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An Analysis of Year 8 Poor Comprehenders'
Responses to the PAT Reading Comprehension Test

A thesis submitted in partial fulfilment of the requirements for the
degree of Master of Literacy Education, Massey University,
Palmerston North, New Zealand.

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2014

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Abstract

Despite years of literacy learning, a group of students continue to struggle with reading in their final year at primary school. Many of these students show adequate decoding skills but perform poorly on comprehension tasks. This study reports on the results of a study into the linguistic skills and cognitive processes of a group of thirty one poor comprehenders and twelve proficient comprehenders in Year 8. An analysis of the poor comprehender group found issues with some foundation language skills persist beyond the junior levels of primary school. Syntactic and morphological awareness were found to be less developed in the poor comprehender group when compared with their more skilled peers, while phonological knowledge was not implicated in reading difficulties. The poor comprehenders were also asked to retrospectively consider their incorrect question responses on the Progressive Achievement Test of Comprehension (PATC) in an effort to understand the reasons behind their choices and further find where breakdowns in comprehension were occurring. The PATC is widely used in New Zealand primary schools and measures silent reading comprehension using a multiple choice format. Tests conducted silently do not allow the processes of comprehension to be revealed, rather they can only tell us if understanding was successful or not. The results of this retrospective analysis highlighted several key areas of difficulty in the poor comprehender group including inferencing, vocabulary knowledge and the use of prior knowledge. Additionally, the use of poor test-taking strategies was highlighted. These included students using a key word matching 'search and destroy' technique to find answers, and employing timesaving measures to avoid a complete reading of the text. Finally an analysis of the questions in the PATC was undertaken to find if certain types proved more challenging for students. Results showed individual questions proved difficult to answer due to their high cognitive demands, but no question type was more difficult to answer. The study indicates the need for assessments to reflect the cognitive aspects of reading comprehension and to include foundation skills until the Year 8 level. In addition to teaching comprehension strategies and vocabulary, teachers need to focus on improving the test-taking skills of students.

Acknowledgements

Many people have contributed to the development and completion of this thesis. First and foremost I thank my family and friends who offered encouragement and support. Thanks to you all but especially to Kath and Clare for the 'walk and talks', my mother, Lee and Cath my sisters, for their timely and practical advice, but especially to John, Amy and Thomas. Thank you for your love and support.

Thank you to my supervisors, Keith Greaney and Alison Arrow for their guidance through the duration of this study. You have been patient, encouraging and tactful and I am grateful for your generous assistance.

I would also like to acknowledge the staff of the Intermediate school where this study took place. It was a privilege to work with a team who are passionate about teaching and learning at the Intermediate level.

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Chapter 1

Introduction

The process of learning to read is complex and occurs over a period of many years. By the time students reach Intermediate school, most have well established decoding skills and the focus of reading is on the comprehension of increasingly more complex texts. The reading process has become internalised and silent reading is the norm. Because of this the strategies used to understand a text are hidden and the teacher must rely on questioning to discover if students understand what they are reading. Consequently the end product of reading is monitored, rather than the process of comprehension being revealed. Some students at upper primary levels may be accurate and fluent when asked to read aloud but on closer examination show poor understanding of the text. This group, with their ability to decode well-established but with weak comprehension skills, are referred to as poor comprehenders.

The existence of these poor comprehenders is well established in the literature (e.g. Buly & Valencia, 2002; Israel & Duffy, 2009; Leach, Scarborough, & Rescorla, 2003). Poor comprehenders are more prevalent in the senior primary years, when a group of children who have demonstrated adequate skill in their early reading fall behind their peers (Catts, Compton, Tomblin, & Bridges, 2012; Meisinger, Bradley, Schwanenflugel, Kuhn, & Morris, 2009). While their existence has been recognised, the reasons behind this group's failure to understand what they are reading are less well understood. The multifaceted and highly individualised nature of the needs of the group has been demonstrated (Cain & Oakhill, 2006), but the contributions of components are yet to be clearly defined. This lack of knowledge affects teaching and learning as classroom practices are not able to cater to the specific requirements of this group.

In New Zealand, Year 8 is the final year of primary education; after this year, students move on to high school and encounter subject-specific texts and high stakes assessments where skills in comprehension are essential for achievement (Hulme & Snowling, 2011; Smith, Elley, & Smith, 1997). Typically, in New Zealand, reading comprehension instruction does not occur beyond the intermediate (Year 7-8) years. If the needs of the poor comprehender are not addressed, the demands of subject literacy at high school will be almost insurmountable. Thus there is a 'last chance' aspect to literacy acquisition at this level (Ehren, Lenz, & Deshler, 2014).

National monitoring of Year 8 students showed only small gains in reading comprehension performance between 1996 and 2004, and no change between 2004 and 2008 (Crooks, Smith, Flockton, & Allan, 2009). These results occur in the context of wider results in international comparisons. Forty five years ago New Zealand was ranked first in the world in reading (IEA,

1971). New Zealand was ranked top in four out of ten international surveys between 1970 and 2001 (Elley, 2004). However, in 2013 a report by PISA, the OECD's Programme for International Student Assessment, positioned New Zealand at 13th, down from 3rd in 2000. This ranking confirmed concerns raised by the 2010/11 Progress in International Reading Literacy Study (PIRLS), where New Zealand's result showed no significant difference in achievement since the 2001 and 2006 studies. Additionally, New Zealand has a long 'tail' of underachieving readers in comparison to other countries (Clark, 2014). It is likely the poor comprehender group are prevalent in this tail.

These trends in both national and international data show New Zealand moving away from its position as a world leader in reading. The causes of this shift are debatable. Elley (2004) notes caution is required when interpreting results due to changes in the demographic composition of New Zealand and casts doubt on the comparability of samples across countries in international reports. However, Tunmer, Chapman, Greaney, Prochnow and Arrow (2013) assert it is educational policies and instructional directions which have failed to improve outcomes. What is certain is that increases in international ranking, and the reduction of the 'tail' of underachievement will only occur through enhancing outcomes for students by improvements to teaching and learning. One of the steps toward this goal is to characterise the reasons for poor comprehenders' difficulties.

The Present Study

This study aimed to determine the causes contributing to poor comprehension results on the Progressive Achievement Test of Comprehension in a group of Year 8 poor comprehenders. Assessments of foundation language skills were carried out to examine if these were an ongoing source of difficulty for this age group. Retrospective interviews with students attempted to discover the cognitive processes that occurred as the students attempted to answer reading comprehension questions. Interviews on strategy use and knowledge further characterised the reading behaviours of these students. Finally, the questions in the Progressive Achievement Test of Reading Comprehension assessment were examined to find if any question types caused particular difficulty.

1.1 Key Terms and Definitions

Decoding: For the purposes of this study, the definition of decoding comes from that of Gough and Tunmer (1986), where decoding is not only the skill of word recognition, but also the knowledge of letter-sound correspondences which enable the reader to recognise words.

Comprehension: Comprehension is a multifaceted process where meaning is derived from text. This study uses Sweet and Snow's (2003) definition of reading comprehension as "the process of simultaneously *extracting* and *constructing* meaning" (p. 1). In comprehending text, the reader, the text and the purpose or activity interact and interrelate.

Linguistic comprehension: also referred to as language comprehension or listening comprehension. This is the ability to derive meaning from spoken words.

Poor comprehension: The definition adopted refers to difficulties stemming from factors other than an inability to decode (Duke, Pressley, & Hilden, 2004). In order to understand a text, the reader must integrate a number of cognitive processes e.g. visualising, making inferences and interpreting the message of the text. Poor comprehension refers specifically to the inability to integrate these processes to understand text even though decoding is accomplished. The 'poor comprehender' is a student who exhibits these attributes.

Progressive Achievement Test (Reading Comprehension): A standardised, multiple choice assessment of reading comprehension available for use in New Zealand for students from Year 4 to Year 10. Abbreviated and referred to as PATC.

1.2 Overview

This thesis is composed of six chapters. The second chapter reviews the relevant literature, including theories of reading, comprehension and comprehension development. The path to skilled reading is described with emphasis on characterising the early adolescent. Factors that may contribute to poor comprehension are then explored. Following on from this, Chapter 3 describes the methodology and research design used, including the participants and the research setting. The assessments and interviews utilised are described, including details of their purpose and how they were administered. Both quantitative and qualitative methods are described. The results of the study are presented in Chapter 4. The findings of the assessments and interviews are presented, with comparisons made between skilled and poor comprehenders where appropriate. In Chapter 5 these results are discussed and the strands of the study are woven together to build a comprehensive picture of the Year 8 poor comprehender. The implications for teaching include the need for teaching of test-taking

strategies, and the ongoing teaching of foundation skills in syntax and morphology in conjunction with comprehension strategies. In terms of assessment, the need for more meaningful data to direct teaching is emphasised. In Chapter 6, conclusions are drawn from the findings of this study linking the literature, discussion and the New Zealand context.

Chapter 2

Literature Review

This chapter examines the theoretical underpinnings of reading comprehension based on the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990). The distinct needs of the Year 8 student are then described along with a profile of a skilled reader. This profile is presented as it is through comparisons with skilled readers that weaknesses in poor comprehenders may be defined. Research identifying the components contributing to successful comprehension is then reviewed. Because an assessment task places additional requirements on a student beyond those in an independent reading situation, a review of assessment or test-taking strategies is also undertaken. The chapter culminates in a review of how student cognition may be revealed through verbal analysis, with a particular focus on Greaney's (2004) study of Year 4-6 poor comprehenders, which this study replicates with an older age group.

2.1 Theory

This section explores theories of reading, starting with the Simple View of Reading which underpins this study. The components of the Simple View are further elaborated by the SEDL framework (Wren 2000), with a focus on those linguistic aspects which contribute to the reading process. Shanahan and Shanahan's (2008) model showing how comprehension is expected to develop over time is then detailed. Theories of how comprehension is accomplished are then explored, with possible implications for the poor comprehender.

2.1.1 The Simple View of Reading

The Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) provides a model where reading is composed of two essential components, decoding and linguistic comprehension. Successful reading (R) is described as the product of linguistic comprehension (L) and decoding (D). The relationship between the two is shown by the equation $R = L \times D$. The multiplicative nature of the relationship indicates that neither decoding nor linguistic comprehension is sufficient on its own; both components must work effectively and concurrently for reading to be achieved (Gough & Tunmer, 1986; Nation, 2005; Wren, 2000). The theory emphasises it is not enough to simply be able to read the words of a text.

The Simple View provides a basis for considering and investigating the complexity of reading and predicts four categories of readers: proficient readers, those who experience difficulties in word reading, those who experience difficulties in language comprehension, or difficulties with both. The existence of a group of poor comprehenders is predicted by the Simple View as

those readers who experience difficulties with comprehension but not decoding (Catts, Adlof, & Weismer, 2006). However, the Simple View alone is not detailed enough to use as a single framework to explore the specific difficulties underpinning early adolescent reading comprehension difficulties.

