspects. Background factors, such as age, motivation, literacy and social class, make the learning experience of all individuals unique. Arguably, the amount of transfer is also related to the linguistic distance between the languages involved.

Bialystok (1997) claims that cross-linguistic transfer of phonological processing skills will show positive effects, since phonological knowledge of two sound systems should facilitate the development of both first and second language skills. Comeau, Cormier, Grandmaison and Lacroix (1999) state that this transfer between languages can be bi-directional: i.e., phonological awareness of the first language transfers to the second language during literacy development and that phonological skills developed as part of second language learning can transfer back to the first language, potentially assisting the development of literacy across both languages (see also Veii & Everatt, 2005). However, this viewpoint of transfer as a solely positive influence has been challenged. Researchers such as Oldin (1989) believe that the higher the similarity between two languages, the higher the chance that a learner will make mistakes. For example, in a study conducted on Spanish students who were learning English,
incidents of negative transfer were identified due to an interchange of sounds between English and Spanish (Durgunoglu, Mir, & Arino-Marti, 2002). Such transfer errors typically occur because of an overextension of an analogy (Doughty & Long, 2003): i.e., the learner uses a feature of the second language incorrectly because it shares similar features with an item in the learner’s native language (e.g., pronouncing a combination of letters in the way they would be in the first language rather than the way they should be pronounced in the second language). Substantial empirical research show documents where learners rely heavily on their existing linguistic knowledge, creating situations where generalization and familiarity formed within a first language can be transferred to a second language potentially leading to errors.

One of the major drawbacks in the creation of suitable measurements for bilingual students is the lack of psychometric benchmarks due to a lack of theoretical, operational and procedural understanding (Sattler, 1992). Few assessment tools are specifically designed to assess bilingual learners. In the vast majority of cases of bilingual assessment, the tools used have been developed for assessing monolingual populations (Valdes & Figueroa, 1994). Everatt, Smythe, Adams and Ocampo (2000) describe the assessment of bilingual students as complicated due to uncertainties distinguishing whether performance difficulties arise from a language barrier, a more specific deficit, such as dyslexia, or both. This is as much an issue for the reliable identification of students who are experiencing literacy learning difficulties as any other area of bilingual assessment. As documented by Cline and Reason (1993), reading complications may be shown due to a number of possibilities, such as a student’s socio-economic position, whether a student is bilingual, or whether the student is experiencing special learning difficulties. This has often led to an under-representation of students with dyslexia who are bilingual mainly because educators more often than not attribute problems to a language barrier rather than something else (Inner London Education Authority, 1985; Curnyn, Wallace, Kistan & McLaren, 1991).

Learning to read is considered one of the most vital prerequisites for a child’s academic success and, therefore, the early identification of problems associated with literacy learning difficulties has been an important focus of research in special education areas. One of the main features that this work has identified as an early predictor of literacy difficulties is phonological skills – particularly those associated
with phonological awareness. However, this focus has been argued to lead to children who exhibit no specific difficulty with phonological awareness or decoding words, yet have problems understanding text potentially being missed in early identification procedures and hence not benefitting from early intervention (see discussions in Landon, 1996). This may lead to a further complication for the assessment of bilingual children, due to the nature of bilingual development. It has been discussed already that there is evidence that bilingual individuals generally develop good phonological abilities due to having more than one phonological system. The idea is that phonological awareness is strengthened, potentially making it easier to decode words (e.g. Bialystok & Herman, 1999). Various studies, such as those conducted by Bialystok and Herman (1999), Rubin and Turner (1989) and Yolland (1993), have established that children who are exposed to a second language at an early age can develop stronger word level knowledge and awareness when compared to monolingual groups – indeed, if second language learning is taught at an early age, as little as one hour a week of exposure may support the development of stronger metalinguistic abilities (Yolland, 1993). This may mean that bilingual children will be more prone to be missed as having pre-curators to literacy difficulties because of their word level/phonological skills if the early assessment focuses purely on this area of processing. Yet, the bilingual child may still develop literacy difficulties, particularly in the area of reading comprehension. Consistent with this, there are circumstances where a bilingual learner is able to decode effectively, but may struggle with comprehending text (Campbell & Sais, 1995; see also Carrell, 1988). Therefore, the assessment of reading comprehension, and the skills that underlie it, may form a vital part of assessment practices within a bilingual context.

As discussed above, processing and understanding language has been found to be an important component of comprehending text, and indeed difficulties in language acquisition may be evident from the very start of a child’s exposure to the language (Pinker, 1994). This may result in a delay in literacy skills in the learner’s mother tongue and second language (Ortiz & Ramirez, 1988, in Maldonado, 1994) as well as behavioural problems, low self-esteem and may experience cultural identity issues (Omark & Erickson, 1983). However, again bilingualism can complicate these interpretations. For example, vocabulary is one of the most significant predictors for reading success (Richek, 2005). In addition, knowledge of vocabulary encourages
fluency improvement and reading comprehension achievement (Bromley, 2004). When Pearson, Fernandez and Oller (1992) examined a Spanish-English bilingual group of children, they found that vocabulary scores on the Peabody Picture Vocabulary Test (revised) were well below the average standardised score. Nevertheless, these students did not demonstrate literacy difficulties arguing for the view that during a bilingual upbringing many properties of the two languages may merge and support each other, thereby reducing the normal relationship between vocabulary and poor literacy levels identified in monolingual populations. Again, normative data from monolingual populations and/or tests developed on English-language dominant cohorts may not be appropriate to identify those who may struggle with literacy acquisition.

A large number of these diagnostic measures would have been created for and would constitute the norm for a monolingual population. Commonly, there is a premise that language development between bilinguals and monolinguals is similar and that the assessment of both can be based on the same criteria. In spite of this, studies in the area have suggested that bilingual learners develop alternative patterns of language development compared to monolingual groups (Grosjean, 1989) and the evidence discussed above indicates that caution is needed before we assume that an assessment tool developed in a monolingual English-language context would be appropriate for use in a bilingual population. Add to this that the literature regarding literacy difficulties and bilingualism has often focused on cognitive/linguistic factors and ignored elements of cultural affiliation and group identification with the language (Cline & Shamsi, 2000), as well as the socio-economic/political influences that can determine the use of a language, and the need for work within specific bilingual groups should be evident. The present work focuses on one such specific context, Malta, and therefore it seems appropriate to give some background details of this context for the reader.

2.5. The context of Malta

2.5.1. The Maltese language and alphabet

Malta’s history has left an imprint on the Maltese linguistic, educational and social heritage. Past conquests and cooperation treaties, such as those of the Phoenicians, Byzantines, Romans, Sicilian, French, and English, have left a legacy of cultural
characteristics, revealed in monuments, traditions, religion, and language. The Maltese language shows this history quite clearly in that it descends from the same root as Arabic but has been highly influenced by Italian and English. For example, it is also the only language in the world that is Semitic in origin but uses the Latin alphabet. The influence of both British and Italian occupations/co-operations led to a large number of ‘borrowed’ words used in everyday speech, but also to some using Italian as a second language as much if not more than English. When Malta became independent in 1964, the languages that were spoken by the majority of people were Maltese and English. Maltese was rightly given the title of National Language, and both Maltese and English are considered as official languages (Government of Malta, 1974), making Malta a bilingual country.

The Maltese alphabet consists of thirty symbols. These include all twenty six symbols of the English alphabet, with the exception of the letter ‘y’. This sound is replaced by the letter ‘j’ in Maltese. Moreover, the letter c becomes ċ in Maltese and is pronounced similarly to the sound of ‘ch’ in English. Four other symbols are included in the Maltese alphabet: ‘g’ that is equivalent to the English sound of ‘j’; ‘h’, that is equivalent to the sound of the voiced ‘h’ in English; ‘gh’ that is mainly a silent consonant unless pronounced at the end of a word, when it is also equivalent to the sound of the voiced ‘h’; and ‘z’, that is equivalent to the English sound of ‘z’. Additionally the letter ‘gh’ influences the length at which the vowels will be pronounced within a word, usually making the duration of the vowel sound longer when compared to words without the letter ‘gh’. The Maltese vowels of the standard variety are derived from Sicilian. These are ‘a’, ‘e’, ‘i’, ‘o’ and ‘u’, of which ‘i’ and ‘o’ are used to represent the closed vowels ‘e’ and ‘o’ whereas ‘u’ takes the equivalent sound of the consonant digraph ‘oo’ in English. The Maltese vowel system is similar to that of the English language, except for an extra letter ‘ie’ which is used to represent the ‘i’ sound and at times to represent certain diphthongs found in some Maltese dialects (Brincat, 2000). Overall, although there are inconsistencies between the written symbols and sound units of the language (particularly when spelling Maltese), the Maltese orthography has been considered fairly transparent for reading (see Firman, 2007). Therefore, Maltese assessment procedures (particularly those focused on assessing reading and writing skills) may be better based on other more transparent orthographies than on English.
However, Maltese is not without its complexities. Its historical development has led to some interesting features: “Maltese is a concatenative language masquerading as a root-and-pattern language” (Hoberman & Aronoff, 2003). According to Hoberman and Aronoff, “The Semitic Maltese verb themes have inherited prosodies and restricted ranges of vowel patterns – though far less restricted than those of Arabic – but the synchronic, productive processes of verb derivation work by affixation, with no particular prosodic properties”. Maltese has no indefinite article and a single definite article ‘il’ which takes the form of ‘il’ before a vowel or a silent ‘gh’ or ‘h’. Five consonants modify the ‘l’ to their own forms; these are ċ, ż, ċ, s, and ž (ič-ċajta: the joke; ċż-żebbuga: the olive; id-dinja: the world; is-sigra: the tree; iz-zija: the aunt).

It is in its semantics that Maltese reveals its departure from the Arabic mould. Since about 1300, the European Romance languages have had a great influence on its vocabulary, as has the English language over the British colonial period. The verbs derived from the Romance retain the Semitic conjugation, so that a verb like ‘kanta’ from the Italian ‘cantare’ (to sing), in which the Italian ‘c’ is replaced by the hard ‘k’, is conjugated with Semitic prefixes as opposed to the Italian suffixes. Some Romance nouns, like the word for ‘room’, ‘kamra’ (from the Italian ‘camera’) also adhere to Semitic plurals, ‘kmamar’, whereas most words take the Romance plural ‘karozzi’ for ‘karozza’ (car) or ‘fjuri’ for ‘fjura’ (flower) where the ‘i’ in Italian is replaced by ‘j’ for the same sound.

The most noticeable change from some Romance sentences, and practically all English ones, is the position of the adjective after the noun in Maltese. The sentence ‘Laura is a beautiful woman’ in English can be rendered as ‘Laura e una bella donna’ or ‘Laura e una donna bella’ in Italian but only as ‘Laura (hi) mara sabiha’, in Maltese. The verb ‘to be’ may sometimes be omitted from a sentence, or replaced by a pronoun. As in Italian, pronouns can be affixed to the verb: ‘tini’ for the Italian ‘dammi’ or the English ‘give me’.

### 2.5.2. Educational system in Malta

Though Maltese is by far the spoken national language, both Maltese and English take the role of official languages of the country (Camilleri, 1996). The acquisition of both languages is considered important for both social and educational purposes. The National Minimum Curriculum (Ministry of Education, 1999) views bilingualism ‘as
the basis of the educational system', where it states that students should be educated and instructed in both of the official languages (Sciriha, 2001). It is expected that by the end of compulsory schooling students are able to converse, write and read in both Maltese and English. However, this general policy hides quite large variations across groups/contexts within the country. For example, in state schools, Maltese is the preferred language. It is also the usual language spoken at home. On the other hand, independent and church schools use English as the principal language of instruction (Baldacchino, 1996). Many of the books used at school are available only in English and, of course, the Internet offers more options to the user of English.

As stated previously, Malta has three types of schooling: those run by the Maltese government (state schools), those run by the Catholic Church (church schools) and independent schools. In state schools, pupils attend co-educational primary school up to Year 6 (age 10) and then transfer to a secondary school (Form 1). Secondary schools, as opposed to primary ones, consist of single sex institutions. Up to 2010 there were two types of state secondary schools: Junior Lyceums and area secondary schools. To enter the Junior Lyceum, students were required to pass the Junior Lyceum examinations, and students who did not make the grade were automatically placed in an area secondary school. The subjects needed to pass into the Junior Lyceum were Mathematics, English, Maltese, Social Studies and Religious Studies, and students had to obtain the required grades in all 5 subjects despite the fact that the curriculum given to both secondary and Junior Lyceum schools was identical (Ministry of Education, Culture, Youth and Sport, 2008). This form of streaming from such an early age has been seen as far from ideal. A two year study conducted by Galea (1991) on students aged between 9 and 11 years, found that students who were placed in area secondary schools, (i.e., the low ability sectors) distanced themselves from the experience of schooling and felt it was not important in their life and future development. The study indicated that a high number of students in the secondary area disliked subjects such as English (which they felt they couldn’t understand) and mathematics (which involved too much memory work). They showed a preference for Maltese and subjects that were taught in Maltese. In addition, Galea’s study showed that a large number of students felt they were treated differently, mainly by being labeled as low achievers by both their peers and authoritarian figures, such as teachers and heads of school. This was confirmed in a study conducted by Pullicino (2001), in
which teachers who were asked to fill in a questionnaire regarding students, revealed that they considered students placed in the lower levels of the school system as being in the ‘failure’ groups with little hope for future achievement. These findings were evident as early as Year 5/Year 6, while the students were still in primary school.

Nevertheless, teachers seem to support the streaming system. According to Galea’s study (1991), many found that streaming is beneficial both for the school system (as an organizational strategy) and for the student. Their view was that teachers could concentrate on the students’ abilities, a task which would prove more difficult and may lead to lower academic standards if the students’ abilities were mixed (Gatt & Vassallo, 1988, Pace-Moore, 1999); though it is interesting to note that many of the teachers who approve of the system teach the ‘high achiever’ classes. However, this system of streaming created many problems, especially for students in the lower ability stream and many educationalists felt that it was unfair, and may potentially lead to lower self-esteem amongst, those in the ‘less able’ levels. These concerns have led to the adoption of a new system that began in 2011, and which involves a more inclusive approach where abilities will be mixed. (Note that this change in the state school system occurred following the data collection undertaken as part of this thesis.) The modification includes a number of amendments to the national curriculum to take account of the preferences of all students. The main aim is to promote education and to encourage more students to continue their studies beyond secondary education. Exams will continue to take place and these will take the form of a ‘National Exam’, where students will be tested in Maltese, English, and Mathematics. The language subjects (Maltese and English) will include oral tests. Although this system favours inclusive practices, as in the old system, there are few tools available to identify students experiencing literacy difficulties. For this to occur, it is necessary that all students are screened and assessment procedures used to understand why some students experience difficulties. Again, measures appropriate to the Maltese population would be a valuable tool for this purpose.

Church schooling is also very popular in Malta. It offers free education but donations are encouraged by the administration. Church schools follow the Roman Catholic religion and are divided into separate male or female schools and usually cater for students from the early primary (age 5) till the end of secondary school (age 16). Entry to a church school entails no specific requirement but is normally decided by
ballot (i.e., a random selection from a large list of applicants), although those who have a sibling already in the school usually are advantaged. All church schools have an inclusive policy and accept students with disabilities. However, most boys' church schools (and some girls' schools too) use a common entry exam prior to entry to secondary school meaning that students with lower abilities may not be able to enter a church secondary school and, therefore, will have to continue their schooling in a separate sector from that experienced at primary level. (See Ministry of Education, Culture, Youth and Sport, 2008.)

Independent schools are fee-paying. A large majority of these schools are co-educational, usually offering continuous schooling from age 5 to 16, and in some cases even 6th form classes. Independent schools have a first come first serve policy; no examinations are needed to enter. They follow an inclusive policy and offer a wide range of programs, including those that support students experiencing difficulties or with some form of disability. Students do not regularly repeat a year if academic performance is not up to standard. The system used in independent schools is one where informal assessment is ongoing: in most schools, formal exams take place twice a year (mid-yearly exams and annual exams). It is a common practice in most independent schools that children get regular profiling and screening. Independent schools are commonly run by a Board of Governors and/or parent foundations (Ministry of Education, Culture, Youth and Sport, 2008).

Malta’s educational process is divided into different phases. The initial phase is that of pre-primary education which, since it is not compulsory, leaves the parents with the freedom of choice as to whether to avail themselves of it or not. At this level there is no formal teaching as such, though activities are organized that are intended to stimulate the development of intellectual curiosity rather than imparting knowledge. The children are given an initial introduction to letters and numbers in an informal way often following a game pattern. When the child turns five, the law requires that s/he is introduced to formal teaching in a primary school. The main subjects that are taught evolve around behaviour and character formation, the teaching of Maltese and English (expressive and receptive language and grammatical rules) and Mathematics. Gradually, scientific and formal knowledge subjects (e.g. physics, chemistry, and biology, geography and environmental science, elementary notions about the human body and elementary technological concepts) are introduced. Moreover, creativity in
both the arts and sports is encouraged. Obviously, this does not occur in a vacuum but develops over the years from when the child is in Year 1 (5 years old) until Year 6 (10/11 years old). Subjects are taught both in Maltese and English. Students do not sit for exams until they have reached the end of Year 4 (8-9 year olds). After that, and throughout secondary schooling, exams take place twice a year - during the middle of the scholastic year (mid-yearly exams) and at the end of the year (annual exams). The mid-yearly exams are set by the class teacher, while the annual exams are set by education officers on a national basis. This is supposed to offer a micro (individual, class and school) and macro (national) view of the different levels and standards set and achieved by the schools. (See Ministry of Education, Culture, Youth and Sport, 2008.)

Secondary education occurs between the ages of 11/12 right up to the age of 16. The aim of secondary schooling is to master skills the foundation of which has been set in primary school (Maltese, English, another foreign language, Mathematics, Science, Geography, History, Religious Knowledge, Social Studies, and Physical Education); however, it is also intended to build a process where self-learning and problem-solving abilities are internalized. At the end of secondary schooling, students are expected to sit for the local Secondary Education Certificate Examinations set by the local University and some also sit for the General Certificate of Education, Ordinary Level, of British Examining Boards; though after the third year of secondary school, students may decide to further their studies in a trade school where subjects are more focused on technological aspects. If passed successfully, academic qualifications will allow the student entrance into higher secondary school/college. However, the latter option is not compulsory and students have the freedom to choose whether or not they would like to further their studies. Studies at post-secondary level are aimed at passes for the acquisition of intermediate and advanced certificates, though a specific level has to be attained for eventual entry into both local or foreign universities or other vocational colleges that offer graduate certificates, such as City and Guilds (Ministry of Education, Culture, Youth and Sport, 2008).

2.5.3. Assessment in Malta
Awareness about learning difficulties in Malta has taken a positive turn in the past decade. Consistent with the discussion above, interest has been directed towards ways
of recognising specific learning difficulties and the means to support students who have them. Nonetheless, techniques to identify students with literacy difficulties that are standardised for the Maltese population are rare. The method commonly used by psychologists in the identification of dyslexia is the discrepancy model: i.e., identification of dyslexia occurs when an inconsistency exists between results achieved on I.Q measurements and literacy performance. Smythe and Everatt (2000) point out that although there is some level of global acknowledgement of, and concern about, dyslexia, appropriate measures to assess difficulties are lacking in a very high percentage of countries and their respective languages. Research has been conducted primarily on English speaking groups and, therefore, may not be applicable to all countries/languages. As discussed above, cross-linguistic studies argue for assessment in different languages needing to focus on their own unique linguistic properties to be reliable (Goulandris, 2003). Even if the underlying deficits are the same across languages (Zeigler et al, 2010), the specific manifestation at a behavioural level still may differ across languages/orthographies.

Malta is considered to be a bilingual country, with most individuals experiencing Maltese and English as part of day-to-day life and schooling. However, the level of this experience may vary depending on the background of the child. The initial phase of early learning in Malta starts with the introduction of skills that involve oral aspects of Maltese and English at kindergarten level. Once the child enters school class levels, at the age of five, further language/literacy work is carried out (Mifsud, Milton, Brooks, & Hutchison, 2000). In some schools the dominant medium of instruction is Maltese, whilst in others it is English. The majority of state schools use Maltese as their medium of instruction for most subjects, with English being considered to be a separate curriculum subject. Children in these schools usually are exposed to the English language only during their English class. The National Minimum Curriculum (NMC) itself recognises that in most cases the school could ‘constitute the only source of learning in the second language’ (Ministry of Education, 1999). On the contrary, the majority of independent schools use English as their primary medium of instruction. As a result, these children have little exposure to the Maltese language outside of its use as a school subject. In both cases, children are not receiving adequate exposure to the languages in question (Baldacchino, 1996). Again consistent with the cross-language discussions above (see also Cline & Shamsi, 2000), this may
mean that it is difficult to distinguish whether difficulties that are encountered by a
child are due to poor language learning/experience or a specific learning difficulty.

Since both Maltese and English were adopted in the Maltese islands, certain linguistic
aspects of the two languages (e.g. their phonology, morphology, syntax etc) have left
an imprint on each other (Camilleri & Borg, 1993). For example, many words derived
from Latin languages have been replaced by words in English: the English word
‘nurse’ is more commonly used than the original Maltese word ‘infermiera’, derived
from the influence of the Romance languages (Spanish, Italian, Portuguese) (Badia-
Capdevila, 2004). Additionally, cases occur where, though the language being used is
English, the intonation is recognizably that of Maltese or where Maltese syntax seems
to be superimposed on that of English. There are also times when Maltese affixes are
added to English words (e.g. the English verb ‘check’ is given Maltese circumfixation
and becomes iċċekjajt meaning ‘I have checked’). This kind of evidence suggests a
clear interaction of the two languages. Indeed, such interference, or code-switching,
between English and Maltese is frequent amongst the Maltese people; and is referred
to by the terms ‘minglish’ or ‘maltenglish’. Many people (both children and adults)
use both languages within one or various sentences (Camilleri, 1995). For example
‘aghtiha kiss lill-baby’ translated into English would be, ‘give the baby (girl) a kiss’,
very often used colloquially, though there exist pure Maltese words for ‘kiss’ (bewsa)
and ‘tarbija’ (baby). When used appropriately and as a means of informal
communication it is seen as a useful tool. On the other hand, the mixture of both
languages can have negative impacts on areas such as language and syntactic ability
(on one or both languages). This could have repercussions on the appropriate learning
of either one or both languages. A large majority of the studies in Malta have focused
on the phonological switching that might occur between Maltese and English on word
level. Grech’s study (2006) found that during an English single word dictation
spelling errors were influenced by Maltese phonological knowledge. These errors
were carried out by both students with and without dyslexia. Errors occurring as a
result of Maltese influence seemed to be more persistent among participants whose
first language is Maltese. Most students who are dominant Maltese speakers applied
the Maltese sounds while writing words in English. The general difficulty was in
associating the appropriate grapheme with the sound rather than lacking phonological
awareness.
A study carried out by Firman (1994) demonstrates that students with literacy problems tend to confuse specific properties of Maltese and English, particularly when dealing with phonological skills in each language and being asked to discriminate between sounds in the different languages. Similarly, research has found that some Maltese learners erroneously apply English sounds to the Maltese context and vice versa (Brincat, 2000). In a study conducted on Maltese children, Xuereb (2009) argued that although phonological processes were important for reading development in Maltese, measures of phonological awareness were not the main predictor of Maltese literacy skills. This finding is contrary to many studies performed on English populations and Xuereb concluded that the difference may be due to the transparent and non-transparent forms of the two orthographies (see discussion in the next section). Xuereb found that the speed of processing and phonological memory were stronger predictors for reading and spelling of Maltese, which may be consistent with its more transparent orthography.

Although there is an interest in the teaching and acquisition of literacy in Malta, few formal academic studies have been conducted and reported in the literature. Martinelli (in a study presented at the 31st International School Psychology Association Conference, 2009) conducted a cross-national comparison of scores produced on an English standardised test by a group of Maltese students from both independent and state schools against scores achieved by UK students. The results from this study argue for poorer reading scores to be achieved by the Maltese students compared to their British counterparts.

Another study, by Mifsud, Milton and Brooks (1998) and commissioned by The Ministry of Education of Malta, aimed to determine the base level of English literacy within a Maltese population of children aged 6-7. An English standardised test, the Literacy Baseline within the Reading Progress Tests series (Vincent, Crumpler, and de la Mare, 1996) was used in the study. This test battery measures phonological awareness, literacy concepts, letter names and sounds, reading at the sentence and word level, and spelling. The project also aimed to design parallel Maltese versions of the test battery. The Maltese version was developed by a group of Maltese professionals who were specialist in the Maltese language. One critical condition in the design of the Maltese test was that the words to be included should consist of high-frequency words that a large number of seven-year-old children would encounter.
either at home or school. As opposed to the mainly monosyllabic words which the Literacy Baseline of the English language test features, the Maltese test adopted more bisyllabic words of higher frequency (a Semitic language, typically, possesses more bisyllabic than monosyllabic familiar nouns), while preserving similar skills to those assessed by the English test. Data collected from Maltese students, in both the Maltese and English versions, found that scores from both were relatively high. The average score was higher for the Maltese language test than it was for the English language one, but this difference was not significant. However, it was argued that both the Maltese and English tests were able to distinguish students who were experiencing literacy difficulties based on a follow-up study performed on the same group of students when age 9-10. Although this provides some promising work in the field, both tests have been described by the authors as part of pilot studies and were not available for use by other researchers at the time of the data collection conducted as part of the work in the present thesis. Additionally, the original test developed by the authors was designed for a younger age group than the one targeted in this thesis. For these reasons, this test was not used in this thesis.

The assessment process has different protocols according to the different types of schools. The Maltese Government uses the services of the Child Development Assessment Unit (CDAU). This unit focuses on the assessment of special needs students where special attention is given to early intervention. The Specific Learning Difficulty Unit (SPLD unit) caters for students who have specific difficulties such as those of a dyslexic nature. Church schools use the services of two psychologists who normally form part of the pastoral team. Independent schools are usually considered as using private practice. The CDAU and SPLD units are open to all; however, due to long waiting lists, many tend to resort to using private assessments.

Protocol and development for access arrangements in Malta were originally put together on the basis of two important documents: Arrangements for Candidates with Particular Requirements-Guidelines of the Ministry of Education, Malta (2002) and Access Arrangements and Special Considerations: Regulations and Guidance Relating to Candidates who are Eligible for Adjustments in Examinations, 1 September 2006 - 31 August 2007 of the Joint Council for Qualifications, UK (2006). The basic guidelines are that students with specific learning difficulties should have documentation that is certified by an educational psychologist (or by a suitably
qualified psychologist) and an assessment that appraises literacy skills. The latter can be drawn up by either an educational psychologist or a specialist teacher. These assessments must be made using standardised tests that evaluate reading accuracy, reading speed, spelling, handwriting speed and legibility.

The main test that is used to assess reading accuracy would normally involve an untimed test of single word reading. A student is only given concessions if the reading accuracy score is less than the 10-year age equivalent level. Therefore, if a child who is 15/16 years of age, is sitting for his/her ‘O’ levels, the Matriculation Certificate or University level examinations, and obtains a reading age score of 10 years or above, he/she is not given any special concession, such as a Reader during exams. This does not exclude the fact that students might have age appropriate reading levels, but nevertheless experience difficulty with the speed at which they read, which can create time constraints during examinations and/or hinder comprehension levels. Assessment, therefore, also involves a timed measure that includes word reading accuracy, speed and comprehension. This test is used to determine if a student with specific learning difficulties should be given extra time during examinations. The test that is regularly used in Malta for this purpose is the Neale Analysis of Reading Ability (NARA II). The ceiling age for this test is thirteen years of age, and applicants only qualify for extra time if the standardised score for reading speed, comprehension and accuracy falls below 10 years of age. (We will return to a discussion of this test in the study chapters.)

This can lead to a number of problems and questions with regard to its suitability in Maltese contexts. Primarily and most obviously, there is the fact that since barely any Maltese tests exist, the standardised scores being evaluated are those intended for British/Australian cohorts. There has been a number of attempts to design word reading tests in Maltese and English over the years. Falzon (1972) tried to create an English reading test, while Bartolo (1988) created a single word reading test in Maltese, and, for children in Year 1 (age 5), there is a Maltese-language version of Clay’s Concepts About Print test (Martinelli, 1996). However, the only test used to date is the single word reading test of Bartolo. Moreover, these tests can be viewed as either out of date or too narrowly focused on the reading of single words and in terms of the targeted age range. The aim of the work in this thesis is to support the
development of more comprehensive assessment tools, particularly those that focus on the assessment of reading comprehension skills.