2.1.2 Southwest Educational Development Laboratory (SEDL) Framework

Wren (2000) proposed a framework based on the Simple View where the components of successful reading are displayed in order to define their relationship to each other (see Figure 1) and the underlying early processes involved in skilled reading. It shows development in a limited manner, with those elements depicted lower on the framework required for mastery of those above, for example, beginning readers direct considerable processing effort into word reading, and this is a very strong predictor of early comprehension (Catts & Kamhi, 2012; Chall & Jacobs, 1983; Cornoldi & Oakhill, 1996). The SEDL framework depicts how linguistic knowledge and background knowledge combine for language comprehension to occur. The framework also predicts that failure to learn to read for reasons other than decoding may be due to problems in one or more foundation areas such as background knowledge, phonology, syntax or semantics.

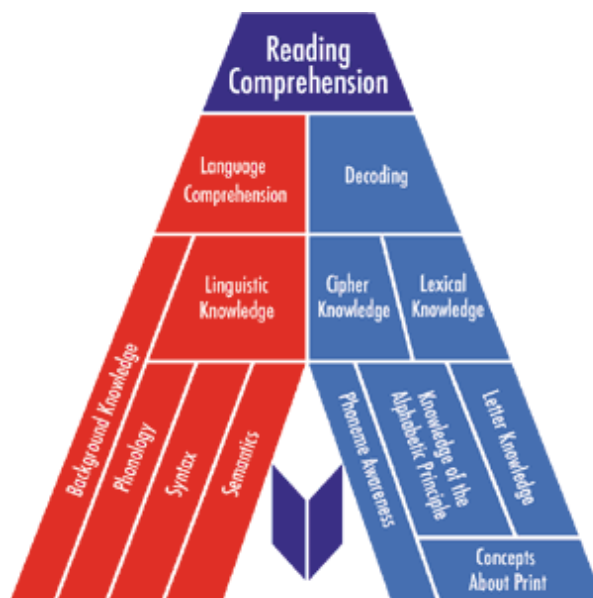


Figure 1 The SEDL Framework (Wren, 2000)

While it might be expected that at Year 8 these foundation skills will be well established, this is not necessarily the case. Longitudinal studies have found distinct developmental patterns in these skills until Grade 6 (Berninger, Abbott, Nagy, & Carlisle, 2010; Tong, Deacon, Kirby, Cain,

& Parrila, 2011), showing that for some students difficulties in orthographic, morphological and syntactic awareness persist until at least this time. The process of specifying these trends remains incomplete (Tong, Deacon, & Cain, 2014), however it seems likely a group of students at Year 8 are still missing the foundation skills which enable them to develop their full reading potential.

2.1.3 Reading comprehension development

The Simple View does not illustrate a developmental progression and the SEDL framework shows limited development of early reading skills; neither provides a complete exploration of reading comprehension development or exploration of the strategies and processes required. Shanahan and Shanahan (2008) propose a three tiered model explaining the development of literacy (see Figure 2). The lowest tier describes the foundation language skill requirements and decoding skills of the SEDL framework (Wren, 2000) in addition to knowledge of high frequency vocabulary. The middle tier depicts the integration of more sophisticated strategies, increasingly complex text structures and the need for self-monitoring of understanding. The skills at this stage are those common to most reading tasks, and classroom instruction in strategies such as visualising and making connections will focus on extending these intermediate level skills. The upper zone describes the advanced comprehension required for the understanding of subject specific texts at secondary school level and beyond.

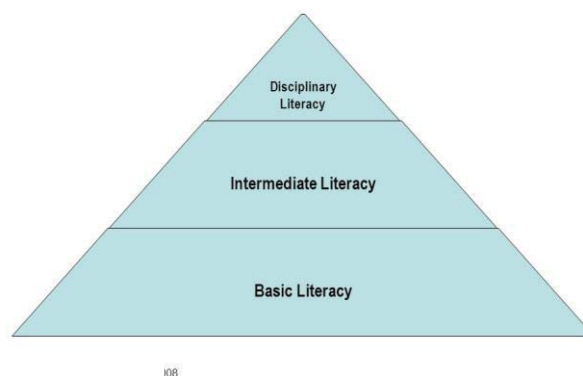


Figure 2 The Increasing Specialisation of Literacy Development (Shanahan & Shanahan 2008)

Poor comprehenders may face difficulties with the foundation skills represented in the bottom tier, but equally there may be issues with the cognitive aspects of comprehension as depicted by the middle levels of the model. As word reading becomes automated, the reader must integrate inferred meanings, conceptual understandings and structural elements for

comprehension to occur (Adlof, Catts, & Lee, 2010; Gough, Hoover, & Peterson, 1996; Vellutino, Tunmer, Jaccard, & Chen, 2007; Willson & Rupley, 1997). If this process proves difficult, the progress of these learners may be impeded when they attempt to read more complex texts and move to more sophisticated understandings.

2.1.4 Theories of reading comprehension

A number of models explaining how comprehension occurs have been proposed based on cognitive psychology. The development of theory for reading comprehension specifically has been occurring over the last forty years and as yet no unified theory has emerged (Cote & Goldman, 2004; Sadoski & Paivio, 2007). However, the common ground between theories is the necessity for the construction of a coherent representation or mental model of the text in memory by the reader. A review of two theories prominent in the field is presented: the first of these, schema theory, focuses on the organisation of information, the second, the construction-integration model, on how the mind processes information.

Schema Theory

Schemata may be considered as frameworks or exemplars which are built from previous reading experiences (Anderson & Pearson, 1984; Bartlett, 1932; Kant, 1929). They provide a way to organise, interpret and store current knowledge and are used as a comparison when new information is considered or predictions are made (Anderson & Pearson, 1984). Rumelhart (1980) described schemata as our knowledge of “objects, situations, events, sequences of events, actions, and sequences of actions” (p. 34). For example, we have schema for objects such as a car, for situations such as being in a restaurant, for events such as going to a rugby game, and for sequences of events such as getting ready for school. To comprehend a text, the reader must have a schema for the information in the text (the content schema) and an understanding of the organisation of the text (the text schema). Comprehension of any new text is simplified and quicker when the reader has these schemas to hand (Catts & Kamhi, 2012).

Schemata may also be viewed as a filter where new information is considered and compared to the existing schemata. Once schemata are activated, a network of information is available to the reader to support the reading process. However, there is the potential for understanding to be impeded if the reader does not assimilate the new information or rejects the new ideas. Because of this, attention to new material in the text and flexibility of thinking are considered important in the application of schemata (Anderson & Pearson, 1984).

In expository texts, three issues in the application of schema have been identified. (Catts & Kamhi, 2012). The content of these texts may be unfamiliar and the reader will be unable to draw on their content schema knowledge. Secondly, expository texts have a variety of structures, for example time-line, cause and effect, compare and contrast, of which the reader may have little experience and so not have developed an appropriate schema. Finally, to understand expository text requires the linking of factual information, as opposed to narratives which require understanding of human behaviour and motivations. The reader may not have the schema appropriate to the different genres.

Construction-Integration

Kintsch and Van Dijk introduced their theory of reading comprehension in 1983 and Kintsch extended the concepts in 1988 and 1998 (Kintsch, 1988, 1998; Van Dijk & Kintsch, 1983). While complementing the comprehension component of the Simple View, depth is added by including aspects of prior knowledge, defining the importance of strategy use and describing a mechanism for the processing that occurs (Deshler & Hock, 2007). The theory describes how meaning is represented in the mind and so how text is comprehended. The construction–integration model (1988) explains reading comprehension in two phases. In the first of these, the text stimulates or activates knowledge in the reader’s long-term memory and produces a variety of meanings which fit the given context (the construction phase). These ideas then connect with prior knowledge, are accepted and then assimilated in working memory (the integration phase).

There are three levels of representing the text mentally. These interact and are interdependent (Kintsch, 2012), while connected in memory (Kintsch, 1988). The first level is the surface representation which refers to the words and phrases of the text itself. This level is described in terms of units of meaning or *propositions*, that is to say the meaning of a simple sentence. A network of propositions represents the text at this level, forming the microstructure of the text. The second level of representation is the textbase which is the bigger picture of the text as represented by paragraphs or the entire story. The textbase is composed of the microstructure and a macrostructure. Whereas the microstructure describes content at the level of sentences, the macrostructure refers to the wider organisation of the text. Both microstructure and macrostructure have propositions as their basic unit, however the textbase contains the organisation and meaning of the text. While inferencing is required at this stage, the inferences are primarily to ensure text cohesiveness enabling readers to construct a meaning close to what the author intended (Farrall, 2012).

The third level of representation is the situation model, which goes beyond the boundaries of the text itself, describing the integration of the new text with prior knowledge and experience (Farrall, 2012). This construction of the situation model is what is commonly referred to as the comprehension process. Unlike the textbase which is a verbatim representation, the situation model is flexible and somewhat elaborated.

Breakdowns in comprehension may occur in the construction of the textbase or the situation model. Because the textbase accurately represents the text, skilled readers are usually able to generate adequate representation at this level; however it is possible the poor comprehender may struggle here. It is when building the situation model that most variation in understanding occurs, and where there is most potential for comprehension to fail.

Comparison of the Theories

These two theories provide conceptual frameworks for investigating reading comprehension. While schema theory views reading comprehension as a single mechanism, the construction–integration model includes two phases and gives a more detailed and less rigid overview of how comprehension is achieved. The theories differ in their approach, with schema theory presenting a top-down approach and construction-integration theory a bottom-up approach. The themes common to both are the requirement for active cognitive processing and that meaning must be actively constructed by the reader.

In summary, the theories reviewed offer an understanding of the multiple opportunities for comprehension to either succeed or break down. Failures in comprehension may occur at the foundation skill level in any one of the component skills depicted by the SEDL framework (Wren 2008), or during the construction of meaning as depicted by schema theory and the construction-integration model. The theories presented clarify the processes of comprehension, but also detail the complexity and depth of what is required for success.

2.2 The Path to Skilled Reading

The concept of the skilled reader has been used to reflect on the needs of the poor reader (McKenna & Dougherty Stahl, 2009; Pressley, 2006). This notion of a skilled reader is a model or template demonstrating the skills and processes of successful reading. Comparisons between skilled and poor readers are carried out to find those aspects which should be given prominence in teaching, including both the cognitive and foundation aspects of language.

In terms of the foundation skills required, skilled readers have shown superior oral language abilities when compared to poor comprehenders (Nation, Clarke, Marshall, & Durand, 2004). While poor comprehenders speak and recite text accurately and with fluency (Nation &

Snowling, 1997; Stothard & Hulme, 1992), underlying issues have been revealed. Poor comprehenders have shown deficits in vocabulary (Catts et al., 2006; Nation et al., 2004; Nation, Snowling, & Clarke, 2005), grammar and syntax (Adlof et al., 2010; Cragg & Nation, 2006; Marshall & Nation, 2003; Oakhill, Cain, & Bryant, 2003) and semantics (Nation & Snowling, 1998b).

By studying the thinking processes skilled readers use, researchers have discovered numerous strategies are utilised to support comprehension. A meta-analysis of think-aloud studies by Pressley and Afflerbach (1995) recorded the “elegant coordination of processes” (p. 60) required before, during and after reading. Before reading those processes might require the skilled reader to establish a purpose, skim the text and make predictions. During reading, the skilled reader will integrate their prior knowledge, reread, visualise, adjust understanding, make links within or between texts, and make inferences. Post-reading processes involve reflecting, reviewing, and modifying thinking and understanding. The skilled reader simultaneously monitors understanding and the level of effort required for specific text (Pressley, 2006; Wyatt et al.). By implication, the poor reader will have difficulty with using or managing some or many of these strategies.

Learning in literacy becomes increasingly complex and demanding as students move through their schooling. Students are expected to read longer and more difficult texts across a variety of curriculum areas, often with little structured support (Booth, 2001). At Year 8, the final year at intermediate level, the New Zealand Reading Standards (Ministry of Education, 2009) expect students to be reading texts which include:

- Elements that require interpretation, such as complex plots, sophisticated themes, and abstract ideas;
- Complex layers of meaning, and/or information that is irrelevant to the identified purpose for reading (that is, competing information), requiring students to infer meanings or make judgments;
- Non-continuous text structures and mixed text types;
- Sentences that vary in length, including long, complex sentences that contain a lot of information;
- Adverbial clauses or connectives that require students to make links across the whole text;
- Academic and content-specific vocabulary;

- Words and phrases with multiple meanings that require students to know and use effective word-solving strategies to retain their focus on meaning;
- Metaphor, analogy, and connotative language that is open to interpretation;
- Illustrations, photographs, text boxes, diagrams, maps, charts, and graphs, containing main ideas that relate to the text's content.

The types of texts identified for Year 8 all require skilled reading, yet reporting of National Standards data (Education Counts, 2013) shows 22.7% of Year 8 students failed to meet the reading standard in New Zealand. A significant proportion of this group will be poor comprehenders, although some students may still have decoding weaknesses. Previous studies have estimated 10 to 30% of poor readers (perhaps 2-4% of good readers) show poor comprehension, with this percentage increasing with age (Catts et al., 2006; Catts & Kamhi, 2005; Stone, 2004).

There are numerous issues contributing to adolescent poor readers' struggle with reading. Students may see reading instruction as disconnected from content, books are perceived as more formal and difficult to read, and there is less social support from teachers (Guthrie & Davis, 2003). Low achievers have little confidence in themselves as readers and do not choose to read for their own pleasure. The social setting of schooling has a strong bearing on learning practices and students may become increasingly disengaged from learning (Brozo, Shiel, & Topping, 2007). Preferring to be seen as poor achievers due to their lack of application rather than lack of intelligence, students may exhibit 'self-handicapping' behaviours such as procrastinating or not trying (Midgley & Urdan, 1995).

Biancarosa and Snow (2006) compiled a list of fifteen recommendations to support adolescent struggling readers from their review of the literature, asserting that "no literacy program targeted at older readers is likely to cause improvements without these elements" (p.5). Instructional improvements listed were direct, explicit comprehension instruction, effective instruction in content areas, motivation and self-directed learning, strategic tutoring, diverse texts, intensive writing, a technology component and ongoing formative assessment. In terms of infrastructure around literacy, improvements for students will be facilitated by extended time for literacy, professional development, ongoing summative assessment, teacher teams, leadership and a comprehensive and coordinated literacy program. It is likely the implementation of most of these recommendations in a literacy intervention programme will specifically benefit the adolescent poor comprehender.

While the success of strategy instruction in enhancing comprehension is generally undisputed, a synthesis of studies on adolescent struggling readers (Edmonds et al., 2009) found that success in strategy interventions at this age frequently did not transfer to more generalised comprehension assessments. This suggests that while these students may have learned new strategies successfully, they then fail to use them in their independent reading. A second finding from the analysis was that the interventions which were successful with younger learners did not necessarily prove effective with this older age group. Both findings indicate the needs of adolescents are fundamentally different from younger learners, perhaps because of the greater requirement to comprehend expository texts, or because a longer or more intense intervention would be required to achieve the same results as the younger group.

The demands of reading at the Year 8 level are higher than at any time at primary school and will continue to escalate at high school. The persistence of poor comprehenders shows the need for instruction to continue into intermediate school and higher education (Snow & Moje, 2010). In addition to more complex reading material contributing to comprehension issues, social factors play an increasing role in the motivation and engagement of adolescent learners. Literacy skills are reflected in achievement levels across subject areas at high school level (Wise, 2009), so supporting reading comprehension before this time will have positive consequences for high school and in further education. Failing to address issues in adolescent literacy is likely to result in frustration and poor achievement, with the negative social and economic impacts for the individual potentially reverberating beyond the school years. It should be noted that attempts at early literacy remediation have been ineffective for these older poor comprehenders and a 'more of the same' approach may not be sufficient. A focus on the early adolescents of the Year 8 group will show patterns of need that may be specific to this developmental stage and are best remediated before entry to the upper levels of education.

2.3 Text Factors that Influence Comprehension

Knowing the characteristics of the skilled reader enables predictions to be made of the potential needs of poor comprehenders. Differences in patterns of comprehension ability have been identified in research (Cain & Oakhill, 2006; Nation, Clarke, & Snowling, 2002; Valencia & Buly, 2004). Poor comprehenders may have difficulty with the foundation skills hypothesised by the SEDL framework (Nation et al., 2004). Equally, poor comprehenders may have difficulty with the skills needed to build understanding at text level (Cain & Oakhill, 2007). While the factors are considered separately for the sake of clarity, during reading these skills will interact and interrelate. These potential sources of difficulty for the poor comprehender are presented

with an emphasis on sources based on linguistic comprehension rather than decoding as the basis of comprehension difficulties.

2.3.1 Foundation skills

Phonological knowledge

Phonology is the study of the sound structure of a language. Studies which have measured phonological awareness have shown poor comprehenders do not differ from their skilled peers (Cain, Oakhill, & Bryant, 2000; Nation et al., 2004; Nation & Snowling, 1998b; Stothard & Hulme, 1995). Two studies have shown the role of phonological awareness appears to decrease with age. Kirby, Parrila and Pfeiffer (2003) found the relationship between phonological awareness and reading was strongest in the first two years at school. Students with deficits in phonological awareness showed improvements with time, but still lagged behind the normally achieving group by Grade 5 (age 10). A longitudinal study by Landerl and Wimmer (2008) followed 115 German students for nearly eight years with assessment points at Grades 1, 4 and 8. While phonological measures contributed to word reading fluency in Grade 1 (age 6), by Grade 4 (age 9) they no longer had a measurable effect.

At a base level, phonological knowledge can be described as the ability to discriminate sounds. This involves a subconscious process enabling the distinction between sounds and thus between the meanings of words (Moats, 2010). Students who are unable to distinguish between words will have difficulty reading. For example, most children can hear the difference between the two words “sake” and “shake”, but if they are not able to differentiate between these words, their understanding will be impaired. While phonological awareness is not implicated in the difficulties of this older age group, this study uses an assessment of phonological knowledge to find if this may be a contributing factor, as the SEDL framework identifies it as contributing to linguistic comprehension.

Vocabulary and morphological awareness

Vocabulary and reading comprehension are inextricably linked (Dymock & Nicholson, 2012). Students with a larger vocabulary are better comprehenders (Cunningham & Stanovich, 1997; Lubliner & Smetana, 2005), while poor comprehenders seem to have difficulty both with how many vocabulary words they know and the adequate representation of known words (Landi & Perfetti, 2007; Nation & Snowling, 1998a, 1999). Many new vocabulary words are introduced while reading, with context providing the support for meaning to be inferred (Oakhill & Cain, 2007) and this is one reason students are encouraged to read widely and regularly. However, learning from context does not always support vocabulary acquisition. The reader may not

infer the correct meaning from context, so any unknown word may potentially compromise comprehension of a paragraph or passage (Nicholson & Dymock, 2010).

Morphological awareness is the understanding and use of word parts. Morphological awareness is linked to vocabulary as students use word parts to infer the meaning of unfamiliar words. Nagy, Berninger and Abbott (2006) found morphological awareness made a “significant unique contribution at all grade levels” (p. 140) to reading comprehension. Their study evaluated 607 students from 4th to 9th grade (age 9 to 14) using measures to investigate first knowledge and use of suffixes, and then by asking students to compare pairs of words and comment on if they were related, for example, quick/quickly (yes) or moth/mother (no). A later study by Berninger, Abbott, Nagy and Carlisle (2010) found morphological awareness had increased growth after fourth grade (age 9).

Tong, Deacon and Cain (2014) separated and combined morphological and syntactic tasks to investigate their relative contributions in fifteen Grade 4 (age 8 to 9) poor comprehenders. They suspected observed weaknesses might be task-dependent and sought to clarify relationships and areas of need. The fifteen poor comprehenders were compared to fifteen average comprehenders with the groups showing clear differences in assessments of comprehension and vocabulary performance. The results confirmed the findings from an earlier study (Tong et al., 2011) that weaknesses in morphology and syntax are implicated in poor comprehension at this age level. Without the support of sentence context, weaknesses were apparent in the target group in both morphological and syntactic awareness. The study revealed issues with the choice of assessments to measure skills but also demonstrated further complexity in the differences between good and poor comprehenders. Questions remain over how these factors might contribute to poor comprehension in older readers. Demonstrating the continuing process of comprehension acquisition, these studies show development in morphological awareness occurs through to intermediate and high school levels and is a possible factor in poor comprehension at the Year 8 level.

Syntactic awareness

Syntax refers to the structural rules of language which dictate the arrangement of words and phrases (Moats, 2010). These rules act to minimise ambiguity and support meaning. For example, in the sentence ‘John kissed Susan’, the order of the words tells you who gave the kiss and who received it. While syntax rules vary between languages and may create a source of confusion for second language learners, there is also a group of English-speaking children who are only exposed to the simplest of syntactic forms because of the poor nature of their

environment (Wren, 2000). These children struggle with comprehension over time as the classroom becomes an increasingly complex linguistic setting.

A study by Nation and Snowling (2000) showed a sub-group of poor comprehenders had weaknesses in syntactic awareness. Subsequent longitudinal studies have also shown support for the link between poor comprehension and syntactic awareness (Adlof et al., 2010; Catts, Fey, Tomblin, & Zhang, 2002; Nation, Cocksey, Taylor, & Bishop, 2010) with speculation that limited reading experience might be responsible (Nation et al., 2005). However, Layton, Robinson, and Lawson (1998) found successfully training a group of 30 Grade 4 (age 8 to 10) students in syntactic awareness did not lead to improvements in reading. Cain (2007) found little evidence of a direct relationship between syntactic awareness and reading comprehension, noting the choice of assessment task may influence results. In this study of 196 seven to ten year-olds, both word order and grammatical correction tasks were used as measures of syntactic awareness. The results demonstrated language skills and memory were implicated in the syntactic awareness to different degrees and explained variance on the chosen tasks in the older group. Together, these studies show that while an association between syntactic knowledge and reading ability has been found, the exact nature of this association remains unclear (Scott & Koonce, 2014).

In summary, studies in word and sentence level skills indicate poor comprehenders at the Year 8 level may show difficulties with vocabulary, and morphological and syntactic awareness. Phonological knowledge is not predicted to be implicated in poor comprehension at this age as students are usually adequate decoders and users of language at a subconscious level. However, the need for clarification of the developmental progression of these foundation skills is indicated.

2.3.2 Text level

Text or discourse level skills are those which relate to how sentences are combined in a meaningful way. Longer texts require the reader to hold ideas about and across paragraphs and chapters as they build to an overall understanding of the text (Pressley, 2006). The reader will be required to use their prior knowledge, make inferences, and apply comprehension strategies as reading progresses. They will also need to monitor their comprehension, and employ a fix-up strategy if meaning breaks down. Any of these aspects may be a roadblock to adequate comprehension. These aspects are described in detail.