In 2006, The Special Needs Unit of Malta launched the Dyslexia Assessment Research Project (D.A.R.P.). This project had three main objectives, which were 1) to determine what an assessment procedure for dyslexia in Malta should consist of, 2) to create tests for a variety of age groups that were specifically standardised on a Maltese population and 3) to devise a system which could evaluate levels of both Maltese and English in the assessment of bi-lingual abilities in different age groups. To date no results for this project have been formally presented.

2.6. The present work

2.6.1. The need for the present research
As mentioned at the beginning of this chapter, reading comprehension involves a number of processes and functions that individually play an important role in the development and progress of reading for meaning. Theories about developmental stages indicate milestones that students need to go through during learning, whereas cognitive-linguistic theories provide insights as to the processes, or skills, needed to acquire reading and writing. Nonetheless one major problem is the fact that many of these theoretical viewpoints were based on studies of monolingual English speaking populations and, therefore, may not be applicable to different orthographies and cultures. The rationale behind the studies reported in this thesis is linked to the fact that, although Malta is considered a bilingual country and both Maltese and English are recognised as official languages, the level of language competence can differ considerably between the two languages due to factors such as social and economic background that leads to children being educated in different school systems (state, church or independent), the introduction of compulsory secondary schooling (in 1971) which lead to variation in skills between generations, and historical links that have led to differing groups within the islands associating themselves with different backgrounds. Despite these differing skills levels in the two languages across groups within Malta, to date, the only formal tests for literacy difficulties in Malta are conducted primarily in English. However, there is a need to determine whether these are appropriate for the Maltese context, particularly given that the majority of children in state schools will experience an education system that focuses on Maltese. These
problems have been recognised and attempts have been made to address them at different intervals; though, with very little success. In particular, tests to assess comprehension difficulties in Malta remain inadequate and the main aim of this thesis is to inform the development of more useful assessment tools in this area.

Initially, the work reported in this thesis will involve research that aims to provide evidence for the efficacy of such English language reading comprehension measures for Maltese children. Additionally, given that the aim of the current work is to use measures of reading comprehension in order to inform learning difficulties assessment practices in the Maltese language, the work reported in this thesis will involve the development of a measure of Maltese reading comprehension. Finally, for assessment processes to be effective, an understanding of the processes that play a part in Maltese reading comprehension would be useful and, therefore, the research also aimed to inform work on the identification of such predictors both within typically developing children and those identified as having literacy learning difficulties.

Although in Malta there are three different types of schools that children can go to (state schools, church schools and independent schools), it was decided that this dissertation would focus on children who attend state schools. This was done in order to focus primarily on students whose first language is Maltese. As indicated above, a large majority of church schools and independent school students use English as their means of communication both at school and at home. The work reported in this thesis was aimed specifically at students whose first language is Maltese, who may be most at risk from the use of inappropriate English-language based assessments. The samples of children targeted involved those who were aged between 8 and 13 and who attended schools from different parts of the country, in order to be representative of the country population. Children in this age range were chosen since around 8 years of age is typically the earliest point at which most assessments are performed, and when reading comprehension skills are starting their main period of rapid development so that by the age of 13, we would expect a child to comprehend written text well. It is hoped that this research and study will contribute to the eventual standardisation of reading comprehension tests for Maltese speakers by providing samples which will prove of significant value in the development of the diagnosis of literacy difficulties in Malta.
2.6.2. Ethical considerations

It was important at this stage to take into consideration the impact that the research might have on children. It was necessary to keep in mind the potential discomfort or anxiety that the child might encounter. Therefore, it was imperative that the research coincided with the code of ethics. All the material to be used was, therefore, given to the Maltese Ministry of Education to evaluate and grant permission for the research. Additionally all parents received a letter well ahead of data collection to explain the aim and content of the study. All students who participated had the authorization of at least one of their parents. Furthermore, the students were informed about the purpose of the study and were given the choice of participating or not. They were notified that they could drop out of the study whenever they wished. All students who took part in the current work had a signed parent consent form and all the tests were approved by the Ministry of Education in Malta.

2.6.3. Training of additional data collectors

Although much of the work reported in this thesis was performed solely by the author, there was a need to seek the cooperation of two assessors/examiners to help in the collection of data in the larger studies conducted. Both were trained by the main researcher (the author of this thesis) prior to collecting data. These examiners were two final year psychology students who were contacted by the Dean of the Faculty of the University of Malta; the Dean was contacted by the main researcher to support the search for suitable assessors. These two students were aware of the general aims of the work and volunteered to take part in the research. Training took place over 3 mornings. On the first day, the students were informed what the project was about and the important implications for assessment of children that it entailed. Additionally, the examiners were given a detailed explanation about why the material being used was seen as necessary for this kind of study. A manual with the necessary information, instructions and marking sheets was handed out to the examiners who were asked to read it carefully. During the second morning, the examiners were shown how to use the tests and were given the opportunity to practice on each other. On the third morning, they were shown how to mark the tests. Again, this involved being asked to test and mark the assessments on each other.
Chapter 3:
Study 1: Assessment of English reading comprehension levels in children within a Maltese-English bilingual context

3.1. Introduction

English standardised tests are commonly employed in Malta for the screening and diagnosis of students who are experiencing literacy difficulties. However, it is questionable whether the content in such an English-language based assessment battery would be suitable for children for whom Maltese is their first, or dominant, language. Although a learner may be capable of communicating in English (or is expected to in the case of Malta), if they have been brought up in a household that speaks another language (Maltese), the probability of receiving a reliable achievement score may be much lower than for an English-background test-taker (Figueroa, 1989). Scores gained by these students on such an English measure may not reflect their true literacy ability, particularly if scores are compared to standardization norms derived from first language English children. Although rarely formally tested in a Maltese context (the present study aims to inform such a consideration), one might expect those for whom English is not their first language to score, on average, worse than those for whom English is the dominant language. Therefore, norms for such tests may over-estimate the number of children performing poorly on the measure. This may lead to over-diagnosis of literacy disabilities (such as dyslexia). Alternatively, large numbers of potential diagnoses may lead to a reconsideration of the point at which poor scores are considered indicative of learning difficulties; i.e., the cut-off point for a diagnosis may be lowered for Maltese children compared to English children. However, there are currently no formal criteria for such a lower cut-off point and the test used may not be sensitive at low-score extremes. Similarly, the findings discussed in the previous introduction chapter also present the possibility that Maltese students may perform well on word level (accuracy) literacy measures, but poorly on measures of reading comprehension (or reading rate). Each of these conditions may lead to misdiagnoses among the Maltese population group, particularly if dyslexia as a word-level problem is the focus of assessment. For this reason this chapter will focus on a study where levels of reading comprehension, speed of reading and reading accuracy will be measured using an English-language standardised test used in Malta.
in order to investigate the results produced by typical groups of Maltese state school children.

The objective of the study reported in this chapter, therefore, was to look for evidence that an English test, standardised on British populations, would be appropriate to use in assessment procedures that aim to identify students with a specific literacy learning difficulty who come from a Maltese language dominant background. The Neale Analysis of Reading Ability (NARA; Neale, 1989) was chosen since it is often used as a diagnostic tool in Malta to assess whether a person is experiencing literacy difficulties (Firman, 1994). It also has the features that children are required to read passages aloud in English and, therefore, assesses reading accuracy, that the time taken to read is measured allowing an assessment of reading rate, and that after each passage, a number of comprehension questions are asked about the passage providing an indication of reading comprehension. Hence, this test can be used to determine levels of ability in all three areas for each Maltese child tested.

3.2. Method

3.2.1. Sample

Participants were recruited from different state schools across Malta. The students belonged to three different classes that were a year apart from each other, two in primary school (Years 5 and 6) and one in secondary school (Form 1). A total of 133 children, aged between 8 and 12 years, participated in the study. A breakdown of the participants mean age, gender and year group is shown in table 3.1.

Table 3.1. Number of children in the first and second part of study 1 by gender and mean age per class group

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Mean age</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First part</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 6</td>
<td>24</td>
<td>16</td>
<td>10y 7m</td>
</tr>
<tr>
<td><strong>Second part</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 5</td>
<td>13</td>
<td>16</td>
<td>9y 4m</td>
</tr>
<tr>
<td>Year 6</td>
<td>19</td>
<td>17</td>
<td>10y 4m</td>
</tr>
<tr>
<td>Form 1</td>
<td>16</td>
<td>12</td>
<td>11y 4m</td>
</tr>
</tbody>
</table>

Forty (40) participants took part in the first part of the study. All students attended state schools and formed part of the Year 6 age group. The participants’ ages ranged from 10 to 11 and all but 2 spoke Maltese as their first language. A further 93 students participated in the second part of the study. Again, all students went to state schools
and belonged to three different age groups and classes: Year 5 and 6 of primary school, and Form 1 of secondary school. All these children spoke Maltese at home as their first language. There was no evidence from school records that any of these children had been diagnosed with literacy learning problems or other special educational needs. There was no evidence from government records that the schools from which the children were selected were atypical of state schools.

### 3.2.2. Test information and procedures

For both the first part and the second part of the study, the Neale Analysis for Reading Ability (NARA; Neale, 1989) was used. This test is standardised on ages 6:00 to 12:11 years. The average time for assessment should be about thirty minutes. The content of the assessment battery includes six passages that increase in difficulty and length. The NARA comprises two testing forms (Form A and Form B), one for younger ages and one for older ages. The first part of the study employed Form B, while the second part of the study made use of Form A. Forms A and B both contain British standardised passages with Form A typically been used for children aged 7 years and below, whereas Form B is used with students aged older than 7. The test offers a method of assessing reading accuracy and rate, in addition to comprehension, in a sentence context rather than with isolated words, which are often used in tests of word reading accuracy. Consistent with the procedures for the test set out in the manual, the child's reading accuracy level was determined from the errors made while reading each passage, reading rate was measured via the time taken to read each passage and reading comprehension was assessed by the number of questions about the passage answered correctly. Again consistent with manual information, if the child was unable to decode a word while reading, the examiner supplied or prompted the particular word with which the child was having difficulty. This way, comprehension questions could be asked about passages even if reading errors were made: the intention of the questions asked after reading the passage is to assess comprehension rather than decoding. However, reading was discontinued if the child made more than 16 errors in a passage (or 20 errors in the last passage). In this case the comprehension questions of the discontinued passage were not asked and the time for that passage was not used in the calculations of reading rate. An example at the beginning of the session was used to demonstrate what was expected from the children and to determine whether the participants understood the procedures. Each
student was tested individually in a separate quiet room. Reading age and comprehension age was derived from the raw score using the normative tables in the manual.

As mentioned above, 6 passages are included in the NARA reading booklet; the first 5 allow a maximum number of 16 reading errors, while the last narrative allows the participant to reach 20 reading errors. The raw scores to evaluate reading accuracy levels in the NARA (for the first 5 passages) are calculated by subtracting the number of mistakes from 16 (and 20 in the last passage). For example, a child who does not perform any mistake in passage 1 will receive all 16 points. If the reader makes 3 mistakes in passage 2, s/he will receive 13 points (16-3). Once all subtractions are done, they are added up and a raw score calculated. The results are inserted into the raw score section in the individual record prepared for each participant. The raw scores are later compared to age groups in a conversion table found in the instruction manual, which are in turn organised in years and months. The reading ages in the NARA are calculated by computing an average raw score of each age group and comparing them against the chronological age from a sample of 1760 students aged between six years old and twelve plus.

The speed of reading is timed (in seconds) for each participant, added up and inserted in the individual record sheet. The NARA calculates the number of words read per minute by totalling the number of words read by the participant across all passages, dividing this by the total speed taken to read the passages and multiplying this figure by sixty. It is important to only include passages that are read by the participant. Once a raw score is achieved, it is compared against a conversion table where the student’s reading rate age is obtained.

The assessment of comprehension involves totalling the number of comprehension questions answered correctly. The maximum number of points that can be achieved is 44. (Note that, if the participant produced 16 or more errors in the first 5 passages or 20 or more in the final passage, the participant is not asked the questions relating to that passage and the test is discontinued.) The child’s score is entered in the individual record sheet and a comprehension age is calculated by matching the raw score to the conversion table in the NARA manual.
3.3. Results

The results produced by the children in the first part and second part of the study can be found in Table 3.2. Additionally, a one-way between subjects ANOVA was conducted (see Table 3.3) to compare the difference between the measures for Year 5, Year 6 and Form 1. A post-hoc Tukey HSD test indicated that there indeed was a significant difference between measures, thus showing that reading comprehension and reading accuracy differed according to grade level.

This indicates that for both reading age (based on the reading accuracy score) and comprehension age for each group of Maltese children, the score was well below expected based on the children's chronological age. Given that there was no reason to believe that these groups of children were poor readers/comprehenders, it would seem reasonable to argue that the norms under-estimate the reading levels of these state sector school children. Norms derived from English-language monolingual children may not give a true representation of the reading/comprehension ages of children within the context tested and, therefore, need to be treated with caution. This is even more the case, given that a large number of children did not complete the test passages, even when Form A of the NARA was used which is typically found to be more appropriate for younger cohorts of children.

Table 3.2. Results from the first and second part of study 1 that offers a mean age for comprehension, reading age and speed of reading.

<table>
<thead>
<tr>
<th></th>
<th>Mean chronologic age (years)</th>
<th>Mean reading age</th>
<th>Mean comprehension age</th>
<th>Mean speed age</th>
<th>Number completing all six test passages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First part</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NARA Form B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 6</td>
<td>N=40</td>
<td>10.06 (SD=1.95)</td>
<td>8.05 (SD=1.95)</td>
<td>7.95 (SD=1.91)</td>
<td>9.92 (SD=2.25)</td>
</tr>
<tr>
<td><strong>Second part</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NARA Form A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 5</td>
<td>N=36</td>
<td>9.33 (SD=1.74)</td>
<td>8.50 (SD=1.74)</td>
<td>7.75 (SD=1.67)</td>
<td>10.06 (SD=1.90)</td>
</tr>
<tr>
<td>Year 6</td>
<td>N=29</td>
<td>10.33 (SD=1.79)</td>
<td>9.67 (SD=1.79)</td>
<td>8.90 (SD=1.86)</td>
<td>10.54 (SD=2.76)</td>
</tr>
<tr>
<td>Form 1</td>
<td>N=28</td>
<td>11.33 (SD=1.95)</td>
<td>10.67 (SD=1.95)</td>
<td>10.92 (SD=1.83)</td>
<td>11.45 (SD=1.92)</td>
</tr>
</tbody>
</table>

Key = Number completing all six passages = the number of students who read the passage through from 1 to 6.
Table 3.3. Comparison between measures of Year 5, Year 6 and Form 1

<table>
<thead>
<tr>
<th>Reading comprehension</th>
<th>Anova df = 2, 90</th>
<th>Year 5 v year 6 Mean difference (MD) and p-value</th>
<th>Year 5 v Form 1 MD and p-value</th>
<th>Year 6 v Form 1 MD and p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading comprehension</td>
<td>F=31.78, p&lt;.001</td>
<td>MD=1.14, p=.009</td>
<td>MD=-3.16, p&lt;.001</td>
<td>MD=-2.01, p&lt;.001</td>
</tr>
<tr>
<td>Reading Speed</td>
<td>F=2.91, p&lt;.06</td>
<td>MD=.47, p=.66</td>
<td>MD=-1.39, p=.051</td>
<td>MD=-.91, p=.233</td>
</tr>
<tr>
<td>Reading Error</td>
<td>F=13.97, p&lt;.001</td>
<td>MD=-1.14, p=.01</td>
<td>MD=-2.16, p&lt;.001</td>
<td>MD=-1.01, p=.02</td>
</tr>
</tbody>
</table>

3.4. Discussion

The NARA (Neale, 1989) offers a test that measures reading accuracy and reading comprehension, while also taking into consideration the speed of reading. It is extensively used for assessment purposes in Malta. The NARA is standardised on students who originate from English speaking countries. The aim of the NARA is to offer a broad understanding of the reader’s comprehension levels and reading ability, which potentially can be used to identify those experiencing difficulties in decoding, comprehension or both. Despite its widespread use and potential for assessment purposes, the results from this study found that those participants in the Year 6 who were given Form B (which should be appropriate for this age cohort) obtained reading comprehension and reading accuracy scores well below (approx 2 years) than what would be expected based on their chronological age. Form A (typically used with cohorts of children aged 7 years or below) was found to be more appropriate for these Maltese state school children whose ages ranged from 8 to 12; although even with this form, the students’ score was still below their expected level.

These findings concur with those obtained by Hutchinson, Whiteley, Smith and Connors (2003) in a longitudinal study which found that bilingual students were one year behind monolingual English norms on the NARA, and it took between two to four years for the bilinguals to catch up with their monolingual counterparts. A study conducted by Frederickson and Frith (1998) compared the comprehension level of students whose second language was English with a group of students who were assessed as having specific learning difficulties. Their results indicated that participants who were bilingual scored low on comprehension levels but not on phonological decoding. Frederickson et al. argued that linguistic competences take
longer to be achieved than word level skills, a view shared by Beech and Keys (1997) who propose that limited comprehension is characteristic of second language-learners due to weak semantic and syntactic components and delayed vocabulary development. In addition, Fredman (1990) holds that the development of established reading and comprehension skills is ‘culturally defined’. This phrase implies that most of the material inserted in the passages and the vocabulary used should tally with the reader’s everyday vocabulary. For example the word ‘wall’ in English could include the concept of a wall of defence, as in ‘city walls’ but that our city walls are called ‘swar’, the correct translation of which in English is ‘bastion’, a word that has become practically anachronistic in the English language. So a simple word like ‘wall’ in an English text might convey a completely different image or even concept to a Maltese reader, especially at so young an age. Children would definitely understand the meaning of the word wall but it would be unlikely for them to associate it to the image of bastion.

Therefore, the participants might have encountered vocabulary and linguistic problems when reading the NARA passages due to barriers based on the cultural context within which they were learning. Practitioners/assessor, therefore, may need to be aware of variations that transpire between different population groups.

A controversial subject that has proved of primary importance in the area of reading and reading comprehension has been the assessment process in identifying students who are encountering difficulties of a dyslexic nature rather than those due to a language barrier. Traditionally, the identification of dyslexia was supported by a discrepancy between average or high intellectual functioning (IQ) as opposed to poor reading performance. The differences between an IQ-based predicted reading score and the actual scores achieved in a test of reading indicated that a learner had a specific learning difficulty (Cotton, Crewther & Crewther, 2005). The discrepancy definition of dyslexia assumes that students with learning difficulties display levels of achievement in academic subjects that are significantly lower than their average academic potential (intelligence). According to Stanford and Oakland (2000), the discrepancies between intelligence and achievement and the knowledge of specific underlying cognitive deficits is a way of strengthening the understanding of the nature of learning difficulties. Psychologists in Malta apply this discrepancy model to assess learning difficulties. Therefore, they compare scores achieved from a chosen
intelligence test to the scores achieved on an ability test. One of the tools used by
many practitioners to measure ability is the Neale Analysis of Reading Ability (1989).
However, the results of this study indicate a need for caution in this process. The
conflict lies in trying to work out whether a reader's low scores are the result of an
underlying literacy difficulty or due to the unsuitability (inappropriateness) of the
chosen test for a particular population; i.e. how do practitioners distinguish between
students who are experiencing literacy difficulties as opposed to those who do not
reach the satisfactory score due to low level language ability. Therefore, in the context
of Malta and because of the scores obtained in this chapter, very careful attention
should be paid to a final assessment and generalization of the results acquired
specifically by and for this particular population. The purpose is not to discredit or
question the Neale analysis in itself, but rather to adjust the focus so that a proper
evaluation can be made when it is used for a context which differs from that for which
it was standardised. Additionally, there is also the question of whether the vocabulary
and context material used in the Neale analysis reflect a Maltese society. If it does
not, then poor scores may reflect cultural background rather than reading skills. For
these reasons, it was considered important that specific reading comprehension tests,
specifically designed for Maltese children, should be created to measure their reading
comprehension. The aim was to develop suitable reading comprehension passages
that would take into consideration the (Maltese) students' culture, vocabulary and,
above all, language rules. The next chapter discusses how these reading
comprehension passages were created and tested on a number of Maltese students.
Chapter 4:
Study 2: Development of a Maltese language reading comprehension measure

4.1. Passage and question development

Currently, Malta lacks suitable standardised measures to assess language and cognitive skills for students who are experiencing difficulties. As seen from the previous chapter, the scores obtained by students were well below their chronological age when reading and reading comprehension were assessed by tests standardised on a British population. Based on these findings, and the arguments presented in chapter 2, the development of a specific Maltese reading comprehension moving on to test was undertaken. This chapter gives an outline of the design, creation and development of this reading comprehension test, written and executed in the Maltese language. In addition, the chapter will also present the results of work to determine the usefulness of the test in terms of ease of use, variability across school year cohorts and estimates of reliability.

Given that the Neale Analysis of Reading Ability (NARA, 1989) has been used extensively in assessment practices in Malta (see previous chapters), the present development work used this test as a basis for the construction of a Maltese language test. The NARA was used initially as a model in terms of the structure of the test and the measures used. The aim, therefore, was for the Maltese test to require children to read aloud passages of Maltese text so that reading accuracy, speed and comprehension could be assessed. Passage structure was initially considered by using simple translations of English passages from the NARA to Maltese. Therefore, as an initial step, several passages from the tests were translated literally from English to Maltese. However, the purpose of developing the test was not to produce a translation of an English measure, but rather to produce passages that reflected the development of reading comprehension levels within a Maltese student cohort, and the translation procedure created several problems with the passage development. One was the restricted vocabulary used in Maltese compared to English which made it difficult to vary the passages in the same way as in the English tests (this point is discussed further below). In addition, the concepts used in the English language passages were developed to be appropriate for British and Australian samples. These
language/cultural differences produced passages that were less appropriate for Maltese-background children and, hence, the Maltese passages were revised to be similar in length and topic to the original English tests, but different in terms of vocabulary and concepts. Therefore, the initial translated passages were changed completely, while still conforming to the general framework of the translated versions, in order to ensure that the passages were suitable for the Maltese students who formed the target population of the test. These additional adaptations involved the use of a number of reading books that formed part of the Year 6’s Maltese syllabus. Year 6 was chosen since this was the school year that was the expected primary target of the work — though use around this grade would be valuable too.

An example of this can be seen in the passage named Jan of the NARA (Form A). The original version of the passage is:

Jan buckled on her diving belt of metal weights and dropped from the launch. Skipper Kells supervised her air-hose to prevent tangling. Leo, following the bubbles, guided the dinghy above the diver as she searched the mysterious underwater world. Jan surfaced frequently clutching crayfish. The required number of specimens was almost obtained when the grey nurse shark advanced directly towards her. Jan retreated cautiously without signalling for assistance. The creation brushed by, ignoring her, as baby sharks emerged from some rocky grooves. Their welfare was more important to the shark than the diver’s now motionless figure.

This was revised to the Maltese passage below:


An approximate translation from Maltese to English would be:
Anna wanted to go sea-diving. She examined the oxygen tank to confirm that there was sufficient oxygen for the next half hour. She put on her goggles and placed the breathing pipe in her mouth. Anna was amazed at the beauty that she saw. All types of fish. Some large and many small ones, fish in many different colours. It was like an underwater rainbow. Just before Anna was going to re-surface, she saw a wonderful vision. A pod of dolphins all swimming together. She remained silent and perfectly still. She didn’t even draw a breath. However, some time later and against her will, she was forced to hurriedly return to the boat. Every day she thinks of the good fortune she’d had that day.

In this passage, the main themes and ideas, character development, sequence of events and vocabulary level were very similar between the original English passage and the developed Maltese version. This was in order to retain the level of comprehension required from the English version. However, the Maltese version is very different from the original in terms of cultural concepts/terminology used. Language was also varied in order to include familiar vocabulary/ideas while ensuring an appropriate level of difficulty for the passage. Compared to English, Maltese has a relatively restricted vocabulary. English often has more than one word to represent a concept. For example, ‘welfare’ in the original English passage above could be easily changed to ‘safety’, whereas this would not be as easily achieved in Maltese. The smaller vocabulary also makes Maltese words relatively more familiar than the English equivalent might seem. For example, the word ‘re-surface’ in English would be ‘to go up’ in Maltese, using the same word as one would use in ‘to go up the stairs’; ‘bomblu’ for (oxygen) tank uses the same word as that for (gas) cylinder; ‘pod’, for dolphins, uses the generic word for ‘group’; ‘underwater’ is ‘under the sea’; the Maltese word for ‘goggles’ is the same word that would be translated from ‘mask’.

Additionally, vocabulary size in English allows tests to increase difficulty by using words for concepts that we would expect only older children or adults to be familiar with: e.g., ‘delight’ has a lower frequency than ‘happy’. In Maltese, such simple replacements of higher frequency words for less familiar words with an identical or similar meaning are much harder to achieve. Therefore, the Maltese version increased complexity by increasing the number of words used in a passage: the first passage was the shortest and contained relatively easy concepts than those in subsequent passages, and the last passage was the longest and included the most difficult concepts in the
test. All the words relate to objects, places or activities with which children would be very familiar. Hence, on a word level, the Maltese passage content involved larger numbers of familiar words when compared to the passages in the English tests.

The length of the passages in the Maltese test were longer than those used in the NARA also because Maltese uses prepositional affixations and the need for sentences to represent the typical form with which the child would be familiar. Sentence structure was considered in collaboration with a Maltese teacher and writer of Maltese texts for children. Based on this work, it was decided that a simple translation from the English version did not reproduce typical Maltese rhythms that would be familiar to the target population, perhaps because the formation of the past tense is much easier in Maltese than it is in English. Hence, again the passages developed for the Maltese test varied from the original passages obtained from the NARA. Although the final passages developed for the test still followed the models adopted by the NARA, the changes outlined above led to passages to be comprised of completely new topics and contents that were based on concepts with which the target students should be familiar, as well as varying in vocabulary use and sentence formation.

In similar fashion, questions were developed according to the information or concepts contained within the Maltese passages and based on characteristic Maltese language/culture. The number of questions ranged from 4 to 8 per passage, with the longer passages allowing more questions to be asked. Although answers to most questions could be found in the passage, a number of questions required the child to make an inference and/or prediction for a correct answer to be made. According to Cain et al. (2004), the skill to infer accurately is essential to determine whether or not a child has understood what s/he has read. It is necessary for the reader to be able to integrate and infer his/her understanding on two separate but related levels: on a sentence level and on a general knowledge one. For example, in the example passage above, one of the questions asked why the underwater scene was like an underwater rainbow. The answer to this question can be found in the 4th and 5th line, where it clearly states that there were ‘All types of fish. Some large and many small ones, fish in many different colours. It was like an underwater rainbow’. On the other hand, another question asked ‘why did Anna have to re-surface’? For someone who understood the passage and the importance of the oxygen under water, the answer would state something along the lines that she only had enough oxygen to last 30
minutes and that she had to re-surface before this ran out. This answer is not explained directly in the text and needs to be inferred by the student.

All passages and questions were given to the Maltese teacher/writer for proof reading and evaluation. Following revisions, a total of 11 passages and associated questions were finalised and used in the following pilot work.

4.2. Pilot 1

These 11 passages were piloted on 23 10-11 year old Maltese children in Year 6 (final year) of state sector primary schools. Of these, 14 were male and all but one indicated speaking Maltese at home as their dominant language. These children were given the 11 passages to read out loud to trained assessors. The assessor noted reading errors and timed the reading, following procedures used in the NARA, with the exception that, whereas the NARA imposed a word error limit to indicate when the participants’ reading should be stopped, the Maltese procedures involved reading being interrupted for two reasons: the first being if the child specifically asked to stop, and the second being determined by the child showing evidence of great difficulty, such as taking a long time in reading and showing signs of frustration and/or embarrassment. The NARA procedure was not used for two main reasons. First, Maltese passages were, on average, much longer than the NARA texts. This would argue against the specific error limit used in the NARA; i.e., there was no reason to assume that this would work in the same way in these longer passages. Second, Maltese is a transparent language (see chapter 2) and, therefore, fewer reading errors might be expected. Again, the Maltese reader who makes far fewer reading errors than those considered important in the NARA may have the same level of difficulty as the English child reaching the stop-criteria in a NARA passage. Therefore, the same stop-criteria may lead to very different outcomes to those intended by this procedure in the NARA. Appropriate stop-criteria, therefore, would need to be considered independently to that used in the NARA and will have to follow further research on the Maltese passages developed. However, the research did not want to cause unnecessary stress to the children taking part in the studies and, therefore, stop-criteria related to signs of stress/upset were used.
Table 4.1. Mean scores, with standard deviations in round brackets and minimum to maximum scores in square brackets, produced for the 11 passages on each of the measures.