Background/Prior Knowledge

Background or prior knowledge refers to what an individual already knows from their previous experiences. It has been demonstrated that prior knowledge has a strong influence on reading comprehension (e.g. Carr & Thompson, 1996; Langer & Nicolich, 1980; Pearson, 1979; Taft & Leslie, 1985). The reader combines the knowledge they have with new knowledge from the text as they actively make meaning. Activating prior knowledge draws the reader's attention to relevant parts of the text and encourages inference-making (Anderson & Pearson, 1984). Schema theory (Anderson & Pearson, 1984) explains the interaction between prior knowledge and the text by competent readers being more likely to activate relevant prior knowledge before, during and after they read and use their existing schema to both understand the text and to provide a framework for integrating new information. However if prior knowledge is used inappropriately, or information in the text is ignored in favour of prior knowledge, errors in comprehension may occur (Block & Pressley, 2002).

Prior knowledge can be beneficial or a liability depending on how it is utilised. Wade (1990) investigated comprehension strategy use in 52 students from Grade 2 to Grade 9 (age 7 to 14) and found students utilised their prior knowledge in a variety of ways. Some students failed to bring their prior knowledge to the reading task and relied only on the text to create meaning. Others used the text and their prior knowledge but only across short passages of the text, so they failed to gain a global meaning. Yet another group ignored what they were reading in favour of their prior knowledge, even if it conflicted with the text. A final group preferred to draw on their prior knowledge rather than the information in the text. McCormick (1992) also found that many students placed too much reliance on prior knowledge. In a study involving 80 fifth grade (age 9 to 10) students, it was found that most of the students had ignored what was written and instead, had favoured their prior knowledge, or interpreted the text in a way that conformed to their prior knowledge. From these studies we can conclude that issues with prior knowledge are a contributing cause to poor comprehension, and there are a variety of ways in which poor comprehenders may misuse their prior knowledge during the comprehension process.

Inferencing

In the context of reading an inference is an idea or conclusion that is suggested by cues in the text. When writing, the author does not include every necessary detail, but rather leaves the reader to fill in the gaps by actively considering clues in the text. The reader must elaborate on the information given or fill in where pieces of information are not explicitly stated.

Consequently incorrect inferences may be drawn by overemphasising some element of the text or drawing conclusions the author did not intend. This failure to make inferences is typical of the poor comprehender (Cain & Oakhill, 2004; Duke, Cartwright, & Hilden, 2014; Laing & Kamhi, 2002), whereas the skilled reader is able to integrate prior knowledge and generate appropriate links to create meaning.

Skill in inferential reasoning develops gradually with age and with the experience of reading texts (Hamm & Hasher, 1992; Thompson & Myers, 1985). Younger children are able to make inferences to the same degree as older readers but do not do this spontaneously, needing the guidance of teacher questioning (Casteel & Simpson, 1991). A study of age-related differences in inferencing by Barnes, Dennis and Haefele-Kalvaitis (1996) focussed on 51 students between the ages of 6 and 15. The results showed the number of inferences increased through early to middle childhood, with a period of stability in the mid years followed by improvement again in early adolescence.

Researchers have identified and classified inferences using different taxonomies (Kispaal, 2008). The PATC classifies inferences as local or global (Graesser, Singer, & Trabasso, 1994). Local inferences require connections to be made across sentences in close proximity. Many readers will make these types of inference relatively quickly and easily. Take, for example, the sentence below:

The driver parked the bus. Then he locked the door.

When reading these two sentences, the reader must understand the door referred to is the bus door and that the pronoun *he* refers to the bus driver. Other situations may require a global inference to be made. This type of inference is required when references are made to previous paragraphs or when the theme of the text must be interpreted by the reader. Global references require considerably more cognitive effort than local inferences (Kintsch & Rawson, 2005) and often require the reader to update or revise their understanding as they move through a text. New information is presented, characters change their behaviour, or the writer may deliberately mislead the reader. Poor readers however, tend to rely on what they read in the early part of a text and fail to make changes to their understanding when new information discounts or contradicts what they have previously understood (Johnson & Seifert, 1994; O'Brien, Cook, & Guéraud, 2010).

Poor comprehenders have particular difficulty with making the inferences that allow them to build a coherent representation of the text (Cain & Oakhill, 1999; Cain, Oakhill, Barnes, & Bryant, 2001; Yuill & Oakhill, 1988, 1991). The evidence suggests faulty inferencing causes

problems with comprehension rather than the reverse situation. Cain and Oakhill (1999) separated inferencing skill from overall comprehension and found that poor comprehenders struggled with an inferencing task and performed worse than younger average readers with the same overall level of comprehension. Exactly why these poor comprehenders fail to make inferences remains unclear although memory issues and lack of general knowledge were discounted (Cain & Oakhill, 2004).

Schema theory and the construction-integration model may be used jointly as a lens to consider the skills required for inferencing. The processes required when making inferences are those utilised in building Kintsch's (1998) situation model. In a particular text, this may require effort and analysis in different ways. For example, a narrative may require the reader to understand character motivations, follow the structure of the story, trace related events and sympathise with the characters. Schema theory (Anderson & Pearson, 1984) accounts for how the reader organises the incoming information to make inferences. The reader will rely on their existing schemata when reading the text, using them to make sense of events and actions as they unfold.

In New Zealand, National Standards show a developmental expectation in the types of inferences children are expected to make, from simple inferences in Year 1, local inferences in Year 3 and 4, to inferences drawing on several related pieces of information in Years 5 and 6. At Years 7 and 8 texts will contain "complex layers of meaning, and/or information that is irrelevant to the identified purpose for reading (that is, competing information), requiring students to infer meanings or make judgments" (Ministry of Education, 2009, p. 33). This implies that students at Year 8 are required to make sense of complicated texts across a range of genres. For the poor comprehender, these increasingly advanced texts are likely to make it difficult to form those inferences which allow comprehension at the required level.

Strategy Use

When applied to reading, the term strategy refers to a "plan to gain meaning from text" (Dymock & Nicholson, 2012, p. 52). The strategies recommended for teaching vary (Gaskins, 2003). In New Zealand schools the following are recommended; making connections, questioning, visualising, inferring, identifying the author's purpose and point of view, identifying the main idea, summarising, analysing and synthesising, and evaluating (Ministry of Education, 2006). While the skilled reader uses these strategies either implicitly or explicitly, the poor comprehender may not independently discover how to use these strategies and will need explicit teaching to support this learning.

Strategy instruction has repeatedly been found to be effective in improving comprehension across all age groups (National Reading Panel, 2000; RAND Reading Study Group, 2002; Rosenshine & Meister, 1994; Swanson, 2011) and readers who struggle may be taught to use cognitive strategies to accelerate their comprehension growth (Nokes & Dole, 2004). A synthesis of research on Grade 6-12 struggling readers found beneficial effects of comprehension strategy instruction in self-questioning, reflecting during and after reading and becoming active in self-monitoring (Edmonds et al., 2009). However, sounding a note of caution, some studies of single strategy interventions with adolescents showed promising results, but students seemed unable or unwilling to transfer their learning to more generalised situations (Jitendra, Hoppes, & Xin, 2000; Wilder & Williams, 2001; Williams, Brown, Silverstein, & deCani, 1994).

Comprehension monitoring

Simply teaching the strategies is not sufficient for students to independently utilise them in their reading (Pressley, Borkowski, & O'Sullivan, 1984). The reader must also regulate when the strategies should be used. Comprehension monitoring refers to the processes by which the reader reflects on the text both during and after the reading to self-assess understanding. In essence, if the reader is fully engaged with the text, monitoring will be occurring. The skilled reader understands better than the poor comprehender that the aim of reading is understanding rather than decoding (Cain, 1999). Therefore a skilled reader will choose a fix-up strategy when understanding fails, whereas a poor comprehender is less able to regulate their reading (Cain, 1999; Erlich, Remond, & Tardieu, 1999).

Monitoring skills and poor comprehension have been linked in two studies with 10-year-olds (Erlich et al., 1999; Oakhill, Hartt, & Samols, 2005). It has been suggested the relationship is reciprocal, that is to say monitoring both contributes to and results from comprehension (Perfetti, Landi, & Oakhill, 2008). Poor comprehenders' monitoring is considerably improved when they read a text that is interesting (de Sousa & Oakhill, 1996), indicating that problems may be overcome at a context level and the issue is not an intrinsic ability.

Monitoring is a skill that develops and improves with age (Cain & Oakhill, 2004). Younger children are less likely to be aware they are not understanding, perhaps because their cognitive resources are consumed by other comprehension processes (Markman, 1979). Baker (1984) studied the monitoring of 9- and 11-year-old children and found differences between older and younger readers, and between stronger and poorer readers. The older and stronger readers were more likely to identify comprehension breakdowns or confusions and were more

flexible in their monitoring. These studies in children only slightly younger show monitoring of comprehension is likely to still be a contributing factor to the poor comprehension of Year 8 students.

2.3.3 Text Factors Summary and Implications

For comprehension to succeed the reader must build a mental representation of the text and in order to achieve this, multiple skills and processes are orchestrated at word, sentence and text levels. A considerable effort in cognitive processing is occurring in order for this to happen. The complexity of the process is clear even if details of the way in which components are coordinated remains a mystery (Kintsch & Rawson, 2005). Failure to comprehend text can occur at any or many places in this web of contributing factors.

There is evidence to support the view that foundation language weaknesses contribute to poor comprehension, although these relationships are poorly defined. Nation et al. (2004) characterised poor comprehenders by a weakness in oral language aside from phonological processing. While the expectation at Year 8 would be for linguistic skills other than phonological knowledge to be implicated in poor comprehension, clarification of the roles of syntactic and morphological skills is indicated for this older age level by the Tong, Deacon and Cain (2014) study.

Poor comprehenders can be taught to use the strategies that skilled readers use. It is likely that students in Year 8 will have been exposed to some form of strategy instruction. What is not clear is if these older poor comprehenders have failed to integrate them into their reading practice, or if they have a poor understanding of which strategies to use in different circumstances.

2.4 Assessment Factors

In addition to the text-based factors detailed previously, the assessment situation places further demands on participants. The students must employ skills and strategies to manage the testing situation above those required for language comprehension.

2.4.1 Effect of question types

While understanding the questions in an assessment requires language comprehension skills, in this study the question types are considered separately as integral to the assessment process, rather than to the process of understanding the text.

It is possible students have difficulty in assessments because they do not know how to analyse the requirements of the question (Greaney & Arrow, 2011; Mesmer & Hutchins, 2002; Raphael

& Au, 2005). Raphael and Au (1982) proposed a framework of question types that reflect the relationship between the text, the question and the reader's prior knowledge. The authors categorised question types in a hierarchical order of Question Answer Relationships or QARs (Raphael, 1982, 1986). The subgroups of question types that the authors use give an indication of the cognitive demands required of the reader as they search for answers. The question types are illustrated in Figure 3.

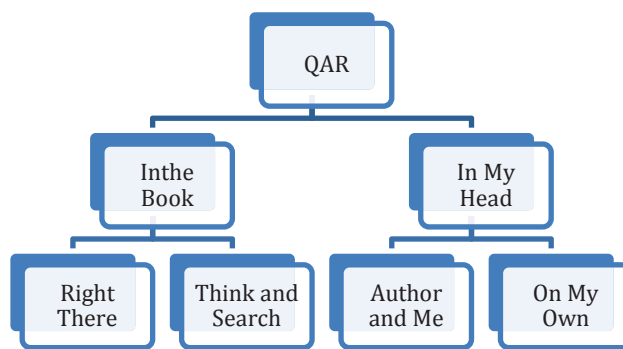


Figure 3 QAR Framework (Raphael & Au, 2005)

In the Book and *In My Head* describe the two categories of questions (Raphael, 1982, 1986; Raphael & Au, 2005). There are two types of *In the Book* questions. The answers to *Right There* questions are usually found within a sentence, and so it is expected these will require comparatively less cognitive processing. *Think and Search* require more effort as the answer will require linking between sentences or sometimes across paragraphs. The *In My Head* questions may require a higher level of cognitive loading as the answers require consideration of information beyond the text. The *Author and Me* questions require the integration of personal experience (prior knowledge) with information in the text, whereas *On My Own* questions require the student to only use their own thinking and knowledge to come up with an answer.

In a study of response patterns on a multiple choice reading comprehension task, Greaney and Arrow (2011) analysed 15 questions according to the QAR framework and examined 447 Year 4 student responses. They found Year 4 students had most difficulty answering the *Think and Search* and *On My Own* question types. The assessment included only one *Author and Me* question, making it difficult to draw conclusions about this question type. It was considered possible that these difficulties with question types might still be apparent in the Year 8 age group, suggesting the need for an analysis of errors according to question types.

2.4.2 Test-taking strategies

In any reading assessment task, students are required to decode and understand a text, but there are also demands posed by the need to manage the test situation. For example, the student will need to allocate time to each question or section of the assessment, decide whether to answer or abandon a question, and choose whether to read the questions or the text first. These strategies are to some extent generated or dictated by the format of the test (e.g. cloze, multiple choice) and are employed by the student to manage the assessment process.

Cohen (2006) separates test-taking strategies into test management strategies and test wiseness strategies. Test management strategies include rereading the question for clarification, rereading the text to support answer choice or choosing to return to a question for later consideration. Those processes employed by students to circumvent the need to use their language knowledge are known as test wiseness strategies. These involve using the format of the test to select answers. Examples of this type include using the process of elimination to select an answer, using clues from other questions to choose an answer, or selecting an option by linking key words in the answer to the text. The reader may be drawing on any language strategies, test management strategies or test wiseness strategies in an approach to a particular question. However, it might be expected that the poor comprehender might draw on test wiseness strategies to compensate for their lack of understanding.

There is an important distinction between strategies for reading and strategies for assessment. The common and defining feature of test-taking strategies is that the students will not usually use them in their independent reading. The purpose of strategies for reading is to make meaning from the text; the purpose of strategies for test-taking is to find the correct answer. The students may be using test-taking strategies because of an unwillingness to engage with the text, or because they do not understand what they are reading.

2.5 Revealing the Process of Comprehension

Assessments of reading comprehension are often completed by answering a series of questions about a text in silence. The resulting data may serve the purpose of obtaining an estimate of ability in relation to peers, or finding if the reader has understood the text. But these assessments focus on what has happened as a result of the comprehension process and not the process itself. The emphasis is on the products, rather than the processes of comprehension (Catts & Kamhi, 2012; Rapp, Van Den Broek, McMaster, Kendeou, & Espin, 2007). To assess the process of comprehension, a deeper analysis is required.

The use of verbal reporting as data, a method that originated with Ericsson and Simon (1980, 1992), has been central to uncovering thinking as comprehension occurs. Verbal reports are prompted by asking the participant questions about their cognition. The participant is required to explain their thinking as they are making sense of text. Both retrospective and concurrent verbal reporting are utilised when studying cognition.

When investigating memories of past reading experiences (retrospective reporting), the participant is accessing information held in long term memory. These memories are not as fresh as those considered at or soon after the reading and further deteriorate over time (Ericsson & Simon, 1992). Consequently these reports are not considered as reliable as concurrent reports. However, this type of investigation still allows a 'window' into comprehension as the reader explains their thought processes. Because the student responds orally and can elucidate their thinking, the teacher or researcher is able to gain greater insights into the processing and strategy use than would be possible from using raw score data alone (Greaney & Arrow, 2011).

The limitation of the retrospective interview is that not all information will be retrieved. Errors may occur due to poor memory recall, combining what may have been several processes into one, or guessing when it is difficult to remember (Ericsson & Simon, 1980, 1992). Wade (1990) notes the reader may use different strategies when reading different text types, may not be being fully aware of their thoughts or may find it difficult to articulate their thinking. While some participants may not be sufficiently aware of their cognitive processes to report them, others may have become so proficient that their processing has become automatic and not able to be consciously accessed (LaBerge & Samuels, 1974). Finally, misinterpretations of data may occur through the researcher drawing incorrect inferences or because of ambiguity in responses (Block, 1986). However in general, verbal reports are considered a credible source of data and have become a preferred tool to uncover strategy use (Cohen, 2006).

Studying a group of ten 4th and 5th grade (age 9 to 10) poor comprehenders Dewitz and Dewitz (2003) attempted a fine grained analysis of reading behaviours in poor comprehenders utilising concurrent verbal reporting. Using the informal reading inventory, Qualitative Reading Inventory 3 (QRI-3), a special education evaluation, they studied the reasoning students used to arrive at their incorrect responses. Students were asked to elaborate their initial answers and this enabled the authors to identify the ineffective strategies these students were employing. This yielded results in which poor inferencing skills, a failure to link ideas across passages, issues with the application of prior knowledge, and poor vocabulary were implicated as factors contributing to poor comprehension. While results were interpreted individually, it

is possible to see the main causes of errors were excessive elaborations (in an average of 40.8% cases) and faulty inferring (an average of 45.3%).

Greaney (2004) used retrospective reporting in his study of New Zealand Year 4-6 students. In this study, the Progressive Achievement Test of Reading Comprehension (Darr, McDowell, Ferral, Twist, & Watson, 2008) was used as the basis for interview questions. The PATC is a multiple choice assessment used widely in New Zealand primary schools to assess comprehension. The multiple choice format is the easiest assessment type to administer and mark (Eley & Caygill, 2002). The benefits of the test are that they are simple to use, inexpensive and have proven to be valid and reliable measures of reading skills (Magliano, Millis, Ozuru, & McNamara, 2007). However, the multiple choice format has been criticised for a number of reasons. These include a failure to assess higher level cognitive skills (Frederiksen, 1984; Shepard, 2008), and because it is possible to answer questions correctly without reading the text (Coleman, Lindstrom, Nelson, Lindstrom, & Gregg, 2010; Katz, Lautenschlager, Blackburn, & Harris, 1990). Additionally, tests presented in this manner do not reflect what occurs when the reader comprehends text, nor do they assess the range of abilities described as contributing to comprehension. The cognitive processes used when answering multiple choice tasks are different to those when reading text (Gorin, 2005).

In the PATC assessment, a variety of passages are read and students answer multiple choice questions. To investigate the reasons why students selected the incorrect answer options, Greaney undertook a retrospective analysis of each student's question-answering behaviour. Students were individually given the opportunity to revisit the test passages, and to read them again and answer the questions. Each student was then asked to explain their reasoning for selecting the (original) incorrect answer options. Greaney concluded that many poor comprehenders were relying heavily on a key word matching technique (38%), showed an inability to link key ideas across sentences (30.1%) and/or used prior knowledge inappropriately (24.2%). Other comprehension difficulties were attributed to relying too heavily on illustrations (5.2%), and poor vocabulary knowledge (2.3%).

Both Dewitz and Dewitz (2003) and Greaney (2004) found an inability to link main ideas across sentences. This lack of inferring skill appears to be a key element in the comprehension difficulties faced by students at this age. Whereas Dewitz and Dewitz (2003) found students relied too much on prior knowledge, Greaney (2004) found students tended to make poor use of their knowledge or use it inappropriately. The differences between the two studies may be the result of the small sample size, but equally may signal some fundamental differences in teaching and learning. Perhaps, for example, in their reading instruction the American students

are encouraged to generate their own ideas of the meaning of the text with less regard for what is explicitly mentioned. A feature of both studies was the lack of students' use of comprehension strategies in their responses. These students did not appear to draw on these strategies as they attempted to make meaning. The large number of students using the "search and destroy" technique suggests these students chose test-taking strategies rather than meaning-making strategies.

The current study attempts to replicate the Greaney (2004) study with a group of older students. Like the Greaney (2004) study, the current research will focus on establishing why some normally developing students scored poorly on the NZ standardised PAT of Reading Comprehension, but this study considers a wider range of aspects as possible contributors to the poor comprehenders' faulty understandings.

2.6 Summary

Poor comprehenders do not form a homogeneous group. Perfetti, Marron and Foltz (1996, p. 140) note "virtually anything that logically can be identified as a component of comprehension has been identified as a source of comprehension failure". While the list of possible contributing causes may be daunting, it is unlikely that each factor is equally important. However, the relative contribution of each factor remains ill-defined as does the exact nature of relationships between factors.

It seems likely that some of the skills defined by the SEDL framework (Wren, 2008) remain underdeveloped in the poor comprehender group at Year 8, accentuating their comprehension difficulties as texts become increasingly complex. The issues around poor strategy use raised by Greaney (2004) and Dewitz and Dewitz (2003) remain under-researched in this older age group. These issues may be resolved as students mature, or continue to play a role in the poor comprehension of older learners.

The review of the literature shows the necessity for a more comprehensive examination of why early adolescents fail to comprehend text adequately. The goal of the study is to provide an in-depth picture of the skills and strategies used by poor comprehenders at the Year 8 level. The PATC, retrospective verbal reporting, interviews and targeted assessment tools combine to form an account of how poor readers at Year 8 fail to comprehend text, emphasising the individual nature of problems as well as finding more generalised issues which may prompt change in classroom practice.

2.7 Research Questions

The overall aim of the study is to find why a sample of competent Year 8 decoders selects incorrect answer responses when taking the multiple choice PAT Reading Comprehension assessment. Investigating the reasons why these students struggle will require an investigation into foundation language deficits and further analysis of PATC data. The specific research questions to be addressed by the study are:

- Do poor comprehenders have weaker foundation language skills than proficient comprehenders?
- What are the question-answering behaviours of a group of Year 8 poor comprehenders, and how do they use comprehension strategies?

Chapter 3

Method

This chapter begins with a description of the methodology of the current study. A mixed method research design was chosen in response to the research questions, which indicate the need for both quantitative and qualitative approaches. The quantitative approach is used for the foundation language abilities and description of summative achievement in reading comprehension. A qualitative approach is used to investigate students' responses and explanations for the types of responses they make to reading comprehension questions. A description of the research setting and the participants follows. The materials and procedures of the study are then outlined, detailing the assessment tools and procedures.

3.1 Mixed Method Design

Mixed methods research utilises multiple ways to explore a research problem. Generally, selection of specific methods flows from the research questions and practicality suggests the use of both qualitative and quantitative approaches (Creswell, 2014). In this case, the complexity of the comprehension process and the number of factors considered to be likely contributors to comprehension failure suggested the need for a combination of quantitative and qualitative methods.