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<thead>
<tr>
<th>Passage</th>
<th>Number of words</th>
<th>Number of questions</th>
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<th>Reading Accuracy</th>
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<td>(3.62)</td>
<td>(92.87)</td>
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After each passage, the assessor asked the child the questions associated with that passage and recorded the answers produced by the children. The test took between 20 to 30 minutes to complete for most children and the results produced can be found in table 4.1. The reading comprehension score was the number of correct comprehension questions answers produced across the 11 passage. Reading speed was the total time,
in seconds, taken to read the passages. Reading accuracy was the number of reading errors committed across all the passage.

The results from this pilot study were used to reduce the number of passages in the test from 11 to 6 in order to select the most appropriate passages and avoid over-testing the children. The passages deleted at this point were either too simple for the participants (e.g. passage 1 and 3) and resulted in scores being skewed, comprised too many words (i.e., passage 11) or produced distributions of scores that were similar to another passage. The work related to this pilot study also led to a number of comprehension questions and some of the passage text being deleted. Questions were considered for deletion if they were found to be too easy, too difficult or confusing for the children in the pilot study. For example, when a question was answered correctly by nearly all students in the different age groups, or approached ceiling and altered the distribution, the data were re-analysed omitting the question to determine the distribution of scores without that question being included. This evaluation was done several times for different questions across the different passages to provide the best distribution of scores for the passages (basically, as close to normal as possible): graphs of scores were visually inspected as part of this process. These procedures were undertaken ensuring that the test could also distinguish between levels. The initial passages in the test were expected to be relatively easy for the eldest group. As the passages advanced, it was expected that children in the youngest group would struggle. Additionally, whole passages were either revised or removed for the same reasons (too easy, too difficult or confusing). Similarly, passages 1 and 2, and passages 10 and 11 produced results that were similar and, therefore, only 2 and 10 were retained. The word content of some of the passages was lessened by omitted sentences that were seen as irrelevant and did not influence how questions could be answered. Overall, this reduction in material reduced the time taken to complete the test and, therefore, should avoid problems related to boredom or tiredness.
### Table 4.2. Revisions made to the passages.

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### 4.3. Pilot 2

The remaining 6 passages were piloted on a further 17 year 6 state sector primary school children. The children were aged between 10 and 11 years old and 10 were male. All but one indicated speaking Maltese at home. The children were tested by trained assessors following the same procedures as for pilot 1. Measures of reading accuracy, reading rate and reading comprehension were again produced. The results can be found in Table 4.3. The procedures used were generally similar to those used in the NARA. Children were asked to read a passage orally and after the passage was read, a number of comprehension questions were asked. The passage was timed and the number of reading errors noted. Students were permitted to look at the passages after each question asked if they wished. The only difference between the Maltese reading test and the NARA was that the examiner did not have a set number of reading errors to discontinue the test. In the NARA, students do not continue if they make 16 (or 20 in the last passage) or more mistakes while reading the passage. The
same procedure was difficult to establish since the word level of the NARA was much shorter than that used for the Maltese measure.
Table 4.3. Mean scores, with standard deviations in round brackets and minimum to maximum scores in square brackets, produced for the 6 passages on each of the measures.

<table>
<thead>
<tr>
<th>Passage</th>
<th>Number of words</th>
<th>Number of questions</th>
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The results suggest that there is a reasonable spread in scores on each of the measures, with the level of difficulty increasing across passages as expected, consistent with the aims of the measure. Although it is not standardised, the measure offers an initial profile of Maltese children's reading skills and may be able to distinguish those students who have appropriate word reading skills while exhibiting low comprehension levels.

4.4. Main study

Given that these 6 passages seemed to be working well in that they were producing expected results and the procedures could be followed by assessors and children, the next logical step was to assess the measure using a larger sample. The pilot work focused on Year 6 children. The present study included children one scholastic year below (i.e., Year 5 children) and one above (i.e., Form 1 children) to provide an
indication of whether the test could distinguish between groups whose reading experience would be expected to vary.

A total of 126 students were tested. All students attended state schools and all were Maltese speakers as would be expected from the population of children attending state schools in Malta (Baldacchino, 1996; Firman, 2007). The group comprised 59 males and 67 females and their ages ranged from 8 year 9 months to 12 years 8 months. These children were in Years 5 and 6 of primary school and Form 1 of secondary school. Table 4.4 provides details of the children included in the study.

Table 4.4. Numbers of children in each year group, with male:female numbers in brackets, and average age.

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</tbody>
</table>

A range of state sector schools across Malta were selected to provide a reasonably representative sample of Maltese state school children. Three of the schools were primary schools in which the targeted Year groups (Year 5 and 6) had either 4 or 5 different classes with approx 28-30 students per class. In order to select an appropriate number of children in each year group, the parents/guardian of every sixth Year 5 or Year 6 student on the register were contacted and asked to consent to their child participating in the project. A similar process was undertaken for the four secondary schools, with the parents/guardian of every third child on the Form 1 registers of the schools being asked to consent to participation. Four secondary schools were contacted in order to include two female schools and two male schools. Testing procedures followed those described in the pilot work. The procedures used were similar to those found in the NARA manual, the only difference being again that the Maltese version did not use a word error limit as a means of stopping a reading. Reading was only stopped if the child asked specifically to end the session or when it became clear that the child was encountering great difficulties or required too long a time to continue reading. After each passage, the assessor asked the child the
questions associated with that passage and recorded the answers produced by the children. The test took between 15 to 20 minutes to complete for most children.

Tables 4.5 to 4.7 present the descriptive statistics generated by the participants. The results are divided into grade levels and a total score is provided. The mean scores indicate that, as expected, the older the group the better the scores. They also indicate that there was a clear distinction between the scores achieved by the three different school year groups (Years 5 and 6 and Form 1) assessed. The greatest number of questions answered correctly came from the eldest group, while the youngest group answered the least amount of questions correctly. Although passage 1 showed similar scores across all three groups, this passage was intended to be the easiest passage so that the majority of participants should have few problems reading it. Although the mean number of questions answered correctly is similar between the three groups (Year 5, Year 6 and Form 1), the speed at which the different groups read the passage differed from one group to another. Year 5 read the slowest, Year 6 read the second slowest while the Form 1 group read the fastest. These differences progressed throughout the passages. Although these differences were small, they were valuable since they clearly showed the gradual improvement that is achieved from one year group to the other. This was also very clear with reading errors performed by the participants. The initial passages show little difference, yet in the last passage, the difference in reading errors between the youngest group (Year 5) and the eldest group (Form 1) is doubled. Statistical comparisons (ANOVA) were conducted between the groups (Year 5, Year 6 and Form 1) on the measures of reading comprehension, reading speed and reading accuracy, followed by Tukey HSD post-hoc test. The results of these analyses are presented in Table 4.8. Overall, the youngest students (Year 5) performed worse than the other two groups (Year 6 and Form 1) on reading comprehension and reading speed but no significant mean difference was found between the youngest and eldest group. Similarly differences where found between scores between Year 6 and Form 1 on reading comprehension and reading speed but none on reading accuracy.

These results show that the passages created for the participants were easier or more difficult depending on age, and therefore also fulfilled one of the main aims of this chapter; i.e. to create passages that were able to distinguish between different levels and age groups.
Table 4.5. Means, standard deviations (SD), minimum (Min) and maximum (Max) scores for the reading comprehension measure.

<table>
<thead>
<tr>
<th></th>
<th>N=126</th>
<th>Passage 1 (max = 4)</th>
<th>Passage 2 (max = 4)</th>
<th>Passage 3 (max = 7)</th>
<th>Passage 4 (max = 7)</th>
<th>Passage 5 (max = 6)</th>
<th>Passage 6 (max = 6)</th>
<th>Total score (max = 34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 5</td>
<td></td>
<td>Mean 3.95</td>
<td>3.19</td>
<td>4.60</td>
<td>3.93</td>
<td>1.96</td>
<td>1.21</td>
<td>19.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SD 0.31</td>
<td>0.82</td>
<td>1.50</td>
<td>1.60</td>
<td>1.66</td>
<td>1.22</td>
<td>4.43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Min 2</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 4</td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>27</td>
</tr>
<tr>
<td>Year 6</td>
<td></td>
<td>Mean 3.87</td>
<td>3.31</td>
<td>5.29</td>
<td>4.60</td>
<td>2.69</td>
<td>2.31</td>
<td>22.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SD 0.34</td>
<td>0.92</td>
<td>1.57</td>
<td>1.35</td>
<td>1.59</td>
<td>1.85</td>
<td>5.31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Min 3</td>
<td>1</td>
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<td>2</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 4</td>
<td>4</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>34</td>
</tr>
<tr>
<td>Form 1</td>
<td></td>
<td>Mean 3.85</td>
<td>3.86</td>
<td>5.50</td>
<td>5.26</td>
<td>3.88</td>
<td>2.60</td>
<td>25.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SD 0.21</td>
<td>0.41</td>
<td>1.30</td>
<td>1.21</td>
<td>1.34</td>
<td>1.64</td>
<td>4.09</td>
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<tr>
<td></td>
<td></td>
<td>Min 3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 4</td>
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<td>7</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>33</td>
</tr>
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</table>
Table 4.6. Means, standard deviations (SD), minimum (Min) and maximum (Max) scores for the time taken to read the passages.

<table>
<thead>
<tr>
<th>Year 5</th>
<th>Passage 1 (time: 34 words)</th>
<th>Passage 2 (time: 60 words)</th>
<th>Passage 3 (time: 102 words)</th>
<th>Passage 4 (time: 219 words)</th>
<th>Passage 5 (time: 291 words)</th>
<th>Passage 6 (time: 344 words)</th>
<th>Total score (time: 1050 words)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No =126</td>
<td>Mean 21.16</td>
<td>39.58</td>
<td>72.21</td>
<td>188.71</td>
<td>258.57</td>
<td>311.80</td>
<td>913.22</td>
</tr>
<tr>
<td></td>
<td>SD 6.00</td>
<td>12.35</td>
<td>20.84</td>
<td>75.56</td>
<td>86.67</td>
<td>94.51</td>
<td>286.36</td>
</tr>
<tr>
<td></td>
<td>Min 14</td>
<td>24</td>
<td>48</td>
<td>100</td>
<td>120</td>
<td>172</td>
<td>542</td>
</tr>
<tr>
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<td>120</td>
<td>393</td>
<td>452</td>
<td>517</td>
<td>1571</td>
</tr>
<tr>
<td>Year 6</td>
<td>Mean 18.47</td>
<td>35.32</td>
<td>69.44</td>
<td>168.38</td>
<td>229.20</td>
<td>284.67</td>
<td>803.05</td>
</tr>
<tr>
<td></td>
<td>SD 4.32</td>
<td>9.82</td>
<td>21.83</td>
<td>60.86</td>
<td>80.86</td>
<td>100.93</td>
<td>270.26</td>
</tr>
<tr>
<td></td>
<td>Min 10</td>
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<td>38</td>
<td>94</td>
<td>134</td>
<td>130</td>
<td>479</td>
</tr>
<tr>
<td></td>
<td>Max 31</td>
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<td>164</td>
<td>342</td>
<td>497</td>
<td>591</td>
<td>1639</td>
</tr>
<tr>
<td>Form 1</td>
<td>Mean 16.83</td>
<td>30.02</td>
<td>57.81</td>
<td>149.51</td>
<td>186.37</td>
<td>233.02</td>
<td>670.31</td>
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<tr>
<td></td>
<td>SD 3.27</td>
<td>6.02</td>
<td>14.68</td>
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<td>55.30</td>
<td>70.61</td>
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<tr>
<td></td>
<td>Min 8</td>
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<td>96</td>
<td>115</td>
<td>117</td>
<td>433</td>
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<tr>
<td></td>
<td>Max 26</td>
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<td>92</td>
<td>391</td>
<td>322</td>
<td>402</td>
<td>1146</td>
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</table>
Table 4.7. Means, standard deviations (SD), minimum (Min) and maximum (Max) scores for reading errors committed while reading the passages.

<table>
<thead>
<tr>
<th></th>
<th>Passage 1 (34 words)</th>
<th>Passage 2 (60 words)</th>
<th>Passage 3 (102 words)</th>
<th>Passage 4 (219 words)</th>
<th>Passage 5 (281 words)</th>
<th>Passage 6 (344 words)</th>
<th>Total score (1060 words)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No =126</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 5</td>
<td>Mean</td>
<td>0.21</td>
<td>0.77</td>
<td>0.93</td>
<td>4.65</td>
<td>6.87</td>
<td>8.39</td>
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<tr>
<td></td>
<td>SD</td>
<td>0.51</td>
<td>1.52</td>
<td>1.21</td>
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<td>7.85</td>
<td>7.50</td>
</tr>
<tr>
<td></td>
<td>Min</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
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<td>4</td>
<td>35</td>
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<td>35</td>
</tr>
<tr>
<td>Year 6</td>
<td>Mean</td>
<td>0.18</td>
<td>0.44</td>
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<td>4.36</td>
<td>6.07</td>
<td>6.98</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>0.53</td>
<td>1.07</td>
<td>1.96</td>
<td>6.18</td>
<td>6.15</td>
<td>8.39</td>
</tr>
<tr>
<td></td>
<td>Min</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>28</td>
<td>24</td>
<td>38</td>
</tr>
<tr>
<td>Form 1</td>
<td>Mean</td>
<td>0.05</td>
<td>0.12</td>
<td>0.88</td>
<td>2.05</td>
<td>4.56</td>
<td>4.44</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>0.21</td>
<td>0.39</td>
<td>1.56</td>
<td>3.59</td>
<td>5.30</td>
<td>6.10</td>
</tr>
<tr>
<td></td>
<td>Min</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>18</td>
<td>23</td>
<td>30</td>
</tr>
</tbody>
</table>
Table 4.8. Comparisons between Year 5, Year 6 and Form 1 children

<table>
<thead>
<tr>
<th></th>
<th>Anova df = 2, 123</th>
<th>Year 5 v year 6 Mean difference (MD) and p-value</th>
<th>Year 5 v Form 1</th>
<th>Year 6 v Form 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading comprehension</td>
<td>F=20.11, p&lt;.001</td>
<td>MD=-3.11, p=.008</td>
<td>MD=-6.52, p&lt;.001</td>
<td>MD=3.41, p=.003</td>
</tr>
<tr>
<td>Reading Speed</td>
<td>F=9.70, p&lt;.001</td>
<td>MD=110, p=.046</td>
<td>MD=242, p&lt;.001</td>
<td>MD=132, p=.015</td>
</tr>
<tr>
<td>Reading Error</td>
<td>F=2.85, p=.075</td>
<td>MD=-3.02, p=.74</td>
<td>MD=-9.34, p=.07</td>
<td>MD=-6.32, p=.26</td>
</tr>
</tbody>
</table>

Internal consistency (Cronbach Alpha) values for the scores produced via the answers to the comprehension questions were calculated to ensure that the items were measuring the same underlying construct/factor (i.e., reading comprehension). The comprehension score for each passage produced by each child was used in these calculations in order to determine whether the passages comprehension scores were consistent across the participants. Reliability scores were calculated for each school-year group (i.e., Year 5, Year 6 and Form 1 separately). The comprehension score reliability values were .73 for the Year 5 group, .76 for the Year 6 group and .73 for Form 1. These results argue for adequate internal consistency: i.e., whatever the comprehension scores are measuring, they are doing so fairly consistently across the passages. Given that the test was designed to assess reading comprehension and was based on current tests within the literature (hence, it is most likely measuring what those other tests are measuring), the most obvious underlying construct is that of reading comprehension – the process of develop argues against the test measuring something else consistently.

4.5. Conclusions

The intention of this chapter was to develop methods of assessing reading comprehension in Maltese. The starting point of the work was the need to design measures appropriate for a Maltese population. At present, there are no standardised measures that evaluate reading comprehension levels in Maltese. Therefore, a number of Maltese reading comprehension passages were developed and tested on Maltese students attending state schools to inform the development of such Maltese language tests. These measures can later be used as the basis of assessing text comprehension levels amongst Maltese-speaking children. For example, the findings from the work
clearly show a difference in the results obtained from the three different school year groups (Years 5 and 6 and Form 1) tested. The highest number of questions answered correctly came from the Form 1 group (eldest group), while the Year 5 group (youngest group) replied correctly to the lowest number of questions. The same was true for the number of reading errors and the time taken to read the passages. Both the pilot work and main study also gave valuable information regarding what procedures needed to be taken and evaluated when administering reading comprehension batteries amongst Maltese children. For example, one of the procedural aspects that was modified from the NARA was the stop-rule.

Future chapters of the thesis will use the reading comprehension measure developed. The development of these passages offers an initial contribution to the understanding of Maltese reading comprehension and consequently to the creation of future measures for aloud reading comprehension assessment. However, reading for comprehension, typically, is not an oral task in everyday life: reading silently is more usual. Therefore, the objective of the next chapter in this thesis was to investigate potential difference in reading comprehension tests when reading was performed silently rather than aloud.
Chapter 5:  
Study 3: Comparisons of silent and aloud reading comprehension in Maltese

5.1. Introduction

The ultimate aim of reading is to understand what is written. However, there are several ways (styles) of reading that can lead to understanding; though it may be that one way is optimal in terms of providing the most efficient way of determining meaning. Two of the main ways that have been used in assessments of reading comprehension are to require the reader to read aloud what is written or to allow them to read silently to themselves. The reading comprehension tool developed as part of the work reported in this thesis requires the child to read aloud. If silent reading produces different levels of understanding for bilingual Maltese students, then this tool may be inappropriate for assessment purposes and additional measures/tests may have to be developed to supplement or replace the current tool. This chapter aims to outline whether any differences are present between levels of Maltese reading comprehension when reading silently compared to when reading aloud amongst a Maltese population.

Distinctions between the processes and functions that take place when reading aloud versus silent reading have been debated in the literature, but are still inconclusive. A widespread view was that the two shared similar cognitive processes. This claim was formed from outcomes of studies that have found little evidence of significant differences between the two modes of reading (Poulton & Brown, 1967) and those studies that have established that phonological processing was essential during both (e.g. Spoehr & Smith, 1975; see also Juel & Holmes, 1981). Holmes and Allison (1985) investigated different methods of reading and their effects on reading comprehension levels. Participants (a) read aloud to a group, (b) read aloud to themselves, (c) read silently, or (d) read silently to oneself in conjunction with listening to the passage being read from a tape. The results indicated that although students performed worst when reading silently while listening to a tape, there was no difference in the level of comprehension found between silent reading and reading aloud to oneself.
Results obtained from research over the years have led to conflicting notions about which mode of reading is the best for understanding. On the one hand, some research concludes that aloud reading is the better mode for comprehension. This was demonstrated in studies such as those by Swalm (1972) and Elgart (1978), which found that children between the ages of 7 and 9 performed better in aloud reading compared to silent reading. Other researchers (e.g. Hopkins, 1997) have argued that silent reading is a more reliable approach to determine understanding, since it is more likely to allow individual styles of reading and adaptation to the reader’s speed. During aloud reading, attention may be largely devoted to word decoding, leaving a minimal amount of attention space to comprehension (Nuttall, 1996). In a study conducted by Bryan, Fawson and Reutzel (2003) sustained silent reading practice resulted in positive outcomes for a large number of students, including those who were considered to be ‘slow readers’. Sustained silent reading allows the student to read silently to themselves without the potential negative feelings associated with assessment or time constraints that may occur when reading aloud to a teacher or others. It allows the teacher to emphasise the importance of reading as a daily activity, thereby increasing practice, and the students to understand that reading can be used as a recreational activity rather only for academic purposes. This method of supporting reading acquisition has been welcomed by the National Reading Panel of the National Institute of Child Health and Human Development, (NICHHD, 2000). However, this USA panel have also argued that such methods would only work effectively if students were monitored. Indeed, the NICHHD (2000) states that the evidence does not indicate whether silent reading is better for understanding nor whether it is preferred by proficient readers. Their view is that a method of reading aloud allows teachers and parents to evaluate, and offer substantial feedback, to the reader regarding rate, accuracy and syntactic structure. This feedback will eventually enable the reader (through role modelling) to make reading and comprehension an effortless task.

One argument in favour of silent reading is that reading aloud will mean that the child will spend more time decoding words, thus diverting attention giving the reader less time for content information to be processed. Rasinski (2006) maintains that a high percentage of early readers make too many single word errors when reading aloud. He believes that various cognitive processes are needed to read and understand, yet the
high amount of effort dedicated to word identification leaves little space for further cognitive tasks. Taylor and Robinson (1963) consider that too much reflection over word decoding decreases speed and reduces fluency when reading. Their view is that decoding is important; however, if excessive time is spent to decode a word this will effect reading rate and comprehension. According to Taylor (2006), the focus on word decoding will result in longer eye fixations causing a larger amount of visual intake, straining short-term memory load and affecting grammatical processing. Taylor also proposes that habitual reading aloud may lead to vocalization occurring during silent reading, and the reader to become over-reliant on this oral strategy, which may in turn result in a slow reading style and generally limiting comprehension. However, Salsoo (1986) challenges this view, concluding that adult readers have automatic pronunciation capability, which would argue against influencing comprehension negatively. Similarly, in a study by McCallum et al. (2004), speed of reading was found to be faster during silent reading than reading aloud, but the level of comprehension produced by both modes did not differ, leading researchers to argue that the only reason why silent reading should be viewed more favourably is because silent reading is less time consuming. Additionally, Elgart (1978) has argued that the use of silent reading needs to be treated with caution since the key reason for why it can be seen as being faster may be due to the omission of certain words. This may be done consciously, for example as a strategy for the reader to avoid words that s/he find challenging and deliberately ignores, or maybe done unconsciously. If this process does take place, comprehension might be compromised and/or limited. Other researchers have argued that, when reading aloud, the consequence is that the reader is able to hear him/herself read and this auditory mode enables better understanding; according to Levin (1979), this may be particularly true for individuals with reading difficulties.

However, still other research argues for different groups of readers to show benefits from one method over another. For example, Fletcher and Pumfrey (1988) found that the benefits of reading aloud were influenced by the readers’ gender, sex and geographical areas. When comprehension was assessed, boys from suburban areas performed better in aloud tasks while females from rural areas performed better in silent reading. Additionally, it was found that students who had weaker reading skills relied more on reading aloud to facilitate comprehension. Similar results were
documented by Prior and Welling (2001) who concentrated on understanding whether there were significant distinctions between silent or aloud reading for students who were divided according to age and level of ability. Their findings showed that children between the ages of 8-10 achieved better results when reading aloud, whereas participants between the ages of 7-8 performed similarly on both silent and aloud reading.

In addition to the argument of whether one method produces better levels of comprehension compared to the other method, researchers have also speculated on whether the different methods lead to different processes influencing reading. For example, Juel and Holmes (1981) draw attention to the view that reading aloud may focus on a bottom-up approach to reading, whereas silent reading may allow more of a focus on a top-down approach. The bottom-up approach implies that the reader accesses the lexicon phonologically by decoding letters to read a word. On the other hand, the top-down approach entails that the reader uses orthographic whole word knowledge and contextual information, such as syntactic and semantic information, in order to read. As discussed in the previous chapters, a major prerequisite in the development of reading involves the ability to phonologically decode words (Goswami, 1990) and have orthographic knowledge of that word (Ehri, 2005; see also Share, 2004a). Hence, it may be that reading aloud focuses learning on this vital skill (though see discussions in De Jong, Bitter, van Setten, & Marinus, 2009). However, according to Bowey and Miller (2007), such processes occur during silent reading. In their research, they asked participants to read short stories that included a number of non-words. Their scores indicate that a large amount of variance was due to phonological recoding and orthographic selection in silent reading. Research carried out by Alario, DeCara and Ziegler (2007) supports the idea that phonological processing is also present during silent reading. Their results show that during silent reading, phonological codes function automatically. They conclude that the only difference between aloud and silent reading is that aloud reading has a systematic transition between reading a word in a serial to a parallel manner, while silent reading is more disorganized and shows indications of fast parallel activation of phonology.

The present study focused on assessing whether the reading aloud measure developed as part of the work in this thesis will lead to differences in Maltese reading comprehension compared to that which would be found with a measure of silent
reading. The majority of work discussed above has been performed on English, which as discussed in the general introduction to this thesis has a more opaque orthography than Maltese. Also as discussed in Chapter 2, such orthographic differences may lead to differences in reading performance: a more regular orthography may lead to more reliance on word decoding strategies. Given the views discussed above about silent reading versus reading aloud potentially leading to differences in such reading strategies, it is important to determine whether findings derived from a reading aloud assessment can be considered indicative of reading comprehension in general or whether they can be considered as an assessment of comprehension levels only in certain reading contexts. Therefore, Maltese reading comprehension was contrasted when reading was silent compared to when reading aloud was required.

In addition, the study aimed to determine if there was any evidence for major differences in the influenced of underlying skills when reading aloud or silently in Maltese. The research outlined in this thesis argues for both reading accuracy and speed to be related to reading comprehension (see also Fuchs, Fuchs, Hosp & Jenkins, 2001). Therefore, the study included measures of both these skills to determine if they were both related to comprehension in the two reading conditions. Similarly, research has indicated that reading comprehension should be influenced by language comprehension levels. Therefore, a measure of listening comprehension was included in the study. Finally, the ability to derive meaning can be considered as an important component of intelligent behaviour, therefore a measure of problem-solving skill was included in the study. In order to reduce a simple influence of verbal skills (and which would comprise components of the listening comprehension measure), a non-verbal problem-solving measure was included. Overall, if the reading aloud measure was influenced by similar skills as a silent reading measure, the research would expect significant relationships to be identified between each of these additional measures and reading comprehension levels in both methods of reading.

5.2. Method

5.2.1. Participants
A total number of 103 children from primary Year 5 and Year 6, and secondary Form 1 participated in the study (see Table 5.1 for a breakdown of children in the three grades targeted). The primary language spoken by the participants was Maltese. All
children attended state schools from eight different schools across Malta. Four of the schools were primary schools in which the targeted year groups (Year 5 and 6) had either 4 or 5 different classes with approx 28-30 students per class. In order to select an appropriate number of children in each year group, the parents of every sixth Year 5 or Year 6 student on the register were contacted and asked to consent to their child participating in the project. A similar process was undertaken for secondary schools, with the parents of every third child on the Form 1 registers of the schools being asked to consent to participation. Since secondary schools in Malta are not mixed, this process was undertaken in two all-female schools and two all-male schools.

Table 5.1. Children in the study by school level.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Form 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers</td>
<td>34</td>
<td>32</td>
<td>37</td>
</tr>
<tr>
<td>(male:female)</td>
<td>18:16</td>
<td>12:20</td>
<td>15:22</td>
</tr>
<tr>
<td>Average age</td>
<td>9yr.7mths</td>
<td>10yr.7mths</td>
<td>11yr.8mths</td>
</tr>
</tbody>
</table>

5.2.2. Measures

5.2.2.1. Silent and aloud reading comprehension

Passages for the comprehension measures were created by selecting topics with which the students would be familiar and which would be appropriate for their age level. This was achieved with the use of school books used at the school levels that were the target of the current research. An author for Maltese school books was contacted and reviewed the material to ensure that it was appropriate. In this way, ten passages were created for the reading comprehension measures. All passages were similar in terms of grammar, tense, structure, length, topic and level of reading complexity. This was to allow passages to be used in both silent reading and reading aloud conditions. For any student, half of the 10 passages were used in the silent reading condition and the other 5 passages were used in the aloud condition. Which 5 passages were used in the two conditions was randomly determined for each child. Hence, no child read the same passage in both conditions, but all passages were used in both conditions across the sample.
For each passage, a series of multiple-choice questions was developed to assess the students’ understanding of the passage. The students were required to choose the correct answer from a selection of four choices, where only one answer was correct (the students were informed that only one answer was correct). For the silent reading, the students were required to read the passages silently. For the reading aloud condition, the students were asked to read the passages aloud to the examiner. Time for reading was not limited in either condition. After each passage there were a number of questions about the passages just read. The participant was asked to read the questions silently to him/herself and mark the correct answer from the multiple choices provided (for silent reading), while the questions and answers for the aloud reading exercise were read aloud by the assessor. The number of multiple-choice questions answered correctly provided a comprehension score for silent reading and for reading aloud, each out of a maximum score of 34.

An example from one of the passages is shown below.

Passage — the moon is the second object which gives most light after the sun. The moon shines because it reflects the light given by the sun. The part of the moon that is facing the sun is lit. The part that is not facing the sun is in the dark.