The design was chosen at the start of the research process. Quantitative and qualitative data were collected concurrently, analysis of data occurred separately and the results were merged during the interpretation phase (see Figure 4). The strategy sought to clarify the role of foundational language skill deficits in poor comprehenders quantitatively prior to the qualitative analysis of the retrospective verbal reports.

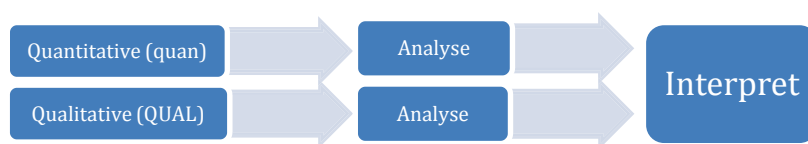


Figure 4 Convergent Parallel Mixed Method (Creswell, 2014)

Combining qualitative and quantitative methods is responsive to the research questions, but increases complexity in planning, data collection and analysis (Punch, 2009). In this study the time-consuming nature of interviews was balanced against the necessity for a sample size large enough to provide meaningful statistical information. Teddie and Yu (2007) propose viewing sampling as a continuum where an intermediate point between purposive and probability sampling occurs. Here a sample size greater than 20 was chosen, enabling the research to be both viable in both quantitative and qualitative spheres.

3.2 Research Setting

The study was located in a suburban, decile 8 intermediate school with approximately 490 students. The ethnic composition of the school is reported as New Zealander 75%, European/pākehā 14%, Māori 4%, British 2%, Chinese 1%, Pacific 4% (Education Review Office, 2011).

Students who participated in the research were excused from class for two sessions with the researcher, which took place within the school environment. The first session was a testing session where location and conditions mirrored those in a typical classroom setting. The second session also took place within the school, but in a quiet location way from the classroom and other students. All sessions occurred within the parameters of the school day.

3.3 Participants and Sampling

Purposive sampling was chosen to strategically choose cases that would yield information relating to the subject of interest (Springer, 2010). Stratified sampling was necessary to ensure the presence of the required subgroups (i.e. skilled and poor comprehenders) in the sample. Here disproportionate stratified random sampling was used to compare groups chosen on the basis of their comprehension achievement. The participants in each group do not reflect the proportions found in the general population.

Participants were selected on the criteria below for poor and proficient comprehenders.

(1) **Poor comprehenders:** The school's previous reading achievement data indicated 52 possible Year 8 candidates with stanine 3 or 4 PATC scores. Thirty one of these students were included following the sampling and consent process, comprising 72% of the total sample chosen. These students were then tested by the researcher on Test 5 of the PATC.

(2) **Proficient readers:** Teachers were asked to nominate candidates who demonstrated reading proficiency as defined by a stanine score of 6 or 7 in the previous year's PATC. Twelve students were randomly selected for this group and had consent. This group were also retested by the researcher on Test 5. The purpose of selecting this group of 'proficient' comprehenders was to enable comparison with the poor comprehenders so that areas of difficulty would be highlighted.

The total sample group consisted of 43 students, drawn from 12 classrooms within the school. All participants were classified as Year 8 in 2014 and ranged in age from 12 years, 1 month to

13 years, 1 month at the time of assessment. The group included 42% boys and 58% girls; 21% Maori and 79% New Zealand European. No students who were learning English as a second language or who were receiving special needs support were included.

Table 1 Participant Summary

	Gender		Ethnicity		Age	
	Male	Female	NZ Euro	Maori	Mean	SD
Poor Comprehenders	10	21	26	5	12yr 5m	4 months
Good Comprehenders	8	4	8	4	12yr 5m	4 months
All	18	25	34	9	12yr 5m	4 months

3.4 Materials

3.4.1 Vocabulary

Vocabulary knowledge was assessed with the Peabody Picture Vocabulary Test, Fourth Edition (Dunn & Dunn, 2007). This version consists of 228 test items arranged into nineteen 12-item sets of increasing difficulty. Respondents only complete relevant sets; those too easy or too hard are not administered. The assessment begins with the establishment of the *basal item set*. This is the highest 12-item set that the respondent makes one or nil errors on. To administer each item, the student listens to a word spoken by the interviewer and then selects the picture that best describes the word's meaning from a page with four colour pictures. The following 12-item sets are then administered until eight or more errors are made within a set, which then becomes the *ceiling set*. The raw score is then calculated by totalling the number of correct responses between the basal and ceiling sets. The scoring protocol assumes all sets below the basal set would be answered correctly, and all those above would be answered incorrectly.

The test is untimed but generally takes 15 minutes to administer. Raw scores may be converted to several modes but in this study were converted to standard scores. Although not standardised for use in New Zealand, the PPVT4 was chosen because of its widespread use in similar studies. Its predecessor, the PPVT-III found reliability in New Zealand matched that of the US (Reese & Read, 2000). Reliability averages .94 (Kush, 2010).

3.4.2 Morphological awareness

A word analogy task (Tong et al., 2014) required the student to first listen to a pair of related words. When the third word was read, the student was required to repeat the relationship found between the first pair e.g. tall; tallest, small; *smallest*. Patterns included changes in tense, singular to plural and related verbs and nouns. The assessment contained fourteen sets, with a point scored for each correct answer.

A sentence completion task (Tong et al., 2014) involved twenty derivational and decomposition tasks presented in oral form. The student was given a key word and required to complete a sentence by making the necessary change e.g. *Farm. My uncle is a _____ (farmer)*. Changes include producing a derived form or a root. Points were scored for correct answers. The reported Cronbach's α is .71 (Tong et al., 2014).

3.4.3 Syntactic awareness

A sentence correction task from Tong et al. (2014) was chosen. Eighteen sentences were orally presented with each containing a grammatical error. The student was asked to repeat the sentence making the required correction, with a point for each correct answer. For example, the researcher would say the sentence "She swims not". This should be corrected to "She doesn't swim". Cronbach's α is .81 as reported by Tong et al. (2014).

3.4.4 Phonological knowledge

Wepman's Auditory Discrimination Test (Wepman & Reynolds, 1987) was used to assess phonological knowledge. Forty pairs of words were presented, with either the same word repeated (10), or two different words (30). Of the forty pairs, only the thirty with different words were scored. The test measures auditory discrimination and is usually used with children up to age 8 to identify children who are delayed in learning auditory discrimination and thus may have difficulty learning to read. Reliability is .92.

3.4.5 Progressive Achievement Test Reading Comprehension (PATC)

Progressive Achievement Tests are nationally-normed tests developed by the NZ Council for Educational Research in 1969, with revisions in 1991 (Reid & Elley) and 2008 (Darr et al.). The PATC forms part of a suite of standardised tests for students in Years 4 to 10 and is used in many schools in New Zealand on an annual basis. Test 5 is the recommended test to use with Year 8 students. To obtain the initial test data for later response analysis, students selected on the basis of their previous PATC results as possible candidates for the study were withdrawn from class as a group and the PATC Test 5 was administered in a 45 minute silent testing session. Students were required to sit separately and were not permitted to leave until the testing period was over.

Tests were marked and scored by hand, with a mark given for each correct answer, resulting in a raw score out of 38. Raw scores were converted to scale scores and stanines using the conversion table in the Teacher's Manual (Darr et al., 2008). Appendix 3 summarises this initial test data.

Test 5 consists of eight passages covering recount, narrative, poetic and transactional forms. Each passage has an average of five multiple choice questions with four or five answer choices per question. There are a total of 38 questions covering three question types. These are classified as retrieval, local inference and global inference. The retrieval question (R) requires the reader to understand information directly from the text. For example, in the text 'River Rescue' students are asked "Where had Hemi found the cargo net?" The answer to this question, "On the beach", was stated directly in the sentence "A ship's cargo net that Hemi had found on the beach..." For Local Inferential questions (LI), the reader must understand information or ideas that are not explicitly stated within short sections of the text. These questions make greater cognitive demands on the reader as the answer is not directly written in the text. An example would be, from the same text, where the final question asks, "Which word best describes how Atawhai felt towards Hemi?" The reader must infer from the way she 'trained her malevolent gaze on Hemi' and hissed at him, "You know what you put me and your uncle through, with your bloody irresponsible antics..." that the correct answer was 'Furious'. Global Inferencing questions (GI) require inferencing across larger sections of text. An example of this kind of question is in the text 'Richard Pearse-Aviator'. Students are asked "What is the main idea of this text?" To answer this question, they must have the broad understanding required to choose the answer "Pearse was an inventor whose achievements were not initially recognised." Because the reader is required to make meaning across paragraphs, these questions require greater cognitive resources than the both the Retrieval and Local Inferential types.

Table 2 presents a summary of the texts from Test 5, clearly showing almost all questions require Local Inferencing skill to find the correct answer. The reliability of the test is 0.9 (Darr et al., 2008).

Table 2 Summary of PATC Texts

Text Title	Text Type	Noun Count Readability	Word Count	Number of Questions and Sequence of Question Types
Suit Yourself	Narrative	9-10yrs	143	5: LI;LI;GI;LI;LI.
Richard Pearse-Aviator	Recount	10-12yrs	269	5: LI;LI;LI;LI;GI.
River Rescue	Narrative	10-12yrs	429	6: LI;LI;LI;LI;R;LI.
The Last Boy in Captivity	Poem	9.5-10.5yrs	98	4: LI;L;LI;LI.
Why Does Popcorn Pop?	Explanation	12-14yrs	374	5: LI;LI;LI;LI;LI.
Before Night Falls	Narrative	9-10yrs	178	4: LI;L;LI;LI.
Opetaiā Foa'i – Musician	Recount	12-14yrs	419	5: LI;L;LI;LI;LI.
The Far End of the Garden	Poem	8-9yrs	107	4: LI;L;LI;LI.

Source: PAT: Reading Teacher Manual, p.10 (Darr et al., 2008).

R = Retrieval

LI= Local Inferencing

GI=Global Inferencing

Decoding and vocabulary in PATC

Running records were used on each passage to ensure decoding proficiency. Poor comprehenders are characterised by adequate decoding skill (Duke et al., 2004). It is generally accepted that students must read texts with at least a 90% accuracy rate to ensure adequate comprehension levels. Students who recorded below this level of accuracy were likely to have a low PATC score due to poor decoding rather than poor comprehension. Accuracy is expressed as a percentage and was calculated using the formula (total words read – total errors) / total words read x 100. Running records were completed on a total of 192 texts. All participants assessed showed adequate decoding skill in both the text passages and the questions and answers and this allowed poor decoding to be eliminated as a possible cause of their low PATC scores.

Following the decoding assessment, students were asked if any words were unknown. This step was prompted by previous studies (Dewitz & Dewitz, 2003; Greaney, 2004; Nation, 2005) who all cited vocabulary issues in poor comprehenders.

Strategy use and knowledge

At a follow-up interview after the initial test administration, each student was given the opportunity to explain their reasons for selecting the incorrect responses. The students were interviewed by the researcher to complete this process with student preferences for interview times respected (Loveridge, 2010). During the retrospective analysis, the researcher asked questions to confirm student responses so their decisions were clear. All interview responses were recorded for later analysis. The average time between the testing session and follow-up interview was two weeks. Detrimental effects due to the delay between assessment and follow-up (Pressley & Afflerbach, 1995) were observed in only one case, where a student was unable to recall answer selections and thought processes.

Each interview was structured in response to student answers. If a student answered half or more of the questions on a passage correctly, no analysis of that passage was undertaken. Where larger numbers of errors were made, these were selected for further analysis. This was because the focus of the analyses was the reasons why the students had selected the incorrect answer options. Appendix 1 summarises the interview format. A total of 394 incorrect answer responses were analysed.

A short interview (see Appendix 2) provided further information on student comprehension knowledge and application of strategy. The first question on test-taking strategy was prompted by concerns students might fail to understand the text due to their test-taking approach. The focus was to find if students were rereading. Responses were noted and the number of students who reread was totalled. Finally, two questions on comprehension strategy knowledge and use were asked to investigate if students had an unprompted repertoire of strategies, and if they used specific strategies in their reading. Unprompted and prompted strategies were counted separately. The prompted strategies were visualising, inferring, skimming, scanning, summarising, predicting, asking questions, rereading and making connections (McKenna & Dougherty Stahl, 2009).

Questions

Analysis of the questions was conducted to find if poor comprehenders found some questions or question types appreciably more difficult than others. Two analyses were undertaken. In the first of these, the number of errors on each question was calculated and those with the highest numbers of errors, and therefore the most difficulty for students, were chosen for further investigation. The student responses to this group of questions were analysed to uncover any particular sources of difficulty. In the second analysis the questions of the PATC were classified according to the QAR taxonomy (Raphael, 1982, 1986; Raphael & Au, 2005) and the errors

made on each question type were counted. The proportions of errors made on each question type were compared to the proportion of question types in the assessment. This was to show if a certain question type was more difficult for students to answer.

Chapter 4

Results

This chapter presents the results of an investigation into some of the reasons why a group of Year 8 students scored poorly on the New Zealand Progressive Achievement Test of Reading Comprehension (PATC). The results presented were collated from the responses of 31 students who, despite showing adequate decoding skill (based on the decoding error analysis), achieved a result placing them at or below stanine 4 on the PATC. These students were then compared to a similar group of 12 of their peers who had scored higher (stanine 6 or 7) on the same test.

The results of the quantitative investigation into foundation language components are presented first. Assessments of vocabulary, phonological knowledge, syntactic awareness and morphological awareness were included to find if the poor comprehender group had weaknesses in their foundation skills. Comparisons were made between the poor and proficient comprehender groups and correlations provide detail on the interdependence of these factors. A series of retrospective interviews were then conducted where each student was asked to recall their reasons for selecting the incorrect answers on some of the multiple choice questions. The key purpose of the retrospective analysis was to ascertain what factors contributed to student errors. Further supplementary interview questions were designed to investigate the extent to which ineffective strategies may have been implicated as reasons for some incorrect answer selections. For example, questions were asked about how the students strategically approached the assessment and whether they had used reading comprehension strategies they had been taught in the classroom.

4.1 Foundation Language Skills

The foundation skills investigated included vocabulary, syntactic awareness (sentence correction), morphological awareness (sentence completion and word analogy) and phonological knowledge (phonological discrimination). Table 3 summarises the findings on the performance of the two groups of students on these selected measures. A *t*-test found significant differences between the reading comprehension raw score means of the two groups $t(41)=13.176$, $p<0.001$, confirming the existence of two distinct groups, with the poor comprehenders showing significantly poorer scores on the PATC .

Table 3 Performance of Proficient and Poor Comprehenders

	Proficient (n=12)				Poor (n= 31)			
	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.
Reading Comp	25	31	27.58	2.109	10	20	14.10	3.280
Vocabulary	90	180	114.42	27.596	74	114	92.81	8.150
Sentence Correction	10	16	13.58	1.975	7	18	11.77	2.526
Word Analogy	8	13	10.58	1.564	4	12	9.00	1.770
Sentence Completion	15	18	16.83	1.030	13	19	15.58	1.628
Wepman's ADT	26	30	28.00	1.128	23	30	27.45	1.823

Reading Comprehension = PATC raw

Vocabulary =PPVT standard score

Sentence correction task = syntactic awareness

Word analogy task and sentence completion task = morphological awareness

Wepman's ADT = Phonological awareness task

In order to answer the research question concerning foundation language skills in the poor comprehender group, a comparison between the two groups on each of the skills is required. T-tests showed significant differences between the means of the two groups in vocabulary $t(41)=3.99, p<0.001$, syntactic awareness $t(41)=2.226, p = .032$, and both morphological tasks; word analogy $t(41)=2.712, p<0.001$ and sentence completion $t(41)=2.470, p = .018$. This shows that the poor comprehenders were significantly out-performed by the proficient comprehenders on these measures. For the phonological knowledge task, $t(41) = .969, p = .338$, the means of the two groups were not significantly different, supporting the third hypothesis.

Correlations between morphological awareness, syntactic awareness and reading comprehension were also conducted for the entire sample. Results showed small to moderate positive correlations between most measures. As expected, significant correlations were found between reading comprehension and each of the factors (morphology and syntactic awareness). Specifically, reading comprehension was significantly correlated with morphological awareness (word analogy and sentence correction tasks and syntactic awareness (sentence completion task. Unexpectedly, there was no significant correlation

between the sentence completion task and the word analogy task, indicating that they were not tapping into the same morphological knowledge.

Table 4 Correlations of Morphological Awareness, Syntactic Awareness and Reading Comprehension

	1	2	3	4
1 Reading Comprehension	-			
2 Word Analogy (Morphology)	.379*	-		
3 Sentence Correction (Syntax)	.439**	.381*	-	
4 Sentence Completion (Morphology)	.427**	.166	.626**	-

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

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

4.2 PATC Retrospective Interview

Students were asked to verbalise the thinking that had occurred as they chose their answers. All the interviews were audio-recorded and transcribed for later analysis. Coding was developed inductively during the analysis phase where categories were suggested and residual data was listed in the category 'Other'. A list of quotations showing insight or demonstrating a particular category was compiled.

The main categories of ineffective strategy use that were identified from the interviews related to the following: poor inferencing, the matching of keywords from the question or answer options with the same word in the text, low vocabulary, and ineffective use of prior knowledge. The number of errors was then counted for each error type across the students.

Table 5 summarises these results:

Table 5 Summary of Reasons for PATC Errors

Error Type	%age of Total Errors	
	Poor Group	Proficient Group
Inference	47	42
Key word search and destroy	19	12.5
Vocabulary	16	12.5
Prior knowledge	8	10
Other	10	23

A considerable percentage of errors in both groups were made due to poor inferencing. The proficient comprehender group made comparatively fewer errors due to vocabulary and using the 'search and destroy' technique, however, they made more errors misreading the question and misunderstanding the question (Other).

4.2.1 Reading Strategies

Because the students were able to read the passages at an acceptable level of accuracy (i.e. over 90%), it was evident that the low comprehension test scores could not be due to poor decoding skills. With poor decoding eliminated as a reason for poor comprehension, several areas of concern were highlighted.

Poor inference making

The most common cause of the errors in the poor comprehender group (47%) was attributed to students making incorrect inferences. These errors were due to poor recollection of the text, a failure to update as new information became available or a failure to make coherence inferences.

Poor recollection

The investigation found that many of the students had read each test passage only once and they had answered the questions based on their memory of what they had read. They had then drawn incorrect conclusions because of an overreliance on what they remembered but without re-checking the text. This error type accounted for 23% of the total errors.

As an example of this issue, the passage 'River Rescue' describes a boy, Hemi, rescuing his cousin Te Maika from a river. Te Maika's father, Baldy, is nearby digging a fence-post hole. A question asks "Why didn't Hemi warn Baldy that Te Maika was in danger before she fell in the

river?" (Correct answer: He didn't have time). One student chose "He thought Baldy was watching Te Maika" because she explained that in her memory of the passage Baldy was looking up. In the text Baldy had looked up, but *after* Te Maika fell in.

Secondly, in the poem 'The Last Boy in Captivity', a child is sitting alone in the back seat of a car in the dark. A question asks "What does the boy do when he sees people staring at him?" A student answered "He writes his name in the car window". However, when asked why he chose this answer he said he remembered in the text that the child breathed on the window and wrote his name. This event actually occurred earlier in the poem. When this student reread the text, he chose the correct answer, "He stares back at them".

When suspecting the error came from the student's poor recollection of the passage, the researcher would ask "Did you go back and check in the text?" The answer was invariably "No".

Failing to update

These errors were made when students failed to make changes to their understanding of the text as new events unfolded or information was updated.

An example occurred in the passage 'Richard Pearse – Aviator', which describes Pearse's early attempts to build an aeroplane capable of flight. A question asks "Who knew that Pearse had made flights in an aeroplane?" (Correct answer: Pearse's neighbours). Several students answered "Nobody" because in the text it mentioned Pearse had "kept his invention very quiet". These students had not changed their understanding of the passage in the light of the new information provided by the later sentence, "People who lived nearby said that Pearse made other flights that were controlled..."

Another example of this issue occurred in the passage 'Opetatia Foa'i – Musician'. This recount is about a Pacific Islander who describes his music and the influences on his life. A question asks "Where does Opetatia get most of his ideas for his music from?" (Correct answer: Discussions he has with his elders). A student chose "Other Polynesian music" because early in the passage there was mention that Polynesian music had captured Opetatia's heart and he had grown to love it. This student inferred that this was where his musical ideas came from. This understanding was not modified when later in the passage the sentence, "My main source of inspiration comes from speaking to the old people and getting information passed to them by their parents" revealed a more complete answer.

Failure to make coherence inferences

A few students failed to make the inferences required to maintain the coherence of the text. The reader must make these bridging inferences to ensure meaning is not lost. The first passage in the PATC, 'Suit Yourself' describes a meeting between a policeman named Colin and a boy named Glyn. The reader must infer from clues in the text that Glyn's mother and Colin are in a relationship together. A question asks "What can we tell about Glyn's mum and Colin?" One of the students answered they were neighbours because she had not made this connection. She had noted the word 'friend' describing the relationship between Colin and Glyn's mother, but this was not a choice in the answer bank. She chose the answer "They are neighbours" because as she said, "*friends* is the closest to *neighbours* so it must be that".

In the text 'Opetaiia Foa'i – Musician', a question asks "What is the main reason Opetaiia uses the knowledge of the old people?" (Correct answer: To pass on the old people's knowledge). One student chose "To inspire other people". She had missed the link between the two sentences, "My main source of inspiration comes from speaking to the old people and getting information passed to them by their parents. I put this valuable information into music to preserve for the following generations."

Vocabulary

Before reviewing the questions on each passage, students were asked if there were any word meanings in the passage, the questions, or the answer options that they did not understand. Unknown words could potentially hinder understanding at any of these three points. In 93 of the 192 passages analysed (48%), students identified words that they had not understood. Subsequent analyses revealed that not all of these misunderstandings had contributed to the reasons for their incorrect answer choices but poor vocabulary was identified as the error source in 16% of the incorrect answers analysed.

An example of how poor vocabulary had influenced the incorrect answer selection occurred in the text 'Before Night Falls'. This passage describes two lost hikers camped on a hillside in bad weather. The passage contained two key words readers struggled with. The first question asked "What did the wind do to the tents?" The correct answer "It blew them about" relied on understanding the word 'bullied' in the sentence "The cold wind bullied the two small tents pitched on the dark hillside". The second question in the same passage asked "What was the most likely reason the tents had been "hastily" pegged out?" This question was incorrectly answered by ten students who did not know the meaning of the word 'hastily'. Here the reader was first required to understand the meaning of 'hastily' and then infer from the passage the reason which was, because the weather was bad and the people who put up the tent wanted shelter.