Question — which object gives out most light?

a) The sun
b) The moon  
c) The world  
d) None of the above

In order to check the internal consistency of the reading comprehension passages, Cronbach's alpha was calculated for the three year groups across the 10 passages: Year 5 = 0.78, Year 6 = 0.83, Form 1 = 0.74. Across the three groups the reliability score was .80.

5.2.2.2. Reading errors and time
During the reading aloud task, the number of reading errors and the time taken to read each passage were recorded. Combining scores across passages provided a measure of reading accurate and reading speed. Time was measured given that Maltese is a relatively regular orthography and, therefore, reading rate may be a more appropriate measure of word-level reading skills.

5.2.2.3. Listening comprehension
As there is no standardised measure of listening comprehension available in the Maltese language, this measure was developed purposely for this research in a similar way to the reading comprehension measure. The test comprised four short sentences/passages that were read to the students twice – the repetition of each passage followed immediately after its first reading. Pilot work determined that these passages were appropriate for the level of children assessed in the current study. The child did not see the written form, but was required to listen to comprehend. Once each passage was read and repeated, the participants were asked questions about the content of the sentence/passage. A total of 26 questions were asked which required simple yes/no verbal answers to avoid written or detailed verbal responses interfering with the measure of comprehension. Answers to questions also required a degree of inference in order to ensure that the difficulty level was appropriate for the group of children tested: i.e., late primary/early secondary school children. An example of a section of Maltese text with related question is provided below, followed by an approximate English language translation.
Sentence - Maria ma tibżax mill-kliex. Maria thobb is-siċar imma allergika ghall-fjuri.

Question - Maria tagħtas meta xxomm il-fjuri? (iva/le)

An approximate translation into English would be:

Sentence - Maria is not afraid of dogs. Maria loves trees but is allergic to flowers.

Question - Maria sneezes when she smells flowers? (yes/no)

5.2.2.4. Non-verbal ability

The Standard Ravens Progressive Matrices (Raven, Court, & Raven, 1996) was selected to assess non-verbal ability levels among the children tested. This test is often considered a measure of non-verbal reasoning skills that shows low correlations with word-level literacy and is weakly related to verbal skills, but is related to IQ scores (see Carpenter, Just & Snell, 1990). Participants were given a detailed explanation and examples of what was expected from them. They were then given the matrices to work through on their own and at their own pace – a time limit was not imposed. Each item comprised a sequence of abstract shapes that followed a logical order. The child’s task was to select, from the multiple-choice items provided, the item that followed the sequence based on the logical order. The number of items selected correctly out of a total of 60 was the measure for this task.

5.3. Results

Table 5.2 presents the descriptive statistics for the measures used in the study. The mean reading comprehension scores indicate a trend for scores to improve with school level. A one-way between subjects ANOVA was conducted to compare the effect of age on silent and aloud reading comprehension. There was a significant difference between the three groups for aloud reading \([F(2, 109) = 7.92, p = .001]\) and \([F(2, 109) = 10.69, p = .001]\) for silent reading, but no significant differences between age group and listening comprehension and non verbal ability.

Post hoc comparisons using the Tukey HSD tests show significant differences between the mean scores of Year 5 and Year 6 \((M = -3.44, p = .006)\), and Year 5 and Form 1 \((M = 4.85, p=.001)\) for aloud reading comprehension. Similarly mean
differences between Year 5 and Year 6 (M = -3.67, SD = .006) and Year 5 and Form 1 (M = -4.85, p=.001) for silent reading were shown, thus indicating difference from one age group to the next.

The results from the descriptive statistics show that all measures, except the Listening comprehension measure, shows a trend for improved performance with increasing school level. However, these data present little evidence of differences between the scores produced in the reading aloud and silent reading conditions across the three school level groups. Repeated measures t-tests comparing silent versus aloud conditions for each school level produced non-significant results: Year 5, t(33)=1.45, p=.15; Year 6, t(31)=1.09, p=.282; Form 1, t(36)=-.43, p=.666.
Table 5.2. Means and standard deviations (SD), with minimum (Min) and maximum (Max) scores produced by the children in primary years 5 and 6 and Form 1.

<table>
<thead>
<tr>
<th></th>
<th>Silent Comp</th>
<th>Aloud Comp</th>
<th>Rd Acc</th>
<th>Rd Spd</th>
<th>List Comp</th>
<th>NV Abil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>21.35</td>
<td>22.68</td>
<td>12.21</td>
<td>501.85</td>
<td>21.26</td>
<td>35.88</td>
</tr>
<tr>
<td>SD</td>
<td>4.86</td>
<td>4.92</td>
<td>11.42</td>
<td>176.42</td>
<td>1.97</td>
<td>9.04</td>
</tr>
<tr>
<td>Min</td>
<td>8</td>
<td>11</td>
<td>0</td>
<td>298</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Max</td>
<td>28</td>
<td>30</td>
<td>40</td>
<td>1020</td>
<td>24</td>
<td>46</td>
</tr>
<tr>
<td>Year 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>24.03</td>
<td>24.78</td>
<td>11.25</td>
<td>448.00</td>
<td>21.22</td>
<td>36.97</td>
</tr>
<tr>
<td>SD</td>
<td>4.42</td>
<td>4.31</td>
<td>16.99</td>
<td>180.63</td>
<td>2.25</td>
<td>8.20</td>
</tr>
<tr>
<td>Min</td>
<td>15</td>
<td>15</td>
<td>0</td>
<td>251</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Max</td>
<td>32</td>
<td>31</td>
<td>69</td>
<td>1035</td>
<td>26</td>
<td>49</td>
</tr>
<tr>
<td>Form 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>25.14</td>
<td>25.49</td>
<td>4.22</td>
<td>365.38</td>
<td>21.00</td>
<td>39.11</td>
</tr>
<tr>
<td>SD</td>
<td>4.73</td>
<td>3.33</td>
<td>4.35</td>
<td>90.35</td>
<td>2.29</td>
<td>6.30</td>
</tr>
<tr>
<td>Min</td>
<td>10</td>
<td>18</td>
<td>0</td>
<td>236</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>Max</td>
<td>31</td>
<td>33</td>
<td>14</td>
<td>508</td>
<td>25</td>
<td>53</td>
</tr>
</tbody>
</table>

Key: Comp = comprehension, Rd Acc = reading accuracy errors, Rd Spd = Speed to read text, List comp = listening comprehension, NV Abil = non-verbal ability.

First order correlations and partial correlation controlling for age, year and sex of the participants were calculated (see Table 5.3). This was done in order to identify the strength of the relationship between the scores produced in the different reading conditions and the other variables: i.e., reading accuracy (errors) and speed, listening comprehension, and non verbal ability. These results indicated that similar relationships were found between silent reading and the other measures as were found between reading aloud and the other measures. Therefore, although the scores in the two reading conditions were not strongly related (r=.56), the two conditions seem to involve similar underlying processes, based on the significant correlations identified in this study.
Table 5.3. First-order correlations (lower diagonal) and partial correlations (controlling for age, year/form and sex) for each of the measures in the study.

<table>
<thead>
<tr>
<th></th>
<th>Silent Comp</th>
<th>Aloud Comp</th>
<th>Rd Acc</th>
<th>Rd Spd</th>
<th>List Comp</th>
<th>NV Abil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silent Comp</td>
<td>40</td>
<td>-.30</td>
<td>-.30</td>
<td>.20</td>
<td>.32</td>
<td></td>
</tr>
<tr>
<td>Aloud Comp</td>
<td>.56**</td>
<td>-.41</td>
<td>-.30</td>
<td>.36</td>
<td>.45</td>
<td></td>
</tr>
<tr>
<td>Rd Acc</td>
<td>-.35**</td>
<td>-.45**</td>
<td>.71</td>
<td>-.17</td>
<td>-.45</td>
<td></td>
</tr>
<tr>
<td>Rd Spd</td>
<td>-.36**</td>
<td>-.34**</td>
<td>.73**</td>
<td>-.12</td>
<td>-.22</td>
<td></td>
</tr>
<tr>
<td>List Comp</td>
<td>.22*</td>
<td>.34**</td>
<td>-.12</td>
<td>.05</td>
<td>.24</td>
<td></td>
</tr>
<tr>
<td>NV Abil</td>
<td>.41**</td>
<td>.47**</td>
<td>-.46**</td>
<td>-.23*</td>
<td>.30**</td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2 tailed)
* Correlation is significant at the 0.05 level (2 tailed)

Key: Comp = comprehension, Rd Acc = reading accuracy errors, Rd spd = speed to read text, List comp = listening comprehension, NV Abil = non-verbal ability

5.4. Discussion

This study investigated differences in Maltese reading comprehension levels when texts were read silently versus aloud. The findings indicate little evidence for a difference in comprehension levels across the two conditions. Similarly, correlations between the reading comprehension measures and the other variables in the study were fairly consistent, and statistically significant, across the two conditions. These results argue for the influence of the skills underlying these additional measures on both modes of reading, at least in terms of the impact on comprehension levels.

These results are consistent with research conducted by for example, Holmes and Allison (1985) that included different modes of testing reading comprehension: silent reading, silent reading while listening to a recorded tape, aloud reading to an audience and aloud reading to oneself. Their results also argued for little distinction between reading when conducted either silently or aloud (see additional research reported in the introduction to this chapter). Overall, they could be argued to add to the equivocal findings of studies investigating differences between silent reading comprehension and reading aloud comprehension levels: i.e., on the one hand researchers such as Fuch et al., (2001) and Fletcher and Pumfrey (1988) have argued for the superiority of reading aloud, since each word is read and understanding is more thorough, whereas others (e.g. Miller & Smith, 1990) have concluded that silent reading is a better way to reach understanding, especially when a reader is considered a poor reader, since
silent reading reduced the need to focus on word decoding and may increase the fluency/efficiency of the reading process in terms of its aim to determine meaning. As such, it could be argued that both methods are useful skills in a child's development of literacy. Silent reading is a useful tool when a student has time restrictions, while oral reading can be useful for educators to highlight particular difficulties that a child is experiencing. This can only be reached through aloud reading (e.g. miscue analysis for identifying accuracy errors). Indeed, as part of arguments for the usefulness of reading aloud, educationalists such as Elgart (1978) and Fuch et al. (2001) have emphasized that the evaluation of silent reading needs to be conducted with prudence due to the possibility that many important variables such as speed and word reading are not accounted for and, therefore, cannot offer the full picture of what skills are necessary for comprehension. The ability to measure reading fluency (via speed) and word knowledge (via accuracy) may be important factors in understanding difficulties that the child may be experiencing with literacy learning and reading comprehension in particular. For this reason, the studies reported in the following chapters in this thesis will use reading aloud procedures to assess Maltese reading comprehension.

The study reported in this chapter also considered relationships between the comprehension measures and other variables. These correlational analyses suggested that all variables included in the study were related to reading comprehension. However, the size of some of the relationships was surprising: e.g. that with listening comprehension was much smaller than might be expected given that language understanding is the core element of both the reading and listening tasks, whereas that with non-verbal ability was larger than might be expected given the other correlational values in the study. An understanding of the processes that influence reading can form an important part of assessment procedures. This was not the aim of the study reported in this chapter: additional variables were included simply to ensure that relationships across reading conditions produced significant results. Therefore, the following studies in this thesis will focus on investigating some of the hypothesised predictors of reading comprehension levels that have been identified in the literature (mainly in studies of English-language reading comprehension) to determine if these same variables are predictive of Maltese reading comprehension.
Chapter 6:
Study 4: Predictors of Maltese reading comprehension in mainstream children

6.1. Introduction

The previous chapters of this thesis centred on the idea of creating suitable Maltese reading comprehension exercises that would help in identifying levels of understanding. As discussed previously, it is also important in assessment practices to determine potential underlying reasons for difficulties – in this case reading comprehension. Therefore, the aim of the work reported in this chapter was to determine what underlying processes are essential for reading comprehension in the Maltese language. This chapter focussed on understanding what processes are predictive of Maltese reading comprehension and whether these predictors are more reliant on word level processes (such as phonological processing) or language processing (such as syntactic awareness). It is also important to recognize whether the components associated with reading comprehension are similar to those in other languages. For this reason this chapter will compare results to British populations.

The measures chosen as potential predictors were: non-word reading, verbal short-term memory, rapid naming, syntactic awareness, listening comprehension and non-verbal ability. These measures were chosen based on current models of reading which have been derived primarily from English language data, though they also incorporate measures that cross-language data have identified as potentially useful when dealing with an orthography that is more transparent than English (see Wimmer, 1993). Additionally since currently there are no tests in Maltese available for assessing non-word reading, syntactic awareness, rapid naming and listening comprehension, these tests were developed based on existing measures in the literature for the present work. The verbal short-term memory test was a digit span task and was derived from measures already in use in Malta as part of intelligence assessment tools.

6.1.1. Reading comprehension development

According to Perfetti, Landi and Oakhill (2005) cognitive functions occur at word, sentence and whole passage levels. Sahu and Kar (1994) argue that the ability to comprehend what is written and the ability to read orally involve two separate cognitive procedures, one that has the primary function of understanding the meaning...
that the author is attempting to put across, and one that is related to the way in which the reader transforms grapheme symbols into phonemes to create a word - a view originally proposed by Cromer (1970) who differentiated between two groups of poor comprehenders, those who have word level difficulties and those who have difficulty understanding text at a sentence and passage level. In the early stages of the development of reading comprehension, the average child will have a lower level of language acquisition but, as the reader matures, his/her comprehension skills move to higher levels, where the reader is better able to infer and predict from a given situation in a text (Cain et al., 2004). Wilson and Rupley (1997) introduced a reading comprehension model where each child experiences three developmental stages for reading comprehension to take place. The first stage takes place when the child is aged between seven and nine. During this stage the reader comprehends written material because of phonemic knowledge and an understanding at word level. At a later stage, and between the ages of eight to ten, a reader strengthens understanding through the use of background knowledge. At a still later stage, from the age of 10 upwards, a child is able to comprehend by making use of the knowledge derived from different strategies. Paris, Wasik and Turner (1991) state that the use of reading strategies is a prerequisite during the process of understanding. Such strategies do not appear suddenly but rather form part of a developmental course. According to Paris et al., such strategies are either taught or emerge naturally during the child’s learning cycle between the ages of seven and thirteen. Lack of the development of strategies will result in poor reading comprehension ability (see Kozminsky & Kozminsky, 2001). It is often considered that a proficient reader is capable of automatically decoding words and simultaneously adapting the use of metacognitive properties, which enables the reader to scrutinize and organize what is read in a coherent and structured manner (Kolic-Vehovec & Bajsanski, 2007).

6.1.2. Word-level processes
The evidence, therefore, argues for two basic processes in reading comprehension: word decoding and language understanding. However, the skills that underlie these processes need also to be considered. In terms of word decoding, phonological processing and letter-sound translation have been the focus of much of the research. Indeed, there is considerable evidence that phonological skills are related to the acquisition of reading in the English language (Castles & Coltheart, 2004). Mapping
between spoken and printed word (the matching of phonemes to graphemes in the case of alphabetic orthographies such as English) has been considered of central importance in learning to read. For example, previous research has suggested that a phonological processing deficit is the core cognitive-linguistic reason for reading failure (Adams, 1990; Cataldo & Ellis, 1988; Torgesen, Wagner & Rashotte, 1994; Wagner, Torgesen, Laughon, Simmons & Rashotte, 1993). The ability to read involves the awareness and manipulation of letter sounds and the ability to string these sounds together to form a word. Mastery in this area will assist in making word recognition (for both old and new words) a simple and automatic task (Prior, 1996). The development of literacy, both at the word and text level, will be hindered if the child fails to acquire accurate and fluent decoding skills. This decoding skill (i.e., the ability to translate letter sequences into appropriate sound forms), typically, has been assessed through non-word reading measures. The reading of familiar words can be undertaken by recognition of the visual form of the word, rather than translating letters into corresponding sounds. However, non-word reading cannot be performed by whole word recognition and requires the child to recognize and translate units smaller than the whole word. Therefore, asking children to read non-words provides a test of phonological decoding (Snowling, Stothard & McLean, 1996). Consistent with this perspective, children with dyslexia show poor scores on non-word reading measures (Rack, Snowling, & Olson, 1992) and such poor scores are related to weaknesses in phonological processing.

Non-word reading measures also may be useful in identifying bilinguals who are dyslexic when English is the language of assessment (Everatt, Smythe, Adams & Ocampo, 2000). However, a number of cross-language studies suggest that the specific relationship between literacy ability and phonological decoding may vary across languages/scripts, leading to the precise role that phonological deficits play in different orthography to be questioned (Smythe et al., 2008). For example, whereas accuracy of decoding may be a useful tool to identify literacy learning problems in English, they may be of limited value when assessing poor readers of transparent languages (Goulandris, 2003) and many studies conducted on highly transparent orthographies argue for reading rate being a better way of distinguishing poor and good readers (Wimmer 1993; see discussions in Goswami, 2000; Smythe & Everatt, 2000). Similarly, although an awareness of sounds within words may be a
fundamental phonological skill for non-word decoding (see Gillon, 2004; Snowling, 2000) this skill has been found to be less able to distinguish between students with dyslexia and learners without dyslexia of a transparent orthography than measures of rapid naming or short-term verbal memory (Everatt, Smythe, Ocampo & Gyarmathy, 2004). Hence, when investigating processes involved in word-level reading of a transparent orthography, measures of rapid naming and verbal memory need to be considered.

Denckla and Rudel (1976, in Meyer, Wood, Hart, & Felton, 1998) were among the first to report that deficits in rapid sequential naming is a key element in distinguishing between children with and without dyslexia (Meyer et al, 1998). In addition, LaBerge and Samuels (1973) declared that for successful understanding, reading needs to be automatic in addition to precise. This automatic process will enable the meaning of what was read to be accessed easily by the reader. Later studies show that poor rapid naming (accompanied by poor decoding) is one of the best predictors for reading failure and dyslexia (e.g. Compton, DeFreis & Olson 2001; Kirby, Parilla, Pfeiffer & Shannon., 2003; Savage & Frederickson, 2005; Wolf, Bowers & Biddle, 2000). Wolf et al. point out that a significant number of individuals with reading problems do not have phonological decoding difficulties but nevertheless show deficits in naming or naming-speed tasks. Their hypothesis is that dyslexia is best explained by a double deficit hypothesis in which both phonological problems and rapid naming deficits can be independent causes of reading difficulties. Therefore, rapid naming is similar to phonological decoding in being a potential predictor of literacy acquisition and reading disability.

Various studies, across different languages (see Gathercole & Baddeley, 1993; Wimmer, Mayringer & Landerl, 1998), have suggested that children who experience difficulties with retaining sounds in short term memory are likely to have problems with the acquisition of verbal vocabulary and the development of stable graphic-sound associations, both of which can impact on reading and listening comprehension, as well as in language acquisition. Indeed, measures of short-term retention of information have been found to be predictive of future literacy levels and educational achievement (Gathercole, Brown & Pickering, 2003; Gathercole & Pickering, 2000). However, the role that working memory retains for the success of reading comprehension has been a controversial issue for many years. Some
researchers support the notion that memory has a dominant function in reading comprehension (Alloway, Gathercole, Willis, & Adams, 2005; Friedman & Miyake, 2004; Swanson & Howell, 2001), while others question its specific contribution to reading comprehension attainment (e.g. Cornoldi, Beni, & Pazzaglia, 1996). The major theoretical debate lies in the uncertainty as to whether working memory is linked to comprehension because of specific factors, such as verbal working memory, or whether its role depends more on general domains such as attention (see Carretti, Borella, Cornoldi, & De Beni, 2009). According to De Beni, Palladino, Pazzaglia and Cornoldi (1998), working memory is responsible for a number of cognitive tasks in addition to the storage and processing of information. Nonetheless, the majority of views concur that working memory tasks can be distinguished according to modality (verbal versus visuo-spatial) and attentional control: i.e., those involving storage only, or simple span task, compared to task requiring storage plus processing, or complex span tasks (Carretti, Borrella, Cornoldi & DeBeni, 2009). Such research work suggests that phonological short-term memory may be specifically impaired in students with dyslexia, which leads to deficits in processing new letter strings or a new vocabulary. Again, such short-term memory measure tasks are potential predictors of literacy levels.

Given the work outlined above, the present study included a measure of non-word reading in order to assess specifically letter-sound translation skills within Maltese text reading. However, given the data that rapid naming and verbal short-term memory may be better predictors of word level literacy skills amongst children learning a more transparent orthography, and that Maltese can be considered a relatively transparent orthography, then these measures will also be included to determine the influence of word-level processes on Maltese reading comprehension.

6.1.3. Understanding-level processes

Clearly, the ability to recognise a word and identify meaning from that word are important aspects of reading (Perfetti et al., 2005), yet they are not necessarily the same skill (Muter, Hulme, Snowling, & Stevenson, 2004). Uncertainties have been expressed as to whether problems in reading comprehension are primarily due to a decoding problem (Keenan & Betjemann, 2006) and there are many cases where children's decoding abilities have been found to be intact despite poor reading
comprehension skills (e.g. Cain, Oakhill, & Bryant, 2000; Oakhill, 1994). Between 10% to 25% of poor readers do not exhibit decoding and single word reading difficulties (Cutting & Scarborough, 2006). Similarly, Spooner, Gathercole and Baddeley (2006) found that 10 to 15% of school age children exhibited comprehension difficulties, despite demonstrating a good level of decoding skills. Furthermore, evidence shows that although there are significant relationships between decoding skills and comprehension skills in the early years of a child’s literacy development, this correlation decreases as the child matures (Catts et al., 2005) and listening comprehension become more highly correlated with reading comprehension (Gough et al., 1996, in Muter, Hulme, Snowling & Stevenson, 2004). This suggestion that a phonological influence on reading comprehension is greater in a child’s early reading development compared to later reading (Curtis, 1980) calls for the need to acknowledge that a percentage of children have comprehension difficulties due to reasons other than word decoding problems, which have been the focus of much reading disability research. Evidence for a dissociation between decoding and comprehension skills (Oakhill, 1994) reveals that problems exhibited in reading comprehension do not occur merely due to phonological and orthographic processing deficits (Perfetti et al., 2005). Evidence also argues for expressive language (e.g. Muter et al., 2004) and syntactic processing (e.g. Share & Leikin, 2004b) to be positively related to reading comprehension, and that these elements may predict reading comprehension over-and-above the level of prediction provided by decoding skills.

There is a growing awareness that oral language abilities are skills that determine a child’s reading success. Gough and Tunmer (1986) proposed that achievement in understanding written material depends on the ability to decode words and knowledge of a specific language (in terms of features such as vocabulary and grammar). The view that comprehension involves receptive (listening comprehension) and decoding skills as separate entities was originally presented in the ‘Simple Model’ of reading proposed by Hoover and Gough (1990). They supported the idea that these two processes are necessary for successful reading comprehension to take place. Results from a study conducted by Proctor, Carlo, August and Snow (2005) on a group of Spanish/English bilingual children, show that oral language abilities were more likely to relate to reading comprehension compared to decoding skills. Their conclusion is in
agreement with the ‘Simple Model’ of reading in that listening comprehension proficiency with suitable decoding skills, is the key to successful reading comprehension. Similarly, Muter et al. (2004) found that measures of oral language awareness, as well as grammatical abilities, were the better predictors of reading comprehension variability, and a 15 week vocabulary intervention programme conducted in a study by Carlo et al. (2004) showed that with increased verbal skills there was an improvement in reading comprehension.

The involvement of syntactic awareness in acquiring meaning from reading has largely been ignored in the area of reading comprehension (Shiotsu, 2007), although an interest in the role of syntactic awareness and its relationship with reading ability has grown in importance over the years (Badian, Duffy, Als & McAnulty, 1991; Gottardo, Stanovich & Siegel, 1996; Leikin, 2002). To make sense of text it is necessary to assimilate words and sentences in a structured and linear way (Alderson, 2000). It has been documented that vocabulary and syntactic knowledge are necessary skills for reading comprehension (e.g. Barnett, 1986), whereas Shiotsu (2007) suggests that syntactic awareness may be an even stronger predictor to reading comprehension than vocabulary. On the other hand, it has been proposed that syntactic difficulties per se are not an issue for poor readers (see discussions in Perfetti et al., 2005). Rather other deficits, such as verbal working memory, in addition to phonological processing, have been argued as responsible for difficulties in comprehension. The answer as to whether syntactic awareness difficulties are a language difficulty per se, or whether they form part of a phonological deficit in poor readers, is still uncertain, though various studies attest that proficiency in syntactic awareness can support word decoding, in addition to playing an essential role in reading comprehension, and being a predictor of reading ability (Rego & Bryant, 1993; Tunmer & Hoover, 1992; Tunmer, Nesdale & Wright, 1987). Work by Nation and Snowling (2000) found that children who demonstrated comprehension difficulties in the absence of decoding problems also scored badly in word order activities that are considered a basis of syntactic awareness compared to children who did not present similar difficulties.

Therefore, the present study included measures of listening comprehension and syntactic awareness to assess the influence of understanding-level processes on Maltese reading comprehension. However, understanding has often been associated
with intelligence and those with higher scores on intelligence tests typically score higher on comprehension measures (Lynn & Mikkel, 2009; Rathvon, 2004). Therefore, a non-verbal reasoning task was included in the study to determine the influence of this area of processing on Maltese reading comprehension. A non-verbal measure was selected to reduce the specific influence of verbal skills on the relationship between reasoning and reading comprehension.

6.1.4. Study aims
The aims of this study were to investigate influences of word-level and understanding-level processes on Maltese reading comprehension. Measures of non-word decoding, rapid naming and verbal short-term memory were used as indicators of word-level processes, and measures of listening comprehension, syntactic awareness and non-verbal reasoning were used as indicators of understanding-level processes. A measure of reading comprehension was used as the dependent variable. Children were selected who were learning to read in the Maltese language and who would be expected to show evidence of a transition between word-level and understanding-level influence (based on the Wilson & Rupley, 1997, model). In the Maltese education context, these would be children in Years 5 and 6 of primary schooling (aged 9 to 11 years old) and in Form 1 of secondary school (aged 11 to 12 years old).

6.2. Method
6.2.1. Participants
A total of 126 students participated in this study. All students attended state schools. The group comprised 59 males and 67 females and their ages ranged from 8 year 9 months to 12 years 8 months. These children were in Years 5 and 6 of primary school and Form 1 of secondary education (Table 6.1 provides a breakdown of numbers in each class). All children were Maltese speakers as would be expected from the population of children attending state schools in Malta (Baldacchino, 1996; Firman, 2007). Selection was based on guardian consent being given, schools records indicating the children presented with no evidence of prolonged problems with reading development, and completion of all tests. Each child completed the tasks over a period of 2 days. The tests were divided into group test and individual tests. The
group test lasted approximately 20 minutes, while the individual test took up approximately 15 minutes per participant.

Table 6.1. Numbers of children in each year group, with male:female numbers in brackets, and average age.

<table>
<thead>
<tr>
<th></th>
<th>Year 5</th>
<th>Year 6</th>
<th>Form 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers (male:female)</td>
<td>40 (19:21)</td>
<td>44 (24:20)</td>
<td>42 (16:26)</td>
</tr>
<tr>
<td>Average age in years</td>
<td>9.48</td>
<td>10.44</td>
<td>11.51</td>
</tr>
</tbody>
</table>

Children from a total of ten different schools across Malta provided the data for the present study. Three of the schools were primary schools in which the targeted year groups (Year 5 and 6) had either 4 or 5 different classes with approximately 28-30 students per class. In order to select an appropriate number of children in each year group, the parents or guardian of every sixth Year 5 or Year 6 student on the register were contacted and asked to consent to their child participating in the project. A similar process was undertaken for secondary schools, with the parents of every third child on the Form 1 registers of the schools being asked to consent to participation. Four schools were contacted, since secondary schools in Malta are not mixed and this provided two all-female schools and two all-male schools.

6.2.2. Measures

Each child completed the tasks over a period of 2 days. The tests used assessed text reading comprehension, together with a measure of reading speed, non-word reading, forward digit span, rapid naming, syntactic awareness, listening comprehension and non-verbal ability. All measures were presented and performed in the Maltese language/orthography. Existing tests were used or measures were developed based on those in other languages (primarily English language tests). All measures were piloted prior to data collection to ensure that they were appropriate for the population targeted.

6.2.2.1. Reading comprehension and Reading speed

The reading comprehension was the reading aloud test developed in this thesis (see Chapter 4). The test comprised six Maltese-language passages that increased in number of words and complexity. The child read each passage and was asked
comprehension questions related to that passage by the researcher. The researcher recorded the number of correct answers given to the comprehension questions. The time taken to read each passage was also measured and these times were totalled to allow reading speed to be included in the study.

6.2.2.2. Non-word reading and non-word reading speed
The non-word reading measure used in the current study comprised 25 non-words (items and procedures followed those used in similar English-language measures; e.g., Snowling et al. 1996). Each non-word was created following Maltese orthographic rules and was decodable based on Maltese alphabetic coding (e.g. non-word = nir, original Maltese word is ‘nar’ meaning fire; non-word = sarmil, original Maltese word is ‘barmil’ meaning pail; non-word = ġelaq, original Maltese word is ‘gelaq’ meaning ice-cream). The non-words had different syllable formats, ranging from one to four. To produce a simple increase in pronunciation difficulty, the non-words were presented to the participants in increasing syllable order: non-words with 1 syllable were first on the list, non-words with 2 syllables followed, and so on up to the 4 syllable non-words. The time taken by the participant to read the 25 items was recorded to provide a measure of speed of non-word reading. The number of non-words read correctly, based on Maltese orthographic rules, was used as a measure of non-word reading accuracy.

6.2.2.3. Verbal short-term memory (Digit span)
Given the reasons outlined in the introduction of this study, a forward recall digit span procedure, derived from the Working Memory Test for Children (WMTB-C; S. Pickering & Gathercole, 2001), was adopted to assess verbal short-term memory. The participants were asked to repeat a number of digits that were orally presented by the assessor. At the beginning, the participant was given 3 practice trials, the first with one digit, the second with two digits and the third with three digits. Once the child completed successfully these trials, blocks of test items were presented. Each block comprised six trials of a set number of digits per trial. The number of digits presented in the sequences increased by one digit every six trials. If the participant answered four out of the six trials correctly, they moved on to the next block of trials. If they did not, testing was stopped. Testing continued until the child failed a block. The total number of trials performed correctly was used as the score for this test.
6.2.2.4. Rapid naming speed and rapid naming error

Line drawings of familiar objects were used in a naming task to assess the students' naming speeds. This task was included in order to understand the speed at which participants process information from their lexicon and was derived from similar measures in the literature (e.g., Denckla & Rudel, 1976; see also Wolf et al, 2000). The participant was presented with 2 charts, one at a time, with each chart containing 24 pictures/drawings of familiar objects. The first chart comprised repetitions of five different objects (xih {old man}, cerva {deer}, balloon {ball}, serp {snake}, cavetta {key}), whereas the second comprised repetitions of six different objects (kelb {dog}, xemx {sun}, umbrella {umbrella}, anka {anchor}, bieb {door}, ktieb {book}). In the 5-set card, 3 names were 1 syllable words, 1 name was a 2 syllable word and the fifth was a 3 syllable word. In the 6-set card, 4 names were 1 syllable words, 1 name was a 2 syllable word and last was a 3 syllable word. The times that the participant took to name all items on each card were recorded, along with any naming errors. The scores for each chart were combined.

6.2.2.5. Syntactic awareness

The syntactic measure used in this study comprised ten different sentences. The sentences were selected from 4 different Maltese school-books, which belonged to three different grade levels. Sentences ranged from simple sentences consisting of a few words to more complex sentences consisting of a larger number of words. The words were jumbled and students were asked to put the words in the correct order to make grammatically correct sentences. The number of grammatically correct sentences produced was used as the measure.

Examples (with English approximations in square brackets):

il- ktieb refghet Rita (which should be changed to Rita refghet il- ktieb)

[the book picked up Rita (which should be changed to Rita picked up the book)]

Ommhom il-basket harget u l-ikel fethet (which should be changed to Ommhom fethet il-basket u harget l-ikel)

[Their mother the basket got out and the food opened (which should be changed to Their mother opened the basket and got out the food)]
6.2.2.6. Listening comprehension
This was the same as used in study 5, therefore the test comprised of four short sentences/passages that made up a maximum score of 26.

6.2.2.7. Non verbal ability
This was the same measure as used in study 5. In the version used, there were 60 items, hence the child produced a score out of 60.

6.3. Results
The initial analysis shows the descriptive statistics. The analyses were performed based on the two aims of the study. Correlation coefficients and multiple regressions were later used to determine relationships between measures and predictors of reading comprehension.

Table 6.2 illustrates the descriptive statistics derived from the data in terms of the mean scores with the standard deviation, as well as minimum and maximum scores. The results are divided into grade levels and as a total of scores of all three groups. In the majority of measures, the mean scores clearly show that the groups followed a sequence, where the eldest group performed better than the younger two groups. On average the younger group performed worst. No differences were identified in non-word reading accuracy (though there was for non-word reading time), listening comprehension and syntactic awareness between groups, with all three groups scoring approximately the same in these measures. Statistical comparisons, Analysis of Variance (ANOVA), of the children (with one between group factor of three levels), were calculated, followed by Tukey HSD post-hoc comparisons contrasting the students in each group (Year 5, Year 6 and Form 1). The results of these analyses are presented in Table 6.3
Table 6.2. Means and standard deviations (SD), with minimum (Min) and maximum (Max) scores produced by the children in primary Years 5 and 6 and secondary Form 1.

<table>
<thead>
<tr>
<th></th>
<th>Rd Comp</th>
<th>Rd Speed (secs)</th>
<th>NW Read</th>
<th>NW Speed (secs)</th>
<th>RN Spd</th>
<th>RN Err</th>
<th>List Comp</th>
<th>Syn Aw</th>
<th>NV Abil</th>
<th>Dig Span</th>
</tr>
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<tbody>
<tr>
<td><strong>Year 5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>19.00</td>
<td>913.22</td>
<td>22.33</td>
<td>46.17</td>
<td>44.02</td>
<td>0.05</td>
<td>21.77</td>
<td>7.15</td>
<td>34.53</td>
<td>36.93</td>
</tr>
<tr>
<td>SD</td>
<td>4.43</td>
<td>286.36</td>
<td>3.37</td>
<td>14.03</td>
<td>10.35</td>
<td>0.22</td>
<td>2.37</td>
<td>1.00</td>
<td>7.61</td>
<td>5.37</td>
</tr>
<tr>
<td>Min</td>
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<td>524</td>
<td>9</td>
<td>28</td>
<td>30</td>
<td>0</td>
<td>15</td>
<td>5</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>Max</td>
<td>27</td>
<td>1571</td>
<td>25</td>
<td>57</td>
<td>57</td>
<td>1</td>
<td>28</td>
<td>9</td>
<td>46</td>
<td>49</td>
</tr>
<tr>
<td><strong>Year 6</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
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<td>863.05</td>
<td>22.41</td>
<td>43.33</td>
<td>43.05</td>
<td>0.11</td>
<td>21.77</td>
<td>7.07</td>
<td>35.68</td>
<td>40.00</td>
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<tr>
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<td>270.26</td>
<td>2.68</td>
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<td>8.02</td>
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<td>2.42</td>
<td>1.74</td>
<td>7.67</td>
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<tr>
<td>Min</td>
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<td>479</td>
<td>14</td>
<td>19</td>
<td>30</td>
<td>0</td>
<td>14</td>
<td>1</td>
<td>11</td>
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<td>Max</td>
<td>34</td>
<td>1639</td>
<td>25</td>
<td>115</td>
<td>68</td>
<td>2</td>
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<td>10</td>
<td>50</td>
<td>50</td>
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<tr>
<td><strong>Form 1</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>25.52</td>
<td>670.31</td>
<td>22.79</td>
<td>34.33</td>
<td>38.31</td>
<td>0.05</td>
<td>21.48</td>
<td>7.90</td>
<td>38.60</td>
<td>41.12</td>
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<tr>
<td>SD</td>
<td>4.09</td>
<td>181.94</td>
<td>2.51</td>
<td>10.26</td>
<td>7.59</td>
<td>0.21</td>
<td>3.12</td>
<td>1.51</td>
<td>8.39</td>
<td>8.31</td>
</tr>
<tr>
<td>Min</td>
<td>14</td>
<td>433</td>
<td>16</td>
<td>17</td>
<td>26</td>
<td>0</td>
<td>10</td>
<td>5</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>Max</td>
<td>33</td>
<td>1146</td>
<td>25</td>
<td>60</td>
<td>60</td>
<td>1</td>
<td>25</td>
<td>10</td>
<td>52</td>
<td>51</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>22.26</td>
<td>793.8</td>
<td>21.8</td>
<td>41.23</td>
<td>41.70</td>
<td>0.07</td>
<td>21.57</td>
<td>7.34</td>
<td>36.07</td>
<td>38.40</td>
</tr>
<tr>
<td>SD</td>
<td>5.32</td>
<td>267.72</td>
<td>3.43</td>
<td>14.65</td>
<td>8.98</td>
<td>0.28</td>
<td>2.71</td>
<td>1.45</td>
<td>7.79</td>
<td>7.13</td>
</tr>
<tr>
<td>Min</td>
<td>8</td>
<td>433</td>
<td>9</td>
<td>17</td>
<td>26</td>
<td>0</td>
<td>10</td>
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<td>11</td>
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<tr>
<td>Max</td>
<td>34</td>
<td>2029</td>
<td>25</td>
<td>120</td>
<td>77</td>
<td>2</td>
<td>28</td>
<td>10</td>
<td>52</td>
<td>51</td>
</tr>
</tbody>
</table>

Key: Rd Comp = reading comprehension, Rd Speed = reading speed (in seconds), NW Read = non-word reading accuracy, NW Spd = non-word reading speed (in seconds), RN Spd = rapid naming speed, RN Err = rapid naming error, List Comp = listening comprehension, Syn Aw = syntactic awareness, NV Abil = non-verbal ability, Dig Span = verbal short-term memory.
Table 6.3. Comparisons of measures between Year 5, Year 6 and Form 1

<table>
<thead>
<tr>
<th></th>
<th>Anova df = 2, 123</th>
<th>Year 5 v Year 6 Mean difference (MD) and p-value</th>
<th>Year 5 v Form 1 Mean difference (MD) and p-value</th>
<th>Year 6 v Form 1 Mean difference (MD) and p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading comprehension</td>
<td>F=20.11, p&lt;.001</td>
<td>MD=3.11, p=.008</td>
<td>MD=6.62, p&lt;.001</td>
<td>MD=3.41, p=.003</td>
</tr>
<tr>
<td>Reading speed</td>
<td>F=9.70, p&lt;.001</td>
<td>MD=110, p=.113</td>
<td>MD=242, p&lt;.001</td>
<td>MD=132, p=.04</td>
</tr>
<tr>
<td>Non-word reading score</td>
<td>F=3.00, p&lt;.739</td>
<td>MD=.08, p=.590</td>
<td>MD=.46, p=749</td>
<td>MD=.37, p=.816</td>
</tr>
<tr>
<td>Non-word reading speed</td>
<td>F=8.23, p&lt;.001</td>
<td>MD=2.85, p=.614</td>
<td>MD=11.8, p=.001</td>
<td>MD=8.98, p=.009</td>
</tr>
<tr>
<td>Digit span</td>
<td>F=10.15, p&lt;.001</td>
<td>MD=.307, p=.106</td>
<td>MD=.419, p=.018</td>
<td>MD=.11, p=.732</td>
</tr>
<tr>
<td>Rapid naming speed</td>
<td>F=5.13, p=.007</td>
<td>MD=98, p=.584</td>
<td>MD=5.71, p=.010</td>
<td>MD=4.73, p=.03</td>
</tr>
<tr>
<td>Rapid naming errors</td>
<td>F=.72, p=.457</td>
<td>MD=0.06, p=.572</td>
<td>MD=0.00, p=.999</td>
<td>MD=0.06, p=.640</td>
</tr>
<tr>
<td>Syntactic awareness</td>
<td>F=4.19, p=.017</td>
<td>MD=0.06, p=.965</td>
<td>MD=5.75, p=.055</td>
<td>MD=5.83, p=.09</td>
</tr>
<tr>
<td>Listening comprehension</td>
<td>F=.17, p=.840</td>
<td>MD=.002, p=1.00</td>
<td>MD=.029, p=.867</td>
<td>MD=.29, p=.863</td>
</tr>
<tr>
<td>Non-verbal ability</td>
<td>F=2.06, p=.061</td>
<td>MD=1.15, p=.863</td>
<td>MD=4.07, p=.058</td>
<td>MD=2.91, p=.211</td>
</tr>
</tbody>
</table>
First order and partial correlations between the measures for the whole cohort were calculated and are presented in Table 6.3. These results from the first order correlations indicate that the strongest relationships with reading comprehension were found with the time taken to read passages (-.41) and syntactic awareness (.42). The speed of reading non-words also showed a reasonable relationship with reading comprehension (-.39). Partial correlations (controlling for age, Year/Form group and gender) indicated that reading comprehension was most highly correlated with syntactic awareness (.40) and listening comprehension (.33). However, the degree of the relationships between comprehension and the other variables differed across the three school-year cohorts (see Tables 6.4 to 6.6). For the youngest grade, text comprehension was reasonable related to non-word reading (.56), syntactic awareness (.44) and the time spent reading the passage (-.33) when gender and age were controlled. However, for the year 6 group, listening comprehension was the only measure that showed a reasonable correlation with passage comprehension in both the first order and partial correlations (.42 and .44 respectively). When the eldest group was considered, relationships with reading comprehension were most evident with listening comprehension (.58) and syntactic awareness (.49) in the partial correlations analyses.
Table 6.4. First order correlations (lower diagonal) and partial correlations (controlling for age, year/form and sex) between the measures in the study for participants in Years 5 and 6 and Form 1.

<table>
<thead>
<tr>
<th></th>
<th>Rd Comp</th>
<th>Rd Speed</th>
<th>List Comp</th>
<th>NV Abil</th>
<th>Synt Aw</th>
<th>NW Read</th>
<th>NW Spd</th>
<th>RN Spd</th>
<th>RN Err</th>
<th>Dig Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rd Comp</td>
<td>0.29</td>
<td>0.33</td>
<td>0.15</td>
<td>0.40</td>
<td>0.27</td>
<td>-0.27</td>
<td>-0.25</td>
<td>-0.03</td>
<td>0.20</td>
<td></td>
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<tr>
<td>Rd Speed</td>
<td>-0.41**</td>
<td>-0.26</td>
<td>-0.21</td>
<td>-0.31</td>
<td>-0.54</td>
<td>0.72</td>
<td>0.23</td>
<td>0.04</td>
<td>-0.19</td>
<td></td>
</tr>
<tr>
<td>List Comp</td>
<td>0.25**</td>
<td>-0.23**</td>
<td>0.17</td>
<td>0.25</td>
<td>0.13</td>
<td>-0.16</td>
<td>-0.27</td>
<td>0.07</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>NV Abil</td>
<td>0.22*</td>
<td>-0.27**</td>
<td>0.18**</td>
<td>0.38</td>
<td>0.18</td>
<td>-0.17</td>
<td>0.19</td>
<td>0.00</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>Synt Aw</td>
<td>0.42**</td>
<td>-0.37**</td>
<td>0.26**</td>
<td>0.43**</td>
<td>0.27</td>
<td>0.17</td>
<td>-0.24</td>
<td>-0.10</td>
<td>0.19</td>
<td></td>
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<tr>
<td>NW Read</td>
<td>0.23**</td>
<td>-0.50**</td>
<td>0.13</td>
<td>0.17*</td>
<td>0.25**</td>
<td>-0.51</td>
<td>-0.04</td>
<td>0.03</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>NW Spd</td>
<td>-0.39**</td>
<td>-0.75**</td>
<td>-0.12</td>
<td>-0.21*</td>
<td>-0.20*</td>
<td>-0.48**</td>
<td>0.28</td>
<td>0.01</td>
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<td></td>
</tr>
<tr>
<td>RN Spd</td>
<td>-0.36**</td>
<td>0.33**</td>
<td>-0.26**</td>
<td>-0.26**</td>
<td>-0.33**</td>
<td>0.35**</td>
<td>-0.04</td>
<td>0.03</td>
<td>-0.16</td>
<td></td>
</tr>
<tr>
<td>RN Err</td>
<td>0.00</td>
<td>0.03</td>
<td>0.05</td>
<td>-0.00</td>
<td>-0.11</td>
<td>-0.03</td>
<td>-0.00</td>
<td>0.05</td>
<td>-0.15</td>
<td></td>
</tr>
<tr>
<td>Dig Span</td>
<td>0.09</td>
<td>-0.14</td>
<td>0.21*</td>
<td>0.16</td>
<td>0.19*</td>
<td>0.10</td>
<td>0.02</td>
<td>-0.13</td>
<td>-0.18</td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2 tailed)
* Correlation is significant at the 0.05 level (2 tailed)

Key: Rd Comp = reading comprehension, Rd Speed = reading speed, List Comp = listening comprehension, NV Abil = non-verbal ability, Synt Aw = syntactic awareness, NW Read = non-word reading accuracy, NW Spd = non-word reading speed, RN Spd = rapid naming speed, RN Err = rapid naming error, Dig Span = verbal short-term memory.

Table 6.5. First order correlations (lower diagonal) and partial correlations (controlling for age and sex) between the measures in the study for participants in Year 5.

<table>
<thead>
<tr>
<th></th>
<th>Rd Comp</th>
<th>Rd Speed</th>
<th>List Comp</th>
<th>NV Abil</th>
<th>Synt Aw</th>
<th>NW Read</th>
<th>NW Spd</th>
<th>RN Spd</th>
<th>RN Err</th>
<th>Dig Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rd Comp</td>
<td>-0.33</td>
<td>0.18</td>
<td>0.03</td>
<td>0.44</td>
<td>0.56</td>
<td>-0.30</td>
<td>-0.19</td>
<td>0.12</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Rd Speed</td>
<td>-0.43**</td>
<td>-0.10</td>
<td>-0.37</td>
<td>-0.14</td>
<td>-0.59</td>
<td>0.62</td>
<td>-0.03</td>
<td>-0.02</td>
<td>-0.12</td>
<td></td>
</tr>
<tr>
<td>List Comp</td>
<td>-0.11</td>
<td>-0.13</td>
<td>0.02</td>
<td>0.12</td>
<td>0.08</td>
<td>0.00</td>
<td>0.05</td>
<td>0.18</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>NV Abil</td>
<td>0.1</td>
<td>-0.34*</td>
<td>-0.02</td>
<td>0.39</td>
<td>0.20</td>
<td>-0.47</td>
<td>-0.34</td>
<td>-0.29</td>
<td>-0.18</td>
<td></td>
</tr>
<tr>
<td>Synt Aw</td>
<td>0.47**</td>
<td>-0.21</td>
<td>0.14</td>
<td>0.38*</td>
<td>0.41</td>
<td>-0.19</td>
<td>-0.28</td>
<td>-0.01</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>NW Read</td>
<td>0.39*</td>
<td>-0.45**</td>
<td>0.04</td>
<td>0.19</td>
<td>0.33*</td>
<td>-0.40</td>
<td>-0.03</td>
<td>0.07</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>NW Spd</td>
<td>-0.46**</td>
<td>0.67**</td>
<td>-0.04</td>
<td>-0.40*</td>
<td>-0.27</td>
<td>-0.24</td>
<td>-0.20</td>
<td>0.28</td>
<td>-0.09</td>
<td></td>
</tr>
<tr>
<td>RN Spd</td>
<td>-0.20</td>
<td>0.01</td>
<td>-0.33*</td>
<td>-0.29</td>
<td>0.03</td>
<td>0.03</td>
<td>0.34</td>
<td>-0.34</td>
<td>-0.25</td>
<td></td>
</tr>
<tr>
<td>RN Err</td>
<td>0.02</td>
<td>0.02</td>
<td>0.16</td>
<td>-0.28</td>
<td>-0.03</td>
<td>0.04</td>
<td>0.31</td>
<td>0.30</td>
<td>-0.25</td>
<td></td>
</tr>
<tr>
<td>Dig Span</td>
<td>0.05</td>
<td>-0.14</td>
<td>0.14</td>
<td>0.18</td>
<td>-0.00</td>
<td>0.01</td>
<td>-0.12</td>
<td>-0.36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2 tailed)
* Correlation is significant at the 0.05 level (2 tailed)

Key: Rd Comp = reading comprehension, Rd Speed = reading speed, List Comp = listening comprehension, NV Abil = non-verbal ability, Synt Aw = syntactic awareness, NW Read = non-word reading accuracy, NW Spd = non-word reading speed, RN Spd = rapid naming speed, RN Err = rapid naming error, Dig Span = verbal short-term memory.
Table 6.6. First order correlations (lower diagonal) and partial correlations (controlling for age and sex) between the measures in the study for participants in Year 6.

<table>
<thead>
<tr>
<th></th>
<th>Rd Comp</th>
<th>Rd Speed</th>
<th>List Comp</th>
<th>NV Abil</th>
<th>Synt Aw</th>
<th>NW Read</th>
<th>NW Spd</th>
<th>RN Spd</th>
<th>RN Err</th>
<th>Dig Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rd Comp</td>
<td>-.17</td>
<td>.44</td>
<td>-.27</td>
<td>.02</td>
<td>-.08</td>
<td>-.19</td>
<td>-.20</td>
<td>-.10</td>
<td>.33</td>
<td>.25</td>
</tr>
<tr>
<td>Rd Speed</td>
<td>-.15</td>
<td>-.40</td>
<td>.05</td>
<td>-.29</td>
<td>-.63</td>
<td>.75</td>
<td>.30</td>
<td>-.05</td>
<td>-.22</td>
<td></td>
</tr>
<tr>
<td>List Comp</td>
<td>.42**</td>
<td>-.43**</td>
<td>.10</td>
<td>.16</td>
<td>.25</td>
<td>-.36</td>
<td>-.53</td>
<td>.09</td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td>NV Abil</td>
<td>.04</td>
<td>.04</td>
<td>.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synt Aw</td>
<td>.29</td>
<td>-.28</td>
<td>.16</td>
<td>.23</td>
<td>.06</td>
<td>.01</td>
<td>-.07</td>
<td>-.12</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>NW Read</td>
<td>.07</td>
<td>-.59**</td>
<td>.23</td>
<td>-.02</td>
<td>.06</td>
<td>-.72</td>
<td>-.04</td>
<td>-.06</td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td>NW Spd</td>
<td>-.16</td>
<td>.74**</td>
<td>-.37*</td>
<td>.13</td>
<td>.04</td>
<td>-.70**</td>
<td>.33</td>
<td>.15</td>
<td>.13</td>
<td></td>
</tr>
<tr>
<td>RN Spd</td>
<td>-.20</td>
<td>.32*</td>
<td>-.54**</td>
<td>.06</td>
<td>-.09</td>
<td>-.03</td>
<td>.33*</td>
<td>-.14</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>RN Err</td>
<td>-.10</td>
<td>.01</td>
<td>.02</td>
<td>.09</td>
<td>-.21</td>
<td>-.04</td>
<td>.13</td>
<td>-.08</td>
<td>-.23</td>
<td></td>
</tr>
<tr>
<td>Dig Span</td>
<td>.17</td>
<td>-.21</td>
<td>-.07</td>
<td>-.17</td>
<td>.22</td>
<td>-.02</td>
<td>.12</td>
<td>.07</td>
<td>-.20</td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2 tailed)
* Correlation is significant at the 0.05 level (2 tailed)

Key: Rd Comp = reading comprehension, Rd Speed = reading speed, List Comp = listening comprehension, NV Abil = non-verbal ability, Synt Aw = syntactic awareness, NW Read = non-word reading accuracy, NW Spd = non-word reading speed, RN Spd = rapid naming speed, RN Err = rapid naming error, Dig Span = verbal short-term memory.

In order to contrast the different measures as predictors of Maltese reading comprehension levels, a series of regressions analyses were performed. In each
analysis, the DV were the reading comprehension test scores and age and sex (and year/form for the whole cohort analysis) were entered first. For these regression analyses, variables were divided into understanding-level measures and word level processes. Syntactic awareness, listening comprehension and non-verbal ability were understanding-level processes, while non-word reading, time taken to read non-words, rapid naming and digit span were included in the word-level processes. The results of these regression analyses can be found in Table 6.7 for the whole cohort and Tables 6.8 to 6.10 for the individual school level groups. (Note that in all regression tables, the Final Beta column presents the beta values for the final model: i.e., after all variables have been entered. Therefore, it can be interpreted as the association between the variable and the comprehension measure controlling for all other variables in the final model.)

For each analysis, two entry sequences were used: one where the word-level measures preceding the understanding-level measures and a second where the word-level measures followed the understanding-level measures (subscripts (i) and (ii) in the Tables). These alternate entry sequences were performed to assess unique contributions to Maltese reading comprehension variability explanation of the two types of predictor measures. In the Year 5 regression analyses, both word-level and understanding-level measures predicted significant unique amounts of reading comprehension variability, whereas for the older children, only understanding-level measures produced significant increases in the level of reading comprehension explained. Overall, these analyses suggested a stronger relationship with understanding-level processes for the whole cohort, but for word-level processes to be equally important for the youngest group tested. Stepwise regression analyses confirmed these interpretations. When all the measures were contrasted in a stepwise procedures, with reading comprehension as the DV again, non-word reading was the main predictor for the youngest group (Year 5), but both listening comprehension and syntactic awareness measures were the main predictors for the two older groups (Year 6 and Form 1).
Table 6.8. Results of a regression analysis to investigate predictors of reading comprehension for the children in Years 5 and 6 and Form 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>$R^2$</th>
<th>$R^2$ change</th>
<th>Sig $R^2$ change</th>
<th>Final Beta*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Age, sex and year/form</td>
<td>.278</td>
<td>.278</td>
<td>$F(3,122)=15.63$, $p&lt;.001$</td>
<td>age .44*; sex -.12; year/form -.02</td>
</tr>
<tr>
<td>(i) Word-level processes</td>
<td>.401</td>
<td>.123</td>
<td>$F(5,117)=4.81$, $p&lt;.001$</td>
<td>NWA .08; NWS -.11; RNS -.06; RNE .01; Digit Span .12</td>
</tr>
<tr>
<td>3 Understanding-level processes</td>
<td>.486</td>
<td>.085</td>
<td>$F(3,114)=0.32$, $p=.001$</td>
<td>ListComp .18*; SyntAw .23*; NVAbil -.06</td>
</tr>
<tr>
<td>(ii) Understanding-level processes</td>
<td>.443</td>
<td>.166</td>
<td>$F(3,110)=11.79$, $p&lt;.001$</td>
<td></td>
</tr>
<tr>
<td>2 Word-level processes</td>
<td>.486</td>
<td>.043</td>
<td>$F(5,114)=1.92$, $p=.097$</td>
<td></td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2 tailed)

Key: NWA = non-word reading accuracy; NWS = non-word reading speed; RNS = rapid naming speed; RNE = rapid naming errors; ListComp = listening comprehension; SyntAw = syntactic awareness; NVAbil = non-verbal ability

Table 6.9. Results of a regression analysis to investigate predictors of reading comprehension for the children in Year 5.

<table>
<thead>
<tr>
<th>Variables</th>
<th>$R^2$</th>
<th>$R^2$ change</th>
<th>Sig $R^2$ change</th>
<th>Final Beta*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Age, sex and year/form</td>
<td>.302</td>
<td>.302</td>
<td>$F(2,37)=8.02$, $p=.001$</td>
<td>age .31*; sex -.18;</td>
</tr>
<tr>
<td>(i) Word-level processes</td>
<td>.531</td>
<td>.228</td>
<td>$F(6,32)=3.11$, $p=.021$</td>
<td>NWA .20*; NWS -.32*; RNS -.07; RNE .20; Digit Span .05</td>
</tr>
<tr>
<td>3 Understanding-level processes</td>
<td>.652</td>
<td>.121</td>
<td>$F(3,29)=3.57$, $p=.032$</td>
<td>ListComp -.22*; SyntAw .31*; NVAbil -.31*</td>
</tr>
<tr>
<td>(ii) Understanding-level processes</td>
<td>.467</td>
<td>.165</td>
<td>$F(3,34)=3.60$, $p=.026$</td>
<td></td>
</tr>
<tr>
<td>2 Understanding-level processes</td>
<td>.652</td>
<td>.185</td>
<td>$F(6,29)=3.08$, $p=.024$</td>
<td></td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2 tailed)

Key: NWA = non-word reading accuracy; NWS = non-word reading speed; RNS = rapid naming speed; RNE = rapid naming errors; ListComp = listening comprehension; SyntAw = syntactic awareness; NVAbil = non-verbal ability
Table 6.10. Results of a regression analysis to investigate predictors of reading comprehension for the children in Year 6.

<table>
<thead>
<tr>
<th>Variables</th>
<th>R²</th>
<th>R² change</th>
<th>Sig R² change</th>
<th>Final Beta*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Age, sex and year/form</td>
<td>.023</td>
<td>.023</td>
<td>F(2,41)&lt;1</td>
<td>age .35; sex .02;</td>
</tr>
<tr>
<td>(i)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Word-level processes</td>
<td>.190</td>
<td>.167</td>
<td>F(5,36)=1.48, p=.220</td>
<td>NWA -.28; NWS -.29; RNS -.02; RNE -.17; Digit Span .23</td>
</tr>
<tr>
<td>3 Understanding-level processes</td>
<td>.362</td>
<td>.172</td>
<td>F(3,33)=2.97, p=.046</td>
<td>ListComp .42*; SyntAw .16; NVAAbil .05</td>
</tr>
<tr>
<td>(ii)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Understanding-level processes</td>
<td>.276</td>
<td>.252</td>
<td>F(3,38)=4.41, p=.009</td>
<td></td>
</tr>
<tr>
<td>3 Word-level processes</td>
<td>.362</td>
<td>.087</td>
<td>F(5,33)&lt;1</td>
<td></td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2 tailed)

Key: NWA = non-word reading accuracy; NWS = non-word reading speed; RNS = rapid naming speed; RNE = rapid naming errors; ListComp = listening comprehension; SyntAw = syntactic awareness; NVAAbil = non-verbal ability

Table 6.11. Results of a regression analysis to investigate predictors of reading comprehension for the children in Form 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>R²</th>
<th>R² change</th>
<th>Sig R² change</th>
<th>Final Beta*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Age, sex and year/form</td>
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<td>.014</td>
<td>F(2,39)&lt;1</td>
<td>age .06; sex -.31*;</td>
</tr>
<tr>
<td>(i)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Word-level processes</td>
<td>.326</td>
<td>.312</td>
<td>F(5,34)=3.15, p=.019</td>
<td>NWA .048 NWS -.20; RNS -.16; RNE .22; Digit Span .12</td>
</tr>
<tr>
<td>3 Understanding-level processes</td>
<td>.547</td>
<td>.221</td>
<td>F(3,31)=5.04, p=.008</td>
<td>ListComp .54*; SyntAw .09; NVAAbil .00</td>
</tr>
<tr>
<td>(ii)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Understanding-level processes</td>
<td>.440</td>
<td>.426</td>
<td>F(3,36)=9.14, p&lt;.001</td>
<td></td>
</tr>
<tr>
<td>3 Word-level processes</td>
<td>.547</td>
<td>.107</td>
<td>F(6,31)=1.46, p=.231</td>
<td></td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2 tailed)

Key: NWA = non-word reading accuracy; NWS = non-word reading speed; RNS = rapid naming speed; RNE = rapid naming errors; ListComp = listening comprehension; SyntAw = syntactic awareness; NVAAbil = non-verbal ability
6.4. Discussion

The results of this study indicated relationships between Maltese reading comprehension and measures of listening comprehension and syntactic awareness in typically developing Maltese late primary/early secondary school children. Additionally, non-word reading was related to reading comprehension in the youngest cohort: the Year 5 children. These analyses were most consistent with a change in processing influence across the school years whereby in Year 5 there was a combined influence of word-level and understanding-level processes, whereas by Year 6 this had focused more on understanding-level influences, possibly indicative of a levelling-off of word-level skills within these older cohorts.

The results indicated that the youngest cohort of Maltese children showed roughly equivalent predictions for both understanding-level and word-level measures. Processing of individual words is an important factor in successful reading comprehension. According to Nagy and Scott (2000), accessing the meaning of about 90% of the individual words in a text is necessary for a reader to understand a passage. Hence, word-level decoding processes are important. However, the current results illustrate that measures that required text processing beyond the individual word were stronger predictors of comprehension for typically developing Maltese readers, particularly the older cohorts tested. This finding supports the current literature (e.g. Nation, Adams, Bowyer-Crane, & Snowling, 1999; Nation & Snowling, 2000; Stothard & Hulme, 1995) that proposes that comprehension goes beyond lower level word reading processes and, rather, moves to higher language processes. The attribution of difficulties in syntactic processing has commonly been associated with memory deficits rather than syntactic problems per se. However, Nation et al. (1999) discarded this view when their findings found that poor comprehenders performed similarly to good comprehenders in memory tasks but not in syntactic exercises. The results indicate a similar conclusion to that of Nation and Snowling, which holds that problems with reading comprehension include both lower level deficits on word level, but also higher level general language skills (grammar and semantics). These relationships argue for Maltese reading comprehension at this level being mainly a facet of linguistic processing, or understanding-level, rather than word-level skills.
A move from word-level to understanding-level influences would suggest that comprehension is becoming more sophisticated during this period of development, which may argue for decoding skills to exert a greater influence on early reading compared to later reading comprehension in Maltese (Curtis, 1980). This conclusion is consistent with the views of Catts et al. (2005) who proposed that phonological skills used in decoding processes are more important in the initial stages of reading, whereas, for skilled comprehension to develop, higher level language skills need to be involved. Indeed, a similar pattern of change in major influence from word recognition/decoding to language/linguistic processing has been argued as being characteristic of English speaking cohorts about the same age range as targeted in the present Maltese study (Muter et al., 2004). Both Muter et al. (2004) and Share et al. (2004b) gave importance to expressive language and syntactic awareness when discussing reading comprehension success.

A high percentage of studies have largely focused on word level processes deficits when taking into account reading comprehension. The dominant idea is that reading and reading comprehension are strongly related to phonological processing abilities (Castles & Coltheart, 2004), since mastery at this level will create opportunity for fluent and automatic reading of words. Thus, creating a situation where less memory and attention is needed to decode words should result in better understanding of written material (Prior, 1996). Nevertheless, the youngest group (Year 5) was the only group to have non-word reading as the best predictor for reading comprehension. The two eldest groups (Year 6 and Form 1), were found to show most influence from listening comprehension and syntactic awareness. The pattern of results is supported by the English literature, which states that both decoding skills and linguistic comprehension are necessary for reading comprehension to be achieved; and corresponds to the simple view of reading proposed by Hoover and Gough (1990). They hold that the necessary skills to understand include the ability to read words through decoding and the processes involved in understanding language. Additionally many researchers have confirmed the importance of language skills in earlier studies (e.g. Baddeley, Logie, Nimmo-Smith, & Brereton, 1985; Cunningham & Stanovich, 1997; Gottardo, Stanovich, & Siegel, 1996). Results obtained by Storch and Whitehurst (2002) found that the success of reading comprehension is achieved by several factors and that though the most predominant one is language abilities,
nonetheless, prior word level skills are also important. Their suggestion is that in pre-
and early primary school comprehension is related to word level processes, whereas,
from 3rd grade onwards, components of verbal ability and oral language, such as
vocabulary and syntax are indispensable. This proposes that the acquisition of word
reading and linguistic competence in Maltese is similar to that proposed in English.
Chapter 7:
Study 5: Maltese reading comprehension in students with dyslexia

7.1. Introduction

The preceding chapters have focused on comprehension levels and development of mainstream Maltese bilingual students. Study 4 indicated that reading comprehension in Maltese involves both word and understanding level processes, with younger children (Year 5) seeming to be more dependent on word level factors, such as decoding, whereas older groups (Year 6 and Form 1) showed more of an influence of factors beyond the decoding of individual words that relate to understanding combinations of words, such as syntactic awareness and listening comprehension. These results were argued to be consistent with the literature derived from studies of monolingual English populations. Given that the overall aim of the work reported in this thesis was to support the identification of children with literacy difficulties, the current chapter addresses whether similar conclusions to those derived from the mainstream Maltese cohorts would be derived from data obtained from Maltese children with reading difficulties (dyslexia). Before reporting the findings of such work, the current introduction will provide a reminder of issues related to dyslexia in the relevant literature.

7.1.1. Definition of Dyslexia

The question of why a number of children have trouble acquiring adequate literacy skills has been the focus of a large number of studies over the past years (Vellutino, Fletcher, Snowling, & Scanlon, 2004). The intriguing notion has been that many children possess average intelligence but nonetheless demonstrate substantial difficulties in reading and spelling. In spite of years of research, there is still no agreement on a definition of dyslexia. Developmental dyslexia was traditionally defined as a discrepancy between reading ability and intelligence in children, but more comprehensive views have considered that it is a neurological disorder with a genetic origin that influences an individual in literacy attainment, though it may also affect memory, information processing, phonological representation, organization and co-ordination (see Reid, 2005). However, despite decades of intensive research, the underlying causes of impeded literacy development are still hotly debated. Harris and
Sipay (1990) documented that the prevalence of these literacy difficulties is approximately 10% to 15% of school age children.

7.1.2. Theories of Dyslexia
Problems that are related to dyslexia are rooted in the individual due to developmental abnormalities. However, as pointed out above, there is no consensus amongst experts about one specific aetiology. Explanations/descriptions of dyslexia have been associated with one or more of three separate levels of investigation: the biological level (genetic and neurology), the cognitive level (information processing) and the behavioural level (primary characteristics that show symptoms of a dyslexic nature (Reid & Wearmouth, 2002). The behavioural level is probably the most obvious and may, therefore, be the easiest to observe. At this level, manifestations of the difficulty are clearly demonstrated in the child’s daily life. For example, at school this may be evident in the child’s reading, spelling, comprehension, understanding and organization (Reid & Wearmouth, 2002). However, most theories about the causes of dyslexia focus on biological or cognitive factors, which often need to be inferred from data.

7.1.2.1. Biological Theories
Biological theories of dyslexia describe differences between individuals with dyslexia and those with no symptoms of dyslexia in terms of genetics and the structure of the brain. Theories of dyslexia that focus on a biological level support the view that dyslexia runs in families and that particular chromosomes are responsible for the difficulties encountered by individuals with dyslexia (Fries, Alarcon, & Olson, 1997), and there is a reasonable amount of evidence to argue that dyslexia does run in families. However, the genetic factors responsible are still to be understood, though they seem to relate to language (possibly phonology), and may involve complex interactions between different chromosomes that make the individual susceptible to dyslexia.

Supporters of the Magnocellular theory believe that the cause of dyslexia is principally the result of large neurons in the brain (Magnocells) that have been damaged. These cells are held responsible for timing motor and sensory events. Consequently, if such a system is faulty, the outcome will lead to visual confusion of letter order when reading and poor visual memory when writing (Stein, Richardson, &
The visual magnocellular system concentrates on processing visual information swiftly, whereas the auditory magnocellular system specializes in fast auditory information. Stein and Walsh (1997) suggest that the magnocellular temporal processing deficit extends to other systems, such as motor control (e.g. Stein et al., 2000). The argument linking deficits in the auditory magnocellular system to dyslexia proposes that impairment in speed of sensory processing reduces sensory input for proper phonological coding, the latter being a system necessary for reading and writing. In support of this theory, training techniques intended to improve auditory processing abilities in individuals with dyslexia have shown progress in their language and literacy capacity (Petkov, O'Connor, Benmoshe, Baynes, & Sutter, 2005).

Another influential biological theory was the Cerebellar Deficit Theory. This theory was developed from an earlier automatization deficit theory by the same authors (Nicolson & Fawcett, 1990; Fawcett, Nicolson & Dean, 2001, Nicolson & Fawcett, 2006). In their original study (Nicolson & Fawcett, 1990) these authors suggested that people with dyslexia had difficulty in performing two tasks at the same time. The results revealed that individuals with a dyslexic nature could not balance as well as people who did not have dyslexia when asked to perform another task (such as counting backwards) simultaneously. More recently, the automatisation deficit has been linked to impaired function of the cerebellum. Individuals with dyslexia have been argued to demonstrate lower performance in a variety of functions that largely depend on cerebellar processing (e.g. motor movement when writing). Nicolson et al. (2001, in Reid & Wearmouth, 2002) concluded that the connection between cerebellar impairment and dyslexia was a causal chain linking cerebellar impairment with phonological processing deficits that resulted in problems with reading and spelling.

7.1.2.2. Cognitive Theories
Cognitive theories of dyslexia declare that problems with literacy are primarily due to an alternative system of information processing in the brain (Reid & Wearmouth, 2002). The most influential hypothesis that is proposed by cognitive theories is the phonological deficit hypothesis. Indeed, as discussed throughout this thesis, the acquisition of phonological skills plays a core role in difficulties encountered in dyslexia (Snowling, 1995; Snowling et al., 1996; Stanovich, 1988). As can be seen from the biological theories outlined above, phonological factors are included in most
theories about dyslexia even if they are considered a link in the causal chain rather than, as argued by proponents of the phonological deficit perspective, being the specific cause. Phonological processing involves the way that sounds are processed. For example, an individual may have adequate hearing but will, nonetheless, find it challenging to identify, discriminate, sequence and reproduce sounds within a word (Vellutino et al., 2004). The deficit lies in the inability to represent or recall speech sounds (phonological representations). This creates difficulty in mentally mapping letters to phonemes (individual speech sounds), a characteristic that is essential for literacy development (Snowling, 2000; Snowling et al., 1996). Proponents of phonological theories view dyslexia as manifesting problems in several closely related sub-domains: phonological awareness (difficulties with analysing, blending and manipulating the sound structures of words), verbal short-term memory (difficulties with recall of words and sentences), word retrieval (reduced verbal fluency and naming speed), and decoding in reading and spelling (evident especially when processing unfamiliar words or pseudowords) (Reid, Szczerbinski, Iskierka-Kasperek, & Hansen, 2007).

Reading failure has often been accredited to memory deficits. Several mechanisms are involved with memory processing. These include audio (e.g. phonological awareness), visual (e.g. orthographical knowledge), procedural (e.g. as in driving a car), and semantic (understanding meaning) memory. Weaknesses in any of these mechanisms can be present in a person with dyslexia (Mortimore, 2003). Research has also linked poor working memory to reading failure (e.g. Jong, 1998; Passolunghi & Siegel, 2001; Swanson, 2003). The belief is that limited memory capacity results in the inability to process and preserve a phonological system in memory (e.g. Shankweiler & Crain, 1986; Siegel, 1994; Stanovich & Siegel, 1994). Additionally, the failure to rapidly and automatically decode words will decrease attention and, as a result, increase working memory load (Mortimore, 2003). Such processing limitations may be apparent in both word recognition (e.g. Siegel & Ryan, 1989) and reading comprehension (e.g. Swanson, 1999). Pickering and Gathercole (2004) have suggested that a major difficulty faced by individuals with dyslexia is the inability to convert what is visually seen into phonological information, which may involve recoding memory systems, such as the phonological loop of working memory. Furthermore, studies have proposed that in addition to phonological processing
difficulties, learners with reading deficits also experience problems in the executive processing in memory (e.g. Passolunghi & Siegel, 2001; Swanson, 1993). However, again, these memory-based viewpoints include discussions of phonological processing.

There are contradictory notions regarding the importance of the roles that phonology and language skills have in text comprehension. The evidence in favour of the phonological hypothesis states proposes that the lack of phonological abilities will impede the information to reach higher levels of processing and, therefore, hinder the ability to understand (Hulme & Snowling, 1992). Bruck (1990) proposed that children with dyslexia who demonstrated good levels of oral ability were more likely to have higher levels of understanding when reading for meaning. Bruck’s idea was that oral language skills compensated for the deficit in word level processes. Conners and Olson (1990) similarly found that older students with dyslexia (when compared to younger students with dyslexia), who had more advanced language skills, also had higher levels of comprehension. Nevertheless, this notion has been discarded by a number of researchers on the grounds that a large number of individuals with dyslexia also exhibit difficulties in language skills (e.g. Lovett, 1987; Swanson & Siegel, 2001). A study conducted by Ransby and Swanson (2003) found that properties belonging to word recognition processes and language skills were equally important for reading comprehension, implying that various cognitive aspects are responsible for deriving meaning.

As indicated in the previous chapter, rapid naming is viewed as a very important component in the identification of students with dyslexia (Meyer, Wood, Hart, & Felton, 1998), since successful reading involves decoding words fluently and automatically. The inability to read words rapidly is a clear indication that something might be wrong. Studies illustrate that poor rapid naming (accompanied by poor decoding) is one of the best predictors for dyslexia (e.g. Compton, DeFreis & Olson, 2001; Kirby et al., 2003; Savage & Frederickson, 2005; Wolf et al., 2000). Wolf, Bowers and Biddle (2000) have found that a number of individuals with dyslexia have phonological skills which are intact but, nevertheless, show difficulties with naming-speed tasks. Their conclusion is that a double deficit (phonological problems and rapid naming deficits) is responsible for their reading difficulties.
Snowling, Gallagher and Frith (2003) were interested in understanding whether children from high risk families (i.e. children whose relative was assessed with dyslexia) for developing dyslexia would show behavioural difficulties that are associated with dyslexia. Additionally they were interested in understanding whether these high-risk children would show language impairments and whether oral language abilities were predictors of reading comprehension. Their study comprised recruiting children who came from high risk families with and without impairments. The results show that the high-risk participants with literacy difficulties struggled in all oral language tasks as well as phonological processing difficulties. The difference was also seen in listening comprehension and expressive language measures. Their results indicated that more than half of the participants who had family risk due to genetic reasons developed literacy difficulties and those who did not develop difficulties but belonged to high-risk groups also showed some mild symptoms of dyslexia. Follow-up studies confirmed that the participants in the at-risk subgroup who did not qualify as having dyslexia according to the diagnostic criteria, anyway demonstrated poor orthographic skills and poor reading fluency in adolescence.

These results are important because they amplify the idea that dyslexia runs through families and that although an individual might not ‘qualify’ as having dyslexia (according to a specific country’s assessment criteria), he/she may demonstrate mild traits that affect performance. The results imply that causes of dyslexia are determined by gene-environment relations. Additionally, there is evidence that the behavioural symptoms of dyslexia go beyond phonological processing difficulties, where significant importance should be placed on oral and written language abilities.

7.1.3. Reading comprehension difficulties

Frith and Snowling (1983) outlined that students with dyslexia are able to understand written material before being able to decode words. In addition a number of researchers (e.g. Oakhill & Garnham, 1988; Stothard & Hulme, 1995) found that students who demonstrate difficulties specifically with reading comprehension have appropriate word recognition skills. It is common for studies that focused on reading comprehension difficulties to have found that the major difficulties are found in reading accuracy (Yuill & Oakhill, 1991) or identifying sight words (Perfetti &
Hogaboam, 1975), and/or verbal ability, such as in listening comprehension and poor receptive language (Stothard & Hulme, 1995). According to Nation and Snowling (1998), the inability to understand written text may primarily be due to poor semantic knowledge, in addition to weak receptive language and listening comprehension skills. Furthermore, their study showed that the speeds at which words were read indicated a lack of fluency, which hampered both comprehension and word level reading ability. Studies that took a sample of adult learners with dyslexia (e.g. Ransby & Swanson, 2003) and researched what cognitive processes are present during reading comprehension discovered that their adult participants had poor scores in activities that involved phonological processing, naming speed, working memory, general knowledge and vocabulary. Nevertheless, they distinguished between comprehension accuracy and comprehension fluency. They found that phonological processing, rapid naming, vocabulary, general knowledge and listening comprehension demonstrated unique variance with regards to the former, while phonological processing and listening comprehension showed unique variance for the latter. Previous research (e.g. Cunningham, Stanovich, & Wilson, 1990) had shown that the strongest predictor for reading comprehension was word recognition, but such research was conducted on children and may be at variance to studies conducted on adults with dyslexia (e.g. Bruck, 1990, Lefly & Pennington, 1991). When adults are considered, a number of studies have found no significant difference between adults with dyslexia and those without when assessing for reading comprehension; and Conners and Olson (1990) achieved similar results when testing adolescents with dyslexia on word level skills and reading comprehension. Hence, although word recognition is highly associated with reading accuracy and fluency, it may be less associated with reading comprehension. As mentioned above, the role that phonological processing plays in understanding text is ambiguous. Furthermore, it is not clear whether phonological skills are important throughout the readers’ life or whether the importance diminishes as the reader matures.

Notwithstanding the notion that ample research points in the direction of deficits in phonological processing as a primary cause of reading difficulties, semantic and syntactic abilities have gained importance over the years. The idea is that limited vocabulary knowledge and word meaning and order contribute to reading comprehension difficulties. Studies such as that conducted by Goswami, Ziegler,
Dalton and Schneider (2001) found vocabulary to be the strongest predictor of later reading comprehension. The biggest conflict lies in understanding whether difficulties in semantic and syntactic abilities result due to reading deficits or whether it is the primary cause of the difficulty.

### 7.1.4. The present study

The studies discussed above show that there is agreement about the role that word level processes have in reading in students with dyslexia, but the same is yet to be established for reading comprehension, particularly when bilingual children are considered; such as the Maltese students that are the focus of the current work. Therefore, the study presented in this chapter tested the reading comprehension levels of a sample of students with dyslexia in addition to a number of tasks that include both word level and understanding level skills. The aim of the study was to increase our understanding of comprehension skills amongst a group of students assessed as having dyslexia. The objectives were to identify differences between students who experienced difficulties of a dyslexic nature and those who were not and to determine whether aspects found to predict comprehension in students without dyslexia were similar to those found in students with dyslexia.

### 7.2. Method

#### 7.2.1. Participants

Three groups of participants were selected: a group of Maltese children with dyslexia, a group of Maltese children without dyslexia from Form 1 (chronologic age equivalent to the group with dyslexia) and a group of Maltese children without dyslexia from Year 5 (reading comprehension level equivalent to the group with dyslexia). This was done to allow comparisons between the groups with dyslexia and those typically developing readers who were the same chronological age and school year level (the Form 1 group); and between the group with dyslexia and those typically developing readers who were at the same reading comprehension level (Year 5). Hence, the groups selected provided a chronological age match and reading comprehension match for the group with dyslexia. (Table 7.1 provides details about these groups.)
All participants were selected from mainstream schools across Malta using purposive sampling methods (Merrian, 1988) to ensure that groups were appropriate for the aims of the study (i.e., students with dyslexia versus students without dyslexia within the school years targeted). The Form 1 group (without dyslexia) consisted of 42 participants, of which 16 were male and 26 were female. The Year 5 group included 40 participants, of which 19 were male and 21 were female. These groups of children were selected following the same procedures as those used in Study 4. None of these children had a record of literacy learning difficulties based on school records and teacher information. The group of students assessed with dyslexia comprised 26 Form 1 students. All were boys and possessed a report from an educational psychologist/dyslexia specialist confirming that they had been diagnosed as having dyslexia. The selection procedures for the sample of students with dyslexia involved contacting a number of Heads of schools who were asked whether they had any students diagnosed with dyslexia who were willing to participate. A consent form was sent to the school and the parents to allow them to indicate if they were willing to allow their child to participate. It would have been preferable had the same number of girls with dyslexia been included in the study, but this was impossible due to either (i) the lack of records that any Form 1 female student with dyslexia student attended a particular school where testing was undertaken or (ii) the lack of permission from parents to allow their daughter to participate.
Table 7.1. Numbers of children with dyslexia and children without dyslexia in each year group, with male:female numbers in brackets, and average age.

<table>
<thead>
<tr>
<th></th>
<th>Year 5</th>
<th>Form 1</th>
<th>Students with dyslexia (males only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers (Male:Female)</td>
<td>40 (19:21)</td>
<td>42 (18:26)</td>
<td>26</td>
</tr>
<tr>
<td>Average age in years</td>
<td>9.48</td>
<td>11.51</td>
<td>11.81</td>
</tr>
</tbody>
</table>

7.2.2. Measures

The measures used for this study were the same as those described in chapter 6 and therefore followed the same piloting and development processes as outlined earlier in this thesis.

7.2.2.1. Reading comprehension and Reading speed

This was the Maltese reading comprehension test developed as part of the work reported in this thesis. The children read the 6 passages aloud and answered comprehension questions about the passage after each. The time taken by the participant to read the passages and number of questions answered correctly were used as measures of reading speed and reading comprehension respectively.

7.2.2.2. Non-word reading and non-word speed

Again, the same task was used as that described in Chapter 6. The time taken to read the list of non-words and the number of correct answers were recorded. (In the regression analyses, these two figures were combined to determine the number of non-words read correctly in a minute, as a measure of non-word decoding fluency.)

7.2.2.3. Verbal short-term memory (Digit span)

The forward digit span procedure described in chapter 6 was used to evaluate verbal short-term memory. Such measures have been used in assessment procedures, such as those in the Wechsler Intelligence Scale for Children (Wechsler, 1992), the Working Memory Test for Children (Pickering & Gathercole, 2001) and the Bangor Dyslexia Test (Miles, 1993). The number of trials completed correctly by the child was used as the measure for this task.
7.2.2.4. Rapid naming speed and rapid naming errors
As described in Chapter 6, an object naming task was used, which involved two naming trials of items (see Chapter 6 for full details). The speed of object naming and the number of incorrect answers was recorded. The score for this task was the addition of the two naming times, plus a one second penalty for any non-corrected errors.

7.2.2.5. Syntactic awareness
The same measure as used in Chapter 6 was used in this study. The measure used was the number of sentences rearranged correctly out of ten.

7.2.2.6. Listening comprehension
This was the same task as used in Chapter 6 and followed the same procedures. Therefore, the score for this task was the number of questions answered correctly out of a maximum of 26.

7.2.2.7. Non verbal ability
As in Chapter 6, the Standard Ravens Progressive matrix (Raven et al., 1996) was chosen as a measure to assess non-verbal ability levels among the children tested. The score, therefore, was the number of correct answers out of a maximum of 60

7.3. Results
Analyses focused on differences between the students with dyslexia and the groups without dyslexia, and predictors of reading comprehension levels amongst the children with dyslexia.

Table 7.2 displays the descriptive statistics produced by students with dyslexia in comparison to the other two groups (without dyslexia). The results show that on measures of listening comprehension and syntactic awareness students with dyslexia performed just as well as the other two groups. Furthermore, the results indicate that reading comprehension levels were similar to the younger group who do not experience difficulties of a dyslexic nature (i.e., those children in Year 5). Speed of reading for both reading comprehension and non-word reading was slightly superior for children in the Year 5 group.
Statistical comparisons of the children with dyslexia with the Form 1, without dyslexia (chronological age matched) and the Year 5 students without dyslexia (reading comprehension matched) incorporated analyses of variance (with one between group factor of three levels), followed by Dunnett post-hoc comparisons contrasting the students with dyslexics to each group of students without dyslexia. The results of these analyses are presented in Table 7.3, which separates the findings for comparisons including both sexes from those comprising boys only (as all the children with dyslexia in this sample were male). Overall, the students with dyslexia performed worse than their age equivalent peers who do not have difficulties of a dysxic nature on all of the measures with the exceptions of the listening comprehension and non-verbal ability measures – although these differences were limited to the text reading and non-word reading measures if male-only comparisons were made between students with dyslexia and the chronological age matched student without dyslexia. Comparisons with the reading comprehension matched student without dyslexia confirm these specific factors. Although the students with dyslexia performed at a similar level to the Year 5 in terms of reading comprehension, they were slower text readers and poorer non-word readers.
Table 7.2. Means and standard deviations (SD), with minimum (Min) and maximum (Max) scores produced by the children in primary Years 5, students with dyslexia and secondary Form 1.

<table>
<thead>
<tr>
<th></th>
<th>Rd Comp</th>
<th>Rd Speed (secs)</th>
<th>NW Reading</th>
<th>NW Speed (secs)</th>
<th>RN Spd</th>
<th>RN Err</th>
<th>List Comp</th>
<th>Syn Aw</th>
<th>NV Abil</th>
<th>Dig span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student with dyslexia</td>
<td>Mean</td>
<td>20.23</td>
<td>1150.73</td>
<td>18.81</td>
<td>61.19</td>
<td>45.50</td>
<td>0.96</td>
<td>21.04</td>
<td>7.19</td>
<td>36.00</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>6.30</td>
<td>463.10</td>
<td>4.29</td>
<td>30.60</td>
<td>11.38</td>
<td>2.27</td>
<td>3.01</td>
<td>1.20</td>
<td>6.21</td>
</tr>
<tr>
<td></td>
<td>Min</td>
<td>8</td>
<td>537</td>
<td>10</td>
<td>26</td>
<td>29</td>
<td>0</td>
<td>12</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>31</td>
<td>2029</td>
<td>25</td>
<td>120</td>
<td>77</td>
<td>11</td>
<td>25</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>Year 5</td>
<td>Mean</td>
<td>19.00</td>
<td>913.22</td>
<td>22.33</td>
<td>46.17</td>
<td>44.02</td>
<td>0.05</td>
<td>21.77</td>
<td>7.15</td>
<td>34.53</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>4.43</td>
<td>286.36</td>
<td>3.37</td>
<td>14.03</td>
<td>10.35</td>
<td>0.22</td>
<td>2.37</td>
<td>1.00</td>
<td>7.81</td>
</tr>
<tr>
<td></td>
<td>Min</td>
<td>10</td>
<td>542</td>
<td>9</td>
<td>28</td>
<td>30</td>
<td>0</td>
<td>15</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>27</td>
<td>1571</td>
<td>25</td>
<td>87</td>
<td>57</td>
<td>1</td>
<td>26</td>
<td>9</td>
<td>46</td>
</tr>
<tr>
<td>Form 1</td>
<td>Mean</td>
<td>25.52</td>
<td>670.31</td>
<td>22.79</td>
<td>34.33</td>
<td>38.31</td>
<td>0.05</td>
<td>21.48</td>
<td>7.90</td>
<td>36.60</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>4.09</td>
<td>181.95</td>
<td>2.51</td>
<td>10.26</td>
<td>7.59</td>
<td>0.21</td>
<td>3.12</td>
<td>1.51</td>
<td>8.39</td>
</tr>
<tr>
<td></td>
<td>Min</td>
<td>14</td>
<td>433</td>
<td>16</td>
<td>17</td>
<td>26</td>
<td>0</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>33</td>
<td>1146</td>
<td>25</td>
<td>60</td>
<td>60</td>
<td>1</td>
<td>25</td>
<td>10</td>
<td>52</td>
</tr>
</tbody>
</table>

Key: Rd Comp = reading comprehension, Rd Speed = reading speed (in seconds), NW Reading = non-word reading accuracy, NW Spd = non-word reading speed (in seconds), RN Spd = rapid naming speed, RN Err = rapid naming error, List Comp = listening comprehension, Syn Aw = syntactic awareness, NV Abil = non-verbal ability, Dig Span = verbal short-term memory.
| Table 7.3. Comparisons of students with dyslexia with Form 1 and Year 5 children without dyslexia (boys only comparisons in brackets). |
|---|---|---|
| | Anova df = 2, 105 (df = 2, 58) | Dylexics v Form 1 Mean difference (MD) and p-value | Dylexics v Year 5 Mean difference (MD) and p-value |
| Reading comprehension | F=20.58, p<.001 (F=4.50, p=.016) | MD=5.29, p<.001 (MD=4.71, p=.016) | MD=-1.23, p=.479 (MD=-0.02, p=.99) |
| Reading speed | F=20.09, p<.001 (F=6.20, p=.004) | MD=480, p<.001 (MD=376, p=.003) | MD=237, p=.005 (MD=268, p=.032) |
| Non-word reading score | F=12.72, p<.001 (F=9.89, p<.001) | MD=3.88, p<.001 (MD=3.51, p=.003) | MD=3.52, p<.001 (MD=4.09, p<.001) |
| Non-word reading speed | F=17.27, p<.001 (F=7.08, p=.002) | MD=26.9, p<.001 (MD=24.8, p=.002) | MD=15.0, p=.003 (MD=17.9, p=.019) |
| Digit span | F=10.16, p<.001 (F=1.60, p=.211) | MD=7.35, p<.001 (MD=3.36, p=.216) | MD=3.16, p=.111 (MD=2.86, p=.285) |
| Rapid naming speed | F=5.64, p=.005 (F<1) | MD=7.19, p=.007 (MD=3.44, p=.54) | MD=1.48, p=.754 (MD=1.86, p=.85) |
| Rapid naming errors | F=6.50, p=.002 (F=.91, p=.063) | MD=0.91, p=.003 (MD=0.90, p=.12) | MD=0.91, p=.003 (MD=0.96, p=.070) |
| Syntactic awareness | F=4.36, p=.015 (F<1) | MD=0.71, p=.047 (MD=0.32, p=.62) | MD=0.04, p=.986 (MD=0.02, p=.99) |
| Listening comprehension | F=2.06, p=.136 (F<1) | MD=0.44, p=746 (MD=1.23, p=.31) | MD=0.74, p=.467 (MD=0.75, p=.63) |
| Non-verbal ability | F=3.29, p=.041 (F<1) | MD=3.60, p=.110 (MD=0.06, p=.99) | MD=0.48, p=.953 (MD=0.68, p=.94) |
The next analyses performed focused on the group with dyslexia only. These were used to determine predictors of reading comprehension within the cohort of student with dyslexia. Initially, correlations were calculated between reading comprehension and the other measures in the study (see Table 7.4). Significant correlations with reading comprehension scores were found with the measures of non-word reading speed (-.72), rapid naming (-.62), and passages reading speed (-.61). In addition non-verbal ability (.60), non-word reading (.41) and rapid naming (-.38) showed significant relationships with reading comprehension.

Regression analyses were then used to determine predictors of reading comprehension levels in the group with dyslexia. The reading comprehension measure was used as the DV and word-level and understanding-level measures (the same as those used in Study 4) were entered after controlling for the participants' ages. Two entry sequences were used: one where the word-level measures preceded the understanding-level measures and a second where the word-level measures followed the understanding-level measures (subscripts (i) and (ii) in respectively in Table 7.5). These alternate entry sequences were performed to assess unique contributions of the two types of predictor measures to Maltese reading comprehension variability. The results indicated that the word-level measures predicted roughly an extra 34% of variability in reading comprehension over-and-above the understanding-level measures, whereas the understanding-level measures increased the level of prediction over the word-level measures by 10%. These findings argue for the Maltese students with dyslexia to show greater influences of word-level processes on their reading comprehension skills. (Stepwise regressions procedures confirmed that non-word reading was the main predictor of reading comprehension within the group of students with dyslexia: it was the only significant measure entered into the analysis and accounted for 53% of the variance in reading comprehension).
Table 7.4. First order correlations (lower diagonal) and partial correlations (controlling for age) between the measures in the study for the children with dyslexia.

<table>
<thead>
<tr>
<th></th>
<th>Rd Comp</th>
<th>Rd Speed</th>
<th>NW Acc</th>
<th>NW Spd</th>
<th>RN Spd</th>
<th>RN Err</th>
<th>Dig Span</th>
<th>List Comp</th>
<th>Syn Aw</th>
<th>NV Abil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rd Comp</td>
<td></td>
<td>-.61**</td>
<td>.41</td>
<td>-.72**</td>
<td>-.62**</td>
<td>-.38</td>
<td>.21</td>
<td>.21</td>
<td>.15</td>
<td>.60</td>
</tr>
<tr>
<td>Rd Speed</td>
<td>-.61**</td>
<td></td>
<td>-.33</td>
<td>.87</td>
<td>.62</td>
<td>.32</td>
<td>-.06</td>
<td>.00</td>
<td>-.12</td>
<td>-.46</td>
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<tr>
<td>NW Acc</td>
<td>.41*</td>
<td>-.32</td>
<td></td>
<td>-.31**</td>
<td>-.11</td>
<td>.13</td>
<td>.19</td>
<td>.12</td>
<td>.25</td>
<td>.09</td>
</tr>
<tr>
<td>NW Spd</td>
<td>-.72**</td>
<td>.88**</td>
<td>-.30</td>
<td></td>
<td>.64</td>
<td>.39</td>
<td>-.00</td>
<td>-.23</td>
<td>-.17</td>
<td>-.02</td>
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<tr>
<td>RN Spd</td>
<td>-.62**</td>
<td>.64**</td>
<td>-.11</td>
<td>.05**</td>
<td></td>
<td>.67</td>
<td>-.07</td>
<td>-.31</td>
<td>-.28</td>
<td>-.41</td>
</tr>
<tr>
<td>RN Err</td>
<td>-.36</td>
<td>.33</td>
<td>.13</td>
<td>.39*</td>
<td>.67**</td>
<td></td>
<td>-.08</td>
<td>-.26</td>
<td>.05</td>
<td>-.17</td>
</tr>
<tr>
<td>Dig Span</td>
<td>.22</td>
<td>-.14</td>
<td>.18</td>
<td>-.07</td>
<td>-.12</td>
<td>.04</td>
<td>.01</td>
<td>.16</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>List Comp</td>
<td>.21</td>
<td>.00</td>
<td>.12</td>
<td>-.22</td>
<td>-.30</td>
<td>-.26</td>
<td>.01</td>
<td>.35</td>
<td>.35</td>
<td></td>
</tr>
<tr>
<td>Syn Aw</td>
<td>.16</td>
<td>-.17</td>
<td>.24</td>
<td>-.22</td>
<td>-.29</td>
<td>.03</td>
<td>.22</td>
<td>.34</td>
<td>.56</td>
<td></td>
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<tr>
<td>NV Abil</td>
<td>.59**</td>
<td>-.44**</td>
<td>.09</td>
<td>-.60**</td>
<td>-.39*</td>
<td>-.17</td>
<td>.18</td>
<td>.36</td>
<td>.54**</td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2 tailed)
* Correlation is significant at the 0.05 level (2 tailed)

Key: Rd Comp = reading comprehension, Rd Speed = reading speed, NW Acc = non-word reading accuracy, NW Spd = non-word reading speed, RN Spd = rapid naming speed, RN Err = rapid naming errors, Dig Span = verbal short-term memory, List Comp = listening comprehension, Syn Aw = syntactic awareness, NV Abil = non-verbal ability

Table 7.5. Results of a regression analysis to investigate predictors of reading comprehension for the children with dyslexia.

<table>
<thead>
<tr>
<th>Variables</th>
<th>$R^2$</th>
<th>$R^2$ change</th>
<th>Sig $R^2$ change</th>
<th>Final Beta*</th>
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<tbody>
<tr>
<td>1 Age</td>
<td>.005</td>
<td>.005</td>
<td>$F(1,24)&lt;1$</td>
<td>Age -.08</td>
</tr>
<tr>
<td>(i)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Word-level processes</td>
<td>.646</td>
<td>.040</td>
<td>$F(5,18)=0.85$, $p=.001$</td>
<td>NWA .40*; NWS -.04; RNS -.35; RNE -.06; Digit Span .05</td>
</tr>
<tr>
<td>3 Understanding-level processes</td>
<td>.751</td>
<td>.105</td>
<td>$F(3,16)=2.25$, $p=.122$</td>
<td>ListComp -.05; SyntAw -.38*; NVAbil .58*</td>
</tr>
<tr>
<td>(ii)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Understanding-level processes</td>
<td>.416</td>
<td>.410</td>
<td>$F(3,21)=4.92$, $p=.010$</td>
<td></td>
</tr>
<tr>
<td>3 Word-level processes</td>
<td>.751</td>
<td>.335</td>
<td>$F(5,16)=4.31$, $p=.011$</td>
<td></td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2 tailed)

Key: NWA = non-word reading accuracy; NWS = non-word reading speed; RNS = rapid naming speed; RNE = rapid naming errors; ListComp = listening comprehension; SyntAw = syntactic awareness; NVAbil = non-verbal ability
7.4. Discussion

These results indicate that for this group of students with dyslexia, Maltese reading comprehension levels were best predicted by word-level processes. Additionally, the children with dyslexia showed poor performance on word-level measures in contrast to a reading comprehension level matched control group, arguing for specific problems in this area over-and-above their ability to understand written text. Overall, the students with dyslexia showed a greater influence of basic word-level processes on reading comprehension than that shown by the children without dyslexia in Study 4. The largest partial correlation produced with the participants' with dyslexia's data was with non-word reading speed and only word-level processes produced significant unique predictions; although the increase in variance explained when adding the understanding-level measures to the word-level measures was roughly the same for the children with dyslexia as for the youngest group without dyslexia (i.e., 10% versus 13% respectively). However, the understanding-level measure with the largest relationship with reading comprehension was the non-verbal measure for the dyslexics in contrast to the Year 5 group where the syntactic measure showed the largest degree of correspondence. These data suggest that the influence of word-level processes may be somewhat larger for the group with dyslexia compared to matched peers, even those producing similar reading comprehension levels, and also that the influence of understanding-level processes within the cohort of students with dyslexia may be due more to general or non-verbal skills in contrast to the language-related skills that are the better predictors of reading comprehension skills of typically developing Maltese readers.

As with the mainstream children in Study 4, the data derived from this Maltese cohort of students with dyslexia argue for consistency between these Maltese children and their English-language counterparts. These Maltese children with dyslexia literacy skills were strongly influenced by word-level skills and these skills were the primary area of deficit presented by the children. These data would seem consistent with a conclusion that dyslexia in the Maltese orthography is similar to that found in the English orthography, in that it is more likely to be apparent at the level of the word than of the text (British Psychological Society, 1999), and that this word-level deficit is related to phonological decoding (Snowling, 2000; Stanovich, 1988). One intriguing feature of the performance of the students with dyslexia in the reading
comprehension and word decoding measures was that, even when the former is equivalent to the performance of students without dyslexia, the latter is still significantly below the level of that comprehension matched cohort. This again argues that a simple relationship between word decoding and text reading cannot be assumed, and that processes other than those used at the word-level can support comprehension.

The results obtained from the students with dyslexia are in agreement with a number of previous studies (e.g. Vellutino et al. 2004; Wilson & Frederickson, 1995), which suggests that phonological awareness is an important skill for reading and in turn for reading comprehension. Regardless of the fact that many studies attribute deficits in reading to a phonological deficit, a number of researchers believe that the key difficulty with reading problems is specifically due to difficulty in the speed of processing (Nicolson & Fawcett, 1999; Wolff, 1993; Wimmer & Goswami, 1994) and, consistent with this, the findings of this study suggested that students with dyslexia performed the tasks at a much slower rate than their peers who did not encounter difficulties of a dyslexic nature. Therefore, these data seem to be in agreement with the premise that many children with dyslexia have a core deficit in word level processes such as non-word reading and speed of processing.

Moreover, the present data also suggest that these compensatory processes may not be confined to language skills, since the dyslexics non-verbal ability was the best understanding-level predictor of reading comprehension. The latter point would support findings of studies that maintained that reading comprehension can be partly attributed to intelligence. According to Nation, Clark and Snowling (2002) there have seldom been studies that took into consideration underlying verbal and non-verbal ability in learners who struggle to understand when reading. The findings concur with those found in early studies which propose that the relation between decoding and reading comprehension decreased as a child got older, while that between non-verbal ability and reading comprehension increased with age (Singer, 1977). Later studies conducted by Droop and Verheven (2003) found similar results in a number of Dutch students and minority groups (low SES students from Morocan and Turkish backgrounds living in Holland). Their findings showed a significant relation between nonverbal ability and reading comprehension. However, it is important to point out that with other variables, such as vocabulary or morphosyntactic knowledge, the
significance decreased considerably for the minority groups. Clearly, further research in this area would be valuable.
Chapter 8: General discussion

8.1. Overview of findings

This thesis investigated reading comprehension levels amongst Maltese bilingual students. The primary aim of the work was to investigate whether measures currently used in Malta to assess reading comprehension difficulties are suitable for the whole Maltese population and, if they are found not to be optimal, to start the work necessary to develop measures that are appropriate for this population. The work also aimed to provide evidence for the cognitive/linguistic skills that are predictive of reading comprehension in both normally developing Maltese readers and Maltese-speaking children with dyslexia. The underlying purpose of the research was to inform the development of assessment procedures that can be used in the identification of children who have specific difficulties in reading within the Maltese context. The thesis presents the results of five studies that included a total of 428 participants who were students from across the island of Malta and aged between 8 and 13. All participants had been exposed to English and Maltese from the beginning of their schooling year (at approximately five years old).

Study 1 focused on determining the appropriateness of the Neale Analysis of Reading Ability (NARA, 1989) in assessing reading comprehension levels amongst a group of Maltese children. The NARA is used widely in reading-based assessments in Malta and, therefore, evidence for or against its usefulness should inform procedures used by assessors within this population. The results indicated that although variation in performance was related to experience in reading (based on school year level), norms derived from a monolingual population seem to be inadequate to determine expected reading age levels for those bilingual children in Malta who were predominantly Maltese-speaking (i.e., the majority of children in state sector schools). These data argue for the need to develop assessment procedures and norms that can provide accurate information about expected levels of performance in this population. Therefore, development work was undertaken and reported in study 2 that focused on the production of Maltese-language reading comprehension passages designed with the Maltese cultural and language/educational contexts in mind. The measures
developed as part of this work showed variations across the different age groups targeted, and reasonable levels of reliability. The test developed was based on the NARA procedures and, therefore, provided measures of reading accuracy and rate as well as comprehension, which also showed evidence of expected improvements with educational level. However, the assessment of accuracy meant that the child tested would be required to read aloud, which may affect the level of performance on the reading comprehension measure: the primary measure in the test. Therefore, study 3 was performed to determine whether there is evidence for reading comprehension levels to be substantially different when reading aloud compared to when reading silently. Parallel reading comprehension measures were developed and used in silent reading and reading aloud conditions. The results indicated little difference between the two conditions and both measures of reading comprehension showed significant relationships with measures that would be expected to be related to comprehension levels (i.e., listening comprehension and reasoning ability). Advantages of using a reading aloud procedure (i.e., determining accuracy and rate in assessments) did not seem to be negated by the potential disadvantage of not using a silent reading procedure and subsequent studies in the thesis used the reading aloud test developed in study 2.

Studies 4 and 5 used the measure of Maltese reading comprehension to determine potential predictors of comprehension levels in the Maltese population. Measures of non-word reading, verbal short term memory, rapid naming, syntactic awareness, listening comprehension and non-verbal ability were included in these studies as possible predictors. Again, procedures to develop such measures were used since currently there are no standardised measures for non-word reading, rapid naming, syntactic awareness and listening comprehension available in Malta. Study 4 focused on groups of typically developing children in state schools in the last two years of primary education and the first year of secondary education. The findings indicated that measures related to skills that might be said to require understanding of relationships between words/materials were important for predicting reading comprehension, particularly for the two elder groups. The youngest groups also showed evidence of these understanding skills being important, but there was evidence of word-level processing skills also being unique predictors of comprehension levels. Study 5 considered the same predictors in a group of students
with dyslexia. These children with specific reading difficulties showed predictions of reading comprehension level more consistent with word-level decoding skills being the primary determiner of performance. Additionally, comparisons of the performance of the students with dyslexia compared to chronological age children showed deficits in most measures in the study; whereas comparisons with children at the same reading level as the children with dyslexia showed that deficits associated with dyslexia focused more on literacy and decoding skills rather than reasoning and understanding.

8.2. Implications

The findings of this thesis have led to a number of implications that are important in the development of reading comprehension in Malta from both practical and theoretical viewpoints. The first part of this discussion section will consider how the main findings are necessary to create suggestions for practical work within the area of (special) educational assessment. The second part will focus on discussing theoretical issues that the data reported in this thesis have raised particularly in relation to current reading comprehension research.

8.2.1. Implications from a practical perspective

The impact of colonization left an imprint on the day-to-day lives of the Maltese citizens, including its education system, which is very similar to that used in the UK. One of the implications of this influence and the bilingual education system is that methods of assessing literacy are still conducted using tests originally standardised in the English language (e.g. for the UK, the USA and/or Australia). The main issue stressed in this thesis is whether these measures, and hence the decisions based on these measures, are suitable for a Maltese population. Although all areas of literacy need to be examined in an assessment procedure, the specific area of interest for the purposes of this thesis was reading comprehension. The principal concern was that the tools being used by Maltese educational practitioners were those originally designed for monolingual children and not children who are brought up with two languages, as is the case in Malta. The findings suggest that the development of assessment in Malta should take into consideration the linguistic environment of the child. The conclusion that has been reached in this thesis is that because of the latter reason a number of children were being wrongly assessed as having some form of learning difficulty when in fact the primary difficulty was a language one. The results
show that all three groups tested (Years 5 and 6 and Form 1) had lower reading and comprehension skills than would be expected based on the standardization data of the Neale Analysis of Reading Ability (1989).

Indeed, Maltese educators are becoming more aware of the limitations that a large number of currently available assessments pose for Maltese learners, even those who have a relatively high level of proficiency in English. It is a common notion that many of the assessment batteries favour individuals whose native language is the same as that of the test. According to Figueroa (1989), these tests will not reflect the true ability of the learner. If we apply this to our findings, it becomes apparent that tests which are not standardised on a Maltese population should be used with caution when assessing Maltese students. It is often assumed, due to its colonial background, that Malta’s levels of English are similar to those of the British population. However, this study argues that assessment measures used to identify children under-performing in English text reading, need to treat standardisation data derived from other country cohorts carefully. It is advised that a re-standardisation using a Maltese/English bilingual representation sample be undertaken and that there be a process of development of literacy and literacy-related tools suitable to generate a profile of the child’s performance that incorporates both the strengths and weaknesses.

In addition to the need to produce English-test norms appropriate for the Maltese population, from a test developmental perspective, the work reported in this thesis argues for the need to develop measures in the Maltese language but against the practice of simply translating materials from English to Maltese. This latter conclusion is reached since a simple translation of test materials will not account for cultural and linguistic characteristics that are particular to Malta. The test development work described specifically for this thesis should offer considerable insights into why this is necessary, particularly within the area of reading comprehension. Passages had to be constructed that included culturally appropriate materials and conformed to features of the language, such as the size of vocabulary and the syntactic structure of the language. Therefore, the research reported in this thesis argues strongly for the need for appropriately developed measures that take these cultural/linguistic factors in account. This will improve assessment and screening procedures specifically for Maltese speaking children. Failure to develop
such appropriate tools may lead to poor comprehension levels that are not due to poor comprehension ability and, hence, to inaccurate assessment conclusions.

Similarly, inappropriately developed tools may lead to reading characteristics that are considered due to underlying weaknesses/skills when in fact they are produced by the features of test construction. For example, comprehension difficulties may be related to deficits in word decoding skills or poor vocabulary levels: i.e., reading comprehension in Maltese could be generated mainly through the use of word level processes or language level processes. Samuels (2002) proposes that lack of fluency creates an obstacle to understanding, and Gunning (2002) has argued that if a reader is unable to decode at least 95% of words within a passage, then understanding will be limited. Although the data from current studies (see Chapter 2) argue that word-level skills are important for reading comprehension, the main predictors of Maltese reading comprehension found within the mainstream school population targeted by the current work were beyond the level of individual word processing. The data from this research argue that although decoding was not the strongest predictor across the school levels targeted, non-word reading explained the largest amount of reading comprehension variance in the youngest age group as well as in the students with dyslexia. This finding concurs with that of others (e.g. Perfetti, Beck, Bell, & Hughes, 1987; Wagner et al., 1993), who promote the importance of phonological awareness in the early stages of learning to read, but agree that this changes as we get older, since maturity replaces decoding with understanding and reading grows more fluent. Phonological awareness, however, is essential with younger children, whose understanding could be impeded by disruption in the lower processes of reading (cf. Hoover & Gough, 1990), even where it is believed that several processes are concurrently used at a variety of levels. Appropriate assessment procedures, therefore, need to take account of both cultural/language factors and developmental changes that occur with Maltese as much as within English — and interpretations of literacy difficulties need to take account of these different potential reasons for problems. The lack of multi-word level skills may limit reading in the school years that were the focus of the current work. Despite the relative regularity of Maltese orthography, the same compensatory processes may be necessary to support understanding as have been identified in research on monolingual English-language cohorts (Stanovich, 1986). The present research acknowledges the importance of phonological processing.
but, nevertheless, demonstrates that attention should also be afforded to the evaluation of factors such as syntax and vocabulary in determining the reason for poor reading comprehension levels. This calls for further work to be carried out in this area, both in terms of assessment procedures and, potentially, in the design of future intervention programmes.

The premise here is that language and literacy characteristics observed in assessment procedures might not be the same for children required to learn two languages as those determined by research and practice with monolingual cohorts. This necessitates further research into the influence on individuals, such as the Maltese learner, primarily at the language level and its reciprocal relationship with literacy acquisition. From birth up to early schooling, the experience of two commonly used languages may affect the amount of vocabulary learnt in both or either language and even the syntactic structure of the two languages, thereby creating grammatical structures that may be appropriate in the bilingual context but incorrect under monolingual testing conditions. It is important that educational authorities recognize that although proficiency in more than one language may be beneficial, it also creates specific characteristics that should be considered in assessment practices.

Furthermore, the literature reported in the introduction to this thesis argues that the identification of learning difficulties may vary due to the orthographic script that is the focus of assessment or that is mainly used by the individual undergoing assessment. For example, for less transparent languages such as English, phonological and word reading accuracy are often used as measures to assess difficulties; yet, transparent languages are not as reliant on word level processes to assess literacy difficulties (see chapter 2). As previously stated, Malta has a tendency to follow the British educational system. This is also the case in assessment procedures, where identification for the use of exam concession purposes is based on the results of word reading assessment. This is in no way insinuating that the English system only uses word level assessment, but rather it is stating that the Maltese focus testing procedures have limited assessment to word level procedures. The results in this thesis show that older groups have greater difficulty in language processes than in word level processes with reading comprehension. However concessions in Malta are only given if single word reading test results are below age 10. This creates serious doubts as to whether the Maltese education system is providing concessions in a fair and just
manner to students who have difficulties beyond word level. The findings call for the need for educational authorities to review and reconsider identification procedures in Malta.

8.2.2. Implications from a theoretical perspective

Children with the ability to communicate in two languages, as is the case for the Maltese participants in question, develop a distinct vocabulary or word lexicon(s), which may be accessed based on different processes. The 'orthographic depth hypothesis' suggests that languages from shallow orthographies do not need excessive lexical processing, but rather rely more on a phonological non-lexical method of processing words. Since Maltese is considered a transparent language, we could hypothesise that unfamiliar English words read through a non-lexical route but using Maltese phonological properties may lead to reading errors. Readers who have a restricted knowledge of vocabulary in a second language tend to depend more heavily on a bottom up approach to reading, and therefore focus on their decoding skills to read a word. Thus, assessments of reading skills in English amongst a Maltese-language dominant population, such as that within the state school system in Malta, may underestimate comprehension levels within that population when English is used. Nonetheless, the results of this thesis suggest that the most influential theories explaining English monolingual reading comprehension are also valid for reading comprehension in the Maltese context, when compensatory processes occur within an orthography that is more transparent than English.

Overall, in fact, the data derived from these Maltese children suggest that models of reading comprehension and dyslexia derived from English-language samples can, in this relatively more regular orthography, be applied to understanding the processes involved in text reading and reading disabilities as long as the differences in factors such as word level, syntax and cultural differences are taking into account. Both the simple model (Hoover & Gough, 1990), with the caveat that different aspects of the model can influence reading comprehension at different ages/levels of experience, and the phonological deficit model (Hulme & Snowling, 1992) seem consistent with the data produced by these end of primary/early secondary Maltese school children. Clearly, further research is necessary to confirm these findings; however, they provide
a basis on which to develop models of skilled and disabled reading in this orthography, upon which assessment and intervention procedures can be based.

The results from this thesis show that reading comprehension goes through a stage-like process. The pattern found would suggest an interactive model where the initial stages of reading comprehension amongst Maltese children are achieved through lower level cognitive processes (e.g. word decoding) and move on to higher level cognitive processes such as the understanding of grammatical ones (e.g. syntactic knowledge and vocabulary). Additionally as with any stage-like model, an obstacle at any one level would hinder the development of appropriate reading comprehension skills and, therefore, create a situation where the subsequent milestone maybe not achieved unless some compensatory process is reached (see Goulandris, 2003). For example, this was seen in the results in the group with dyslexia, where comprehension abilities were hindered by word level processes as opposed to their chronological age-matched counterparts, whose reading comprehension levels were explained primarily by syntactic awareness. Moreover, findings from study 5 suggest that the group with dyslexia used compensatory processes for reading comprehension since their strongest predictor was non verbal ability, therefore a process not confined to language skills. This aspect supports many developmental theories proposed in chapter 2. Nonetheless, these properties are not found in isolation but rather supported by cultural, linguistic and orthographic knowledge. According to Anderson and Pearson (1984) in their Schema theory, levels of comprehension can only be achieved if the reader is familiar with the information presented. From this point of view, the difficulties shown by the participant may have been due to cultural schemata, rather than lack of reading and/or comprehension abilities. The present thesis shows how this problem was tackled by the language used in Malta, a Mediterranean island, as opposed to the cultural settings of other English-speaking countries: Maltese has a Semitic basis and has incorporated words from the Romance languages, including English, during its development. Therefore, a model of Maltese reading comprehension should incorporate word level knowledge, linguistic level knowledge and cultural/schemaetic level knowledge. All levels interact and build on each other. Initially, word level processes determine reading comprehension levels. Then, as the child matures and develops different skills, he/she develops the ability to use his or her linguistic and background knowledge to support the understanding of written text.
8.3. Limitations of the work and future studies

In order to evaluate the contribution of the present study, a number of limitations need to be considered. Many of these limitations can be viewed as an opportunity to develop future research in the same field as this thesis, which has concerned itself primarily with the assessment of reading comprehension. As such, assessment practices were researched from a rather narrow empirical perspective and work focused on other areas of literacy (e.g., written performance), as well as the interaction between different elements of literacy, would be appropriate for a greater understanding of literacy development within the Maltese context.

Additionally, it is important to remember that the findings obtained from this work were based on studies of children within the state school system within Malta. Further work is needed to determine how applicable these are to other contexts within Malta and whether or not the findings should be generalized to cover the whole population of Malta. As discussed in Chapter 2, Malta has three types of schools (State schools, Church schools and Independent schools). Independent and church schools use English as the principal language of instruction, while children who attend state schools generally use Maltese as the principal language of instruction. Given that children outside of the state sector, particularly in the independent sector, have been considered as more competent English than Maltese users, this may influence their performance on English versus Maltese measures. Therefore, it is suggested that future studies include participants from the same age range as those targeted by the current research but who attend different school types. Using a larger number of participants from a range of backgrounds within Malta may also strengthen the external validity of the study.

Similarly, work covering different school grades from state schools should be conducted in the future to further our understanding of literacy development within the Maltese context and provide data for the appropriateness of the assessment tools developed for a wider age range. As mentioned previously, the reason for targeting the school levels that were the focus of the present research was because it is expected that students between the ages of 8 and 13 should have comprehension abilities that go beyond word and sentence levels. Although it is not expected that including older
age levels from state schools would show different findings, it would offer an opportunity to expand the tests for usage of older age groups.

One consideration that is important to mention is the uncertainty of the reliability of the sample group chosen to represent the students with dyslexia. As mentioned in the method section of Chapter 7, the students with dyslexia had been selected on the criteria that they had been assessed by an educational psychologist or dyslexia specialist as having dyslexia. This thesis has shown that tests standardised on foreign individuals should be dealt with caution when assessing for dyslexia since the reading accuracy age, reading comprehension age and reading speed age scores were poor. These results could easily list a number of students as having difficulties when as such (according to school records) none have been encountered at school. Therefore, one difficulty was establishing the students with dyslexia used in this study do in fact have difficulties of a dyslexic nature or whether they were misdiagnosed due to the inappropriateness of these tests.

The need for more research in Maltese reading comprehension is essential. One ongoing difficulty that was encountered by this thesis was the lack of appropriate background information related to reading comprehension levels amongst Maltese students, as well as tools designed to measure these levels. The latter point can be seen as both a limitation and a call for other researchers to conduct studies that aim at understanding reading comprehension in Malta. It is felt that this thesis has considered a range of factors that might be predictive of reading comprehension; however, further research including additional factors is clearly necessary to provide further evidence for the conclusions derived from the present work. For example, future studies may wish to consider including measures of syntactic awareness that focus on word order and/or grammar exercises. Measures of memory may include a range of procedures in order to obtain a broader and more detailed perspective of the specific role that entry to stored information plays in Maltese reading comprehension. Additionally, the inclusion of other higher level processing skills (for example, skills such inference generation, attention, understanding figurative language) may offer further insight into this area.
8.4. Concluding comments

Reading comprehension is an essential part of any child's education. Although as a concept it is a simple one to understand, the cognitive tasks behind this action are far from simple. This is especially true for students who encounter reading comprehension difficulties. Before any assessment can be made, reading comprehension needs to be understood. Thus recognizing the variety of comprehension levels of different age groups and identifying what factors are relevant to the prediction for the success of reading comprehension is crucial. This was exactly the purpose of this thesis since currently there are no current reading comprehension measures to assess levels of reading comprehension amongst Maltese students. Therefore, designing and creating reading comprehension measures, while simultaneously understanding what factors predict reading comprehension in Malta for students with and without dyslexia, became the primary aim of this thesis. This aim was achieved through the studies reported in this thesis.

From the studies performed, the following conclusions were derived. First, that it is necessary to design reading comprehension measures appropriate for a Maltese population, and which take account of linguistic and cultural factors related to the target population: in the case of the studies reported, these were Maltese/English non-equal bilingual children who were more dominant in Maltese. The measures produced in the course of the work described in this thesis should inform further development work and improve assessment practice. Second, that word level processes are required for successful reading comprehension, particularly if the children are younger/least experienced readers or have been assessed with dyslexia. However, word level processes do not seem to be sufficient for the development of reading comprehension levels expected of older children/adults and other language processes, such as syntactic awareness, vocabulary and listening comprehension, are important for the prediction of the normal development of Maltese reading comprehension. The findings of this thesis should inform current practice and theory, and prove useful for practitioners and future studies in the area of reading comprehension.
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Appendix A: Reading comprehension passages and questions developed for Chapter 4

1-annimali


(34)

Hin f'secondi

1. It-tifla fejn iżomm l-annimali?
2. Liema annimal thobb l-iktar?
3. Bil-lej x’taghmel it-tifla?
4. Semmi żewg annimali ohra li ghandha t-tifla
Ktieb ghal ohti

Żewġ subien marru l-Belt bix-xarabank. Meta x-xarabank waqaf, niżlu u xejru lin-
nies. Imxew fit-toroq u harsu lejn xi hwienet. Imbaghad dahlu go hanut u raw xi kotba
tal-annimali. Wiehed mis-subien ra ktieb li kien fih qattus. Qal, "Ohti, kieku, tieħu
gost b’dan il-ktieb imma m’ghandix hafna flus. " Il-habib tieghu qallu, "Mela sib
stampa ta’ qattus. Mhux se jiswa daqs ktieb."

(60)

Hin f’sekondi ______________________

1. Ghalieq ma setax jixtri l-ktieb?
2. X’kien se jghamel it-tifel bl-istampa?
3. Ghalieq haseb f’ohtu meta hares lejn il-ktieb?
4. X’iktar seta’ jaghmel jekk ma kellux biżżejjed flus?
Is-sbuhija tal- Bahar


(102)

Hin f’secondi

1. X’riedet tagħmel Anna?
2. Ghaliex dahlet il-pajp għa dalqha?
3. Ghaliex kienet qiswa qawsalla ta’ taħt il-bahar?
4. X’kien li Anna żammha fl-istess post?
5. X’inhi ir-raguni ghaliex Anna kellha xorti dakinhar?
6. Ghaliex Anna kellha titla’?
7. X’taħseb li ġara meta Anna bdiet tghum ‘il fuq biex tidhol fid-dghajsa?
Zghira wisq


Tghidx kemm staghgbu Ikoll u staqsewha kif ghamlet, imma hi qaltilhom biss wara li kellhom jammettu li tiżhem daqsom jew izjed minnhom. U li naturalment ihalluha tiġħab ukoll. Hemm bżonn nghidilkom min kien jirbah l-aktar fosthom? Tghid dik li kienet żghira wisq?

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Hin f’sekondi

1. Ghaliex ma hallewx lil Lisa tiġħab bil-kompjuter? ______ 
2. X’kien Lisa ma qalet xejn meta qalulha li ma scethetx tiġħab? ______ 
3. Meta it-tfal kienu qeqhdin jiġiġbu, min kien jirbah? ______ 
4. Ghaliex bdew jibżghu mill-papà? ______ 
5. Ghaliex irnexxielha ssewi il-kompjuter? ______ 
6. Taħseb li Freddy u Anna hargu ta’ nies ma’ Lisa? Ghaliex? ______ 
7. Kif taħseb li hassitha lisa fl-ahhar ta’ l-istorja? ______
Id-dubbiena


Li kieku ma kienx ghad-dubbien, il-hmieġ idum retorno mhux nispiċċaw imdawrin bih. Dan ghalix id-dubbien jghix fil-hmieġ tagħna u jghin biex ifarrku u jiddikomponi iktar malajr. Ma ninsewx ukoll li kieku ma kienx ghal hafna speċi ta’ dubbien, hafna speċi ta’ fjuri ma jkollhomx min idakkarhom, u barra minn hekk, ċerti tipi ta’ annimali li jagħmlulna l-hsara, jiġu kkontrollati minn dubbien li jeqridhom.

(291)

Hin f’secondi
1. Ghaliex ghandu vantagg id-dubbien li jixbah lin-nahal?
2. X’inhu x-xoghol ta’ dan it-tip ta’ dubbien?
3. Ghal xiec jintużaw il-ġwienah ta’ wara?
4. Kif jista’ jghin id-dubbien fid-dar?
5. Fejn jippreferi jhalli l-bajd tieghu d-dubbien?
6. Id-dubbien jaqdi funzjoni ohra importanti. Liema hi?
**Il-Pakkett**


Marret ċritt ġo kamrīţha, warrbet il-ktieb li kienet qed taqra qabel u poġġiet il-pakkett fuq l-iskrivania. Il-bolli kienu Inglizi u iżjed staghġet. Ma kienet taf lil hadd l-Ingilterra li jibaghtilha pakkett anki kieku kien verament il-birżeday, jew il-Mi-lied – aħseb u ara f’nos is-sajjif!


Il-gurnata ta’ wara, Rita reğghet stennietu ġej biex tirringrazzjah minn qalbha ukoll. Saru hbieb hafna u hekk ghadhom sallum.

(344)

Hin f’sekondi _____________________

1. Ghaliex Matthew kellu bżonn il-flus?
2. Ghaliex Rita kienet ferhana li missierha rcieva ittra rregistrata?
3. X’kien Rita ma fethitx ir-rigal?
4. Ghaliex Matthew ta’ ktieb lil Rita?
5. Ghal liema raġuni ma haditx il-pakkett lura l-posta?
6. Ghal kemm Matthew kien se jghamel dax-xoghol?
Appendix B: Reading comprehension passages and questions developed for Chapter 5

Appendix B.1 – Passage 1 used in Chapter 5

Annimali


1. Kemm ghndu annimali it-tifel
   a) 1
   b) 2
   c) 3
   d) 4

2. It-tifel jil ghab bl-annimali:
   a) kull jumejn
   b) kuljum
   c) darba kultant
   d) qatt

3. Liema annimal ihobb l-ikar?
   a) il-qattus
   b) il-ghasfur
   c) il-kelba
   d) it-tlieta li huma

4. Liema annimali torqod mat-tifel?
   a) il-qattus
   b) il-ghasfur
   c) il-kelba
   d) it-tlieta li huma
Ajma x'ugigh!


Għall l-ewwel jumex Ħommu kien qed jieħu gost b'naqra soppa. Ġżda beda jhoss innuqqas tal-ikel. F'mohħu beda jtieghem it-togħma tat-torta tal-lampuki u l-pastizzi tal-irkotta, ma' xi tazza Kinnie.

1. Għaliex Ħommu ġaseb li kellu uġigh f'zaqqu ġhax
   a) kellu l-appendiċiċte
   b) kien kiel wisq
   c) kienet taqaghlu zaqqu għall-ikel
   d) kien allergiku għall-ikel

2. Ħommu beż' ġhax:
   a) kellu l-uġigh
   b) ma kienx ġhobb l-isptar
   c) ma kienx jaf x'kellu
   d) kien diehel ghal opperazzjoni

3. Ħommu kien se jibqa' l-isptar għal:
   a) ġimgħa
   b) ġimaghtejn
   c) tliet ġimgħat
   d) erba' ġimgħat

4. Għaliex Ħommu ma setax jiekol ikel solidu? Ġhax ...
   a) kellu infezzjoni
   b) kien għadu hierg minn opperazzjoni
   c) kien allergiku għall-ikel
   d) ġhax ma setax jogħmod minhabba l-opperazzjoni.
5. Ghalix tahseb li Ċikku beda jhoss in-nuqqas tal-ikel? Ghax ...
   a) kien żaqqieq
   b) kien qed jiekol ilkel likwidu biss
   c) ma kienx ihobb is-sopop
   d) il-ikel tal-isptar kien hazin

6. Meta hareġ mill-isptar x' tahseb li ghamej Ċikku?
   a) mar jistrieh ghax kien muġugh
   b) mar jiehu iktar soppa
   c) mar jistad ghal-lampuki
   d) mar jiekol ikla tajba

1. It-tfal tal-iskola hasbu li Rita kienet stramba?
   a) ghax kienet qalbha tajba.
   b) ghax kienet taqbad mat-tfal tal-iskola.
   c) ghax kienet toqghod wahidha.
   d) ghax kienet titkellem wahidha.

2. Tahseb li Rita kienet:
   a) sinjura
   b) qammiela
   c) fessuda
   d)fqira

3. It-tfal tal-iskola inhasdu?
   a) ghax Rita bdiet tghajjat ma’ żewg subien.
   b) ghax marret fuq żewg subien biex twaqqafhom mill-ġlied.
   c) ghax Rita bdiet taghti d-daqqiet lil żewg subien.
   d) ghax Rita kienet hbieb ma’ żewg subien.

4. Tahseb li Rita kienet irqiqa hafna?
   a) Ghaliex bil-kemm kienet tiekol.
   b) Ghaliex ma kinitx thobb il-laham.
   c) Ghaliex kienet tixrob hafna ilma.
   d) Ghaliex kienet tagħmel hafna sport.
5. X'kienu qed jaghmlu hażin it-tfal?
   a) kienu qeghdin jaqbdu ma' tfal ohra.
   b) kienu qeghdin jaqbdu ma' Rita.
   c) kienu qeghdin jidghu
   d) kienu qeghdin ikantaw.

6. Tahseb li t-tfal bdew jifirhulha?
   a) ghax Rita kellha l-kuraġġ taghtihom daqqa.
   b) ghax Rita kellha l-kuraġġ twaqqafhom
   c) ghax Rita kellha l-kuraġġ taqbad magghom.
   d) ghax Rita kellha l-kuraġġ tghajjat kemm tfilh magghom.

7. X'tahseb li gara wara?
   a) Rita ghamlet hafîia hbieb.
   b) It-tfal tal-iskola ma ridux ikellmuha.
   c) marret id-dar tibki.
   d) qatt ma marret lura l-iskola.

8. Ghaliex tahseb li Rita qaltihom il kliem fuq l-imħabba u mibedda?
   a) biex hekk mmorru jiggieldu barra mil l-iskola.
   b) biex jifmhu li biex tghamel flus hemm bzonn l-mħabba.
   c) biex jifmu li l-mibedda huwa tajjeb.
   d) biex jifmu li l-mibedda huwa hażin.
Iċ-Ċikkulata


1. Iċ-Ċikkulata hija xi haġa li giet ivvintata:
   a) Fi żminijietna
   b) għoxrin sena ilu
   c) mill-antenati tagħna
   d) mill-allat

2. Għaliex Il-qassinin kienu joffru ż-żerriegha tal-kakaw lill-allat?
   a) Biex l-allat jikluhom
   b) Ghax kienu jemmu li jekk jagħmlu saġrifiċi jkollhom il-ġid
   c) Biex jarmuhom
   d) Ghax kellhom hafna żerriegha

3. Is-sigar tal-Kakaw jikbru f’pajjżi li hemm:
   a) Hafna xemx
   b) Fejn hemm ix-xita
   c) Fejn hemm hafna borra u silġ
   d) F’pajżi li ma jghamilx xita

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4. Inkunu nafu li l-fazola tkun lest biex issajjarha meta:
   a) issir kannella
   b) issir vjola
   c) issir żerriegha
   d) issir bhal ballun

5. X'insejhulha 1-parti li tkun tkun imxarrba u twehhel?
   a) il-ballun
   b) il-pjanta
   c) iż-żerriegha
   d) il-fazola

6. Ghalix hemm bżonn li jithallat ma' ingredjenti ohra?
   a) biex insajru kejk
   b) ghax inhobbu iż-zokor
   c) ghalix ikun mielah
   d) ghalix ikun morr

7. X'kulur ikun iż-żerriegha fil-bidu:
   a) vjola
   b) kannella
   c) isfar
   d) ma jghidx fir-rakkont

8. X'tahseb li jiġri jekk wiehed jipprova jiżra' pjanta tal-Kakaw Malta?
   a) Jikber ghax is-shana ta' Malta tajba
   b) Jikbru ghax fMalta ma jaghlmlx hafna xita
   c) Ma jikbirx ghax m'għandniex biżżejjed xita
   d) Ma jikbirx ghalix m'għandniex iż-żerriegha tal-pjanta tal-Kakaw
Mars


1) Mars hija:
   a) Isfar
   b) blu
   c) aħmar
   d) kannella

2) Il-pjaneta Mars:
   a) ma tidhirx
   b) tidher iktar minn pjaneti ohra
   c) hija ċikkulata
   d) qieghda wara d-dinja
3) L-atmosfera ta' Mars hija maghmula minn biċċiet:
   a) Hadid
   b) Injam
   c) Sadid
   d) Gebel

4) Kemm hemm pjanieti fis-sistema solari:
   a) 1
   b) 3
   c) 5
   d) 9

5) Il pjanieta l-iktar viċin ix-xemx hija:
   a) id-dinja
   b) Mercury
   c) Mars
   d) Jupiter

6) Fuq Mars sabu:
   a) xi mikrobi
   b) ilma
   c) nies hajjen
   d) biċċiet ta' sadid
7) ix-xjenzjati kif isiru jafu x’hemm fuq il-pjaneta Mars:
   a) jibaghtu fotografu jiehu ritratti
   b) jibaghtu awstronawta biex jara
   c) jibaghtu nies Gappuniżi jsibu l-provi
   d) jibaghtu robots biex jiehdu r-ritratti

8) Go Mars wiehed ihoss iktar bard ghaliex:
   a) mhemmxx xemx
   b) ix-xemx hija iktar vičin id-dinja milli Mars.
   c) ghax hemm is-silg fuq Mars
   d) ghax hemm hafna bahar fid-dinja
Appendix B.2 – Passage 2 used in Chapter 5

Wiغا


1. Wiغا hija:
   a. karozza
   b. tifel
   c. annimal
   d. habib

2. X’taghmel Wiغا:
   a. tidhol fis-sodda
   b. tinbah
   c. tğiři wara 1-karozza
   d. tiekol hafna

3. Wiغا thobb?
   a. thobb tiekol
   b. tğiři hafna
   c. tilghab
   d. tinbah

4. Wiغا hija qattusa ________
   a. brava
   b. imqarba
   c. li ghandha hafna surf
   d. zghira
Lura lejn Malta


1. Martin ma marx lura Malta qabel ghaliex:
   a) kellu wisq xoghol
   b) ma kellux bizzejjed hin
   c) ma kellux bizzejjed flus
   d) ma riedx

2. Liema hi r-raġuni lin-nies kienu jharsu lejn ommu b'ċertu mod?
   a) minhabba d-dahqa li kellha
   b) minhabba l-fatt li kienet titkellem ħafna
   c) minhabba l-fatt li kienet tghid ħafna ċajt
   d) minhabba l-fatt li kienet tkanta

3. Kemm kien ilu li telaq minn Malta?
   a) sentejn
   b) hames snien
   c) xaghjar
   d) ghoxrin sena

4. Martin kien:
   a) iż-żghir
   b) il-kbir
   c) tan-nofs
   d) ma ċjghidx fl-istorja
5. Min tahseb li kien l-iktar imqarreb minnhom kollha
   a) Martin
   b) Ohtu
   c) Huh
   d) Majghidx fir-rakkont

6. Kemm tahseb li ghandu zmien Martin?
   a) 20
   b) 25
   c) 30
   d) 35
Toni


1. Toni kien pastaz:
   a) kien tghallem mill-iskola
   b) ghaliex kien fessud u kull ma ried kien jiehdu
   c) ghaliex il-ġenituri d-dar kienu jiktellmu pastaz
   d) kien jaghmilha ma’ nies li kienu psataż

2. Ghaliex taħsbu li Toni qatt ma kien jobdi?
   a) ghax il-ġenituri tieghu qatt ma qalulu xejn.
   b) ghax kien tghallem mill-iskola
   c) ghax l-ġhaliema kienu jaqbdru mieghu
   d) ghax it-tfal tal-iskola kienu jaqbdru mieghu.

3. Ghaliex l-ġhaliema bdew jippruvaw ikkilmuh?
   a) biex jghajtu mieghu
   b) biex jghidulu li qed jghamel tajjeb
   c) biex jiċċajtaw mieghu
   d) biex jghidulu li qed jaghmel hazin
4. Toni kien jidhaq meta kienu jkellmuh l-ghalliema ghaliex
   a) kienu jghidulu xi ċajta
   b) ma kienx qed jaghti kashom
   c) kien jghid xi ċajta
   d) kienu qed jilbsu hwejjeg tad-dahq

5. Ghaliex tahseb li hadd ma mar il-party:
   a) ghaliex ma sabux fejn
   b) ghaliex ma kellux hbieb vera
   c) ghaliex ma kinux mistidniem
   d) ghaliex kellhom ċiġibu rigal.

6. Kif tahsbu li hassu Toni li hadd ma mar il-party?
   a) ferhan ghax kellu il-birthday
   b) irrabjat li hadd ma mar
   c) imdejjjaq ghax induna li ma kellux hbieb
   d) ma tax kas ghax kien ċajtir

7. X’tahseb li ġara meta Toni mar lura l-iskola
   a) irrabja mat-tfal ghax hadd ma mar il-party
   b) ma regax mar lura l-iskola
   c) habbar li hadu haża gost il-party
   d) skuża ruhu ma’ kulhadd ghax kien ċameli ġazin

8. Ghaliex bdew jghajtulu Tony biss?
   a) ghaliex qalilhom biex jghajtulu hekk
   b) ghax inbidel minn ġazin ġhat-tajjeb
   c) ghax ma kienx iħobb dak il-laqam
   d) ghax kien ċajtir
In-Nahal


1. Minn fejn jigi l-ghasel
   a) Mill-fjuri
   b) Min-nahal
   c) Mill-pjanti
   d) Mis-sigar

2. Kemm hemm bżonn nahal biex jaghmlu l-ghasel
   a) 1
   b) 2
   c) 3
   d) 4

3. Kemm ghandhom stonku n-nahal
   a) 1
   b) 2
   c) 3
   d) 4

4. Ghaliex l-ilsien tan-naħal jixbah lil straw
   a) biex meta jkollu l-għatx jixrob ilma
   b) biex meta jkollu l-ġuh jiekol
   c) biex iniżgeż in-nies u l-fjuri
   d) biex jigbed il-meraq mill-fjuri

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5. In-nahal jrid jaghmel daqs 1500 titjira fuq fjuri differenti ghaliex:
   a) Inkella ma jimliex ċaqqu bl-ghasel
   b) Ghax ihobb il-fjuri
   c) Ghax inkella in-nahal il-haddiem johodlu ix-xoghol
   d) Hekk l-ilma jevapora minnu

6. Ghal xiex jintużaw il-gwienah tan-nahal
   a) biex itir u jnehhi l-mikrobi
   b) biex itir u jżomm l-bilanċ
   c) biex itir u jniżxef l-ghasel
   d) biex itir biss

7. X’inhu parti mix-xoghol tan-nahal haddiem?
   a) Jghin biex inehhi l-mikrobi
   b) Imur minn fuq fjura ghal ohra biex jigbed il-meraq
   c) Biex iżomm l-ghasel golu-stonku
   d) Kollha kemm huma

8. Biex l-ghasel ikun maghqud in-nahal
   a) jomoghdu ghal xi nofs siegha shiha
   b) isib mod biex l-ilma jevapora minnu
   c) iniżxef ukoll in-nektar permezz ta’ ġwenħajh
   d) kollha kemm huma
Il-Qamar


Il-qamar idum 27 ġurnata jdur mad-dinja sa ma jerga’jasal għall-punt tat-tluq tieghu. Il-qamar la ghandu atmosfera u lanqas ilma. La hemm rih u lanqas temp fuq il-qamar. U minhabba f’hekk, il-passi li l-astronawti hallew fuqu, ghad idumu hemm miljuni ta’ snin.

1. Liemu l-oġġett li jaghti l-iktar dawl?
   a) Ix-xemx
   b) Il-qamar
   c) Id-dinja
   d) L-ebda minnhom

2. Il-qamar jdur
   a) Mad-dinja
   b) Ma x-xemx
   c) Ma x-xemx u d-dinja
   d) Mal-ebda wahda minnhom

3. Minn dawn, liema taħseb li hija tajba
   a) Il-bniedem ma jistax jghix fuq il-qamar għaliex mhemm xi ilma
   b) Il-bniedem ma jistax jghix fuq il-qamar għaliex mhemm xemx
   c) Il-bniedem ma jistax jghix fuq il-qamar għax mhemm xi shana bizżejjed
   d) Il-bniedem mar fuq il-qamar u għadu jghix hemm

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4. Il-qamar idur mad-dinja
   a) Darba kull gimaghtejn
   b) Darba fix-xahar
   c) Darba fis-sena
   d) L-ebda minnhom

5. Min kienu l-ewwel li imxew fuq il-qamar?
   a) L-Amerikani
   b) Il-Gappunizzi
   c) Is-Sovjetici
   d) Il-Francizi

6. Il-passi tal-astronawta ha jibqghu hemm ghal hafna zmien ghax
   a) Dak li tela' fuq il-qamar kien xi hağa speċjali u l-passi saru monument.
   b) Ghax mhemmx nies fuq il-qamar biex inehhu l-passi
   c) Mhemmx rih jew ilma
   d) Hija l-unika pjaneta li marru fuqha l-bnedmin

7. Ghalix tahseb li l-astronawti jilbsu l-bomblu fuq rasu
   a) biex jaraw ahjar
   b) ghax hemm hafna rih u hemm bżonn li jipprotegu wieċhom
   c) minhabba ix-xemx
   d) biex jiehdu nifs ghax mhemmx atmosfera

8. Il-forma tal-qamar jinbidel:
   a) ghax biċċa mill-qamar ikun mghotti meta jdur mad-dinja
   b) ghax biċċa mill-qamar ikun mghotti meta jdur max-xemx
   c) ghax biċċa mix-xemx tkun mghottija meta ddur mad-dinja
   d) ghax biċċa mid-dinja tkun mghottija meta ddur mal-qamar
Appendix B.3 – Listening comprehension passages and questions developed for Chapter 5, 6 and 7.


1. Maria taqra steijjer li ghandhom x’jaqsmu maż-żwiemel jew man-naghaġ?
2. Louis ghandu kelb id-dar?
3. Maria taqra inqas minn Louis?
4. Maria taghtas meta xxomm il-fjuri?
5. Maria iddoqq strument?
6. Louis idoqq il-trumbeta?

2 Eżerċizzju


Fluwa, Joe, kien jiekol kollox speċjalment xi biċċa ċanga bil-patata.

7. Carmen tiekol ħafna ħass?
8. Joe kien ihobb il-faqqiegh?
9. Joe ma kienx jiekol laham?
10. Carmen kienet tiekol ħawh u bettieh ta’ spiss?
11. Carmen thobb it-tadam u l-faqqiegh ilsajrin fil-forn?
12. Fejn insibu il-ħanek? A. Fiz-zaqq, b. fil-wiec, c. fil-halq
13. Harsu lejn l-istampa – Dan huwa Qarabala?

3 Ezerċizzju


14. Xandru kien ferhan?
15. Ċikka misset haruf?
16. L-annimali kienu jghixu ġo razzett?
17. Xandru jobghod il-hmieg?
18. Ir-razzett kien f'ghalqa?
19. Il-haruf kien ckejken?

4 Ezerċizzju


20. Ix-xoghol ta’ Peppi huwa biex jahmi l-hobż?
21. Peppi jpejjep?
22. Peppi jmur ix-xoghol imdejjaq?
23. Peppi huwa raġel ġentili?
24. Peppi jqaxxar il-lehja?
25. Peppi jghix fil-belt?
26. Peppi sinjur?
Appendix C : Exercises developed for Chapters 6 and 7

Appendix C.1 : Non-word reading exercise used in Chapters 6 and 7

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<tr>
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Appendix C.2 : Non-word reading sheet given to the participants

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Appendix C.3: Rapid naming exercises used in Chapters 6 and 7.

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### Appendix D: Syntactic awareness exercise used in Chapters 6 and 7

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<tr>
<th>Ez. 1</th>
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<th>hanut ġol</th>
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<tr>
<td>Ez. 2</td>
<td>Nina</td>
<td>Frans</td>
<td>ħarsu u xulxin lejn.</td>
</tr>
</tbody>
</table>

1) il-ktieb refghet Rita.
2) sabbat Ir-rağel it-tieqa
3) il-qanpiena čempel Is-surmast.
4) iddoqq strument xi Int?
5) nharqu u bin-nar Il-bieb t-tieqa.
6) mohhu It-tifel fil-fniek kien.
7) stabtet It-tieqa tal-bejt tal-kamra.
8) Ommhom il-basket ħarget u l-ikel il-basket fethet.
9) bil-hasla fuq It-tifla tonxorha il-bejt biex telghet.
10) tieghek ħdejn Ghadejt id-dar imma ghax li forsi minn tkun qed ma čempiltx tistrieh bżajt.