Similarly in the passage 'River Rescue', if a student did not know the meaning of 'primate', it was difficult to complete the statement "By comparing Hemi to a primate this text suggests that Hemi..." (Correct answer: was good at swinging through branches). In this passage, it was possible to infer the meaning from context, but not all students were able to achieve this. Fifteen students commented they did not know the meaning of the word 'primate'. These students did not attempt to infer the meaning from context, instead falling back on guessing the answer.

Inappropriate use of prior knowledge

Because of the close relationship between prior knowledge and inferencing, it is necessary to further define this category of errors. Prior knowledge errors were coded when the student specifically referred to knowledge they had from outside the passage. Faulty use of prior knowledge issues was implicated in 7% of the errors analysed in this study. Errors are classified into four groups: (1) students who relied on their prior knowledge when it disagreed with the text, (2) students' prior knowledge used was itself faulty, and (3) students who responded according to their own opinions.

In some cases, students only used their prior knowledge, even when it disagreed with the text. In these examples, students had substantially ignored text information in favour of personal prior knowledge, or they had interpreted the text to conform to their prior knowledge. In the passage 'Before Night Falls', a question asks "Why did Glen shrug?" (Correct answer: He was unsure which way they came). One student answered "He didn't care," because as he said, "When people shrug that means they don't care". This response suggested that the student had disregarded several pieces of information in the text which would have contributed to the understanding that the characters in the passage were lost. The student had constructed a response and ignored the cues which would have led to a more complete understanding.

In the second example, while reading the passage 'Why Does Popcorn Pop?' several students had used their own prior knowledge about making popcorn to answer questions and they had ignored the information in the text. A question asked "According to the text, why are hot popcorn kernels like balloons?" (Correct answer: They are stretched to breaking point). Three students chose "They are light and bouncy" because they made their own comparisons between popcorn and balloons, drawing on their own prior knowledge.

In other cases, the prior knowledge used was itself faulty. The poem 'The Far End of the Garden' describes a man sleeping in a deckchair outside in the dark. A question asks "Where is the person with the cup of tea?" (Correct answer: A long way from the house). A student chose

the answer “Just outside the kitchen window” because the person was sitting in a deckchair and according to the student’s knowledge that is where you normally find deck chairs. The next question on the same poem asks “What is the person with the cup of tea doing?” (Correct answer: Sleeping). A student chose “Watching the sun go down” because she knew the person in the poem was outside and according to her thinking, that is something you do outside. According to her prior knowledge, the other things listed in the answer choices (drinking his cup of tea, reading the newspaper, and sleeping) are things you do inside.

Another group of errors occurred when students responded according to their own opinions. These errors occurred when students made evaluations of a personal nature, emphasising their own feelings and emotions. An example of this type of error occurred when interpreting the poem ‘The Last Boy in Captivity’. The question was “Which word best describes how the boy is feeling in the last verse?” (Correct answer: Trapped). One student answered “Lonely - because that’s how I’d feel.” In the passage ‘River Rescue’, Hemi rescues Te Maika after she falls in the river. Atawhai, Te Maika’s mother, then berates Hemi for his “bloody irresponsible antics.” A question asks “Which word best describes how Atawhai felt towards Hemi?” (Correct answer: Furious). One student ignored the cues in the text and answered “Grateful”, because she thought Te Maika’s mother should have been glad Hemi rescued Te Maika.

Other reasons for incorrect responses

Not all student responses fitted these categories mentioned. 10% of errors were from the following sources. Each error type occurred on less than twenty occasions.

- Misunderstanding of the question (3%)
- Misreading of the question (4%)
- Misunderstanding of the characters (2%)
- Misreading of punctuation emphasis (1%)

Student knowledge of comprehension strategies

Questions were asked to investigate what the poor comprehender group knew about comprehension strategies. When asked what strategies they knew about (unprompted), 80% of the group could list no more than one and no one could name more than three strategies. Table 6 summarises the responses.

Table 6 Poor Comprehender Group - Unprompted Strategies

Strategy	Number of Students
Rereading	9
Inferring	5
Visualising	4
Predicting	2
Skimming	1
Asking questions	1

A follow-up question then prompted the students to recall strategies that they may have noticed they used from a list of nine strategies (McKenna & Dougherty Stahl, 2009). These prompted strategies included rereading, inferring, visualising, predicting, skimming, asking questions, scanning, summarising, and making connections. The average number of strategies the students recalled was seven. Table 7 summarises the responses.

Table 7 Poor Comprehender Group - Prompted Strategies

Strategy	Number of Students
Rereading	24
Inferring	19
Visualising	22
Predicting	22
Skimming	21
Asking questions	14
Scanning	20
Summarising	17
Making connections	20

The results show a considerable discrepancy between the number of unprompted strategies students could recall, and the number of prompted strategies.

4.2.2 Assessment Strategies

Not all errors on the PATC were due to poor comprehension strategies. A number of errors were attributed to factors specific to the assessment situation.

Error patterns by question

By examining the number of errors made at each question in the PATC, it was possible to find which questions had been answered incorrectly most often and therefore posed the most difficulty to students. This data is summarised in Appendix 4 and shows students had made the most errors on the final passage “The Far End of the Garden.” Aside from this passage, error counts greater than 25 were also made on Questions 4, 20, 26, 30, 36 and 37. These questions were chosen for further analysis.

In the passage “Suit Yourself”, a question asks, “In this text, what does Glyn say aloud?” (Correct answer: Nothing, he only makes ‘suit-yourself’ noises). There are two reasons this question was difficult to answer. The first was because the question sets up an expectation that he actually says something; while the question asks what he says aloud, he does not actually say anything. The second reason students answered incorrectly was because of the sentence in the passage, *I’m not your son! Glyn snarled silently.* Several students ignored the two pieces of information that showed this was not spoken aloud i.e. the lack of speech marks and the word ‘silently’.

In the passage ‘The Last Boy in Captivity’, a question asks, “Which word best describes how the boy is feeling in the last verse?” (Correct answer: Trapped). This was the question that generated the most errors. Students were required to interpret a simile to infer how the boy was feeling and some students were unable to accomplish this. Others used their prior knowledge to answer according to how they might themselves have felt. And others looked more globally and took the meaning from the entire poem, rather than from the last verse, as specified in the question.

The passage ‘Before Night Falls’ asks the question, “What did the wind do to the tents?” (Correct answer: It blew them about). Some students did not know the meaning of the word ‘bullied’ in the text and so could not make meaning from the sentence that contained the answer, “The cold wind bullied the two small tents pitched on the hillside.” Other students matched key words from the text and answers, and others relied on their prior knowledge of what wind might do to a tent.

In the passage ‘Opetaia Foa’i – Musician’, where a question asks, “What does Opetaia mean when he says his “musical journey has come full circle”?” (Correct answer: His music is now

similar to the music he grew up with). Many students had no understanding of this idiom and so could not make sense of the question. The passage itself offers few clues to support drawing meaning from context.

Students made the most errors on the final passage 'The Far End of the Garden'. One question asks "What is the person with the cup of tea doing?" (Correct answer: Sleeping). The three incorrect or distractor items in the answer bank all contained items mentioned in the poem. An example of this is the answer choice "Drinking his cup of tea." The poem mentions a cup of tea, but it is cold, so the reader needs to infer the person is not drinking it. Likewise the answer choice "Reading the newspaper", where a newspaper is mentioned, but it is "growing old across his lap". The reader must infer this means the person is not currently reading. And finally the poem mentions the setting sun, causing some students to choose "Watching the sun go down". Errors were due to students using the keyword search and destroy technique and going from their memory of what had happened in the poem rather than checking back. The following question on this passage asks "About what time of day is it?" (Correct answer: Sometime after sunset). Reasons for incorrect choices at this question included using the keyword search and destroy technique, going from their own thinking about what was occurring and inferring that because it was dark, it was "After midnight".

This analysis shows there were a variety of reasons contributing to the errors at these questions.

Error patterns by question type

Previous literature has noted students often have particular difficulty with certain question types (Greaney & Arrow, 2011), so an analysis of questions was undertaken in the current study. Almost all questions in the PATC were described as Local Inference, so analysis using the QAR framework (Pearson & Johnson, 1978) was used in an attempt to further characterise response patterns.

This analysis of the question types showed students made the largest numbers of errors on Think and Search type questions. However, when comparing the percentage of questions to the percentage of errors made (see Table 9), results indicate there was no influence of question type on error as the percentages are similar.

Table 8 Error Analysis Using QAR

Question Type	Number of Questions	Percentage of All Questions	Number of Errors	Percentage of Total Errors
<i>In the Book:</i>				
Right There	14	37%	247	36%
Think and Search	14	37%	284	41%
<i>In My Head:</i>				
Author and You	7	18%	99	14%
On My Own	3	8%	57	8%

Test-taking strategy

A significant proportion (19%) of the incorrect answers on the PATC was attributable to the use of poor approaches to the assessment itself. Almost all came from a technique described by Greaney as “search and destroy” (2004, p.13). These students explained that they had chosen their answer by matching word(s) that had appeared within the question or answer options with the same word(s) in the text. Twenty three of the thirty one poor comprehenders (74%) had used this ‘search and destroy’ technique at least once during the assessment, showing the prevalence of the practice.

For example, after reading the poem ‘The Last Boy in Captivity’ a question asks “What does the boy compare himself to?” (Correct answer: A goldfish). One student answered “A wobbly gearstick” because she had seen this referred to in the text “For company: a wobbly gearstick, a nodding dog, a Batman comic.” She had not read past the first answer choice when she selected this option as in fact all four of the answer options were mentioned in the passage.

Similarly after the passage ‘Why Does Popcorn Pop?’ a question asks “How is fresh popcorn made into popcorn kernels?” (Correct answer: By drying the corn). One student matched the word ‘oil’ in the answer “By heating the corn in oil” saying she chose the answer “because in the text it said something about oil”. Oil was mentioned, but in the context of popping the corn, not making the popcorn kernels, “When you make popcorn, you must heat the kernels to a very high temperature in hot oil...” Another student chose the answer “By boiling the corn” because “somewhere in the text it said you should boil it”. Again, this was not in reference to making the popcorn kernels, “As the temperature rises, the hot water inside the popcorn kernels starts to boil...”

Other ineffective test-taking strategies were observed. While the necessity to read the complete passages might have appeared self-evident, only sixteen of the thirty one poor comprehenders (51%) had actually read the whole of each passage before they had attempted the questions. Furthermore, only 19 students (i.e. 61%), reported that they had reread sections in the passages (either to verify their answers or to clarify meaning) as part of their test-taking.

Two students reported that they had read the passage paragraph by paragraph and tried to match each with a particular question, and 3 others reported only reading the shorter texts before attempting the questions. For the longer passages they matched keywords, or guessed answers.

Table 9 PATC Response Style

Approach	Number of Poor Comprehenders
Read text, read questions and answers and chose one	16
Read questions and answers, then read text, then answered questions	6
A process from above that involved rereading	19

Students did not necessarily use the same approach for every passage of the assessment. Some students changed their approach according to the perceived level of difficulty. For example, they may have only skim read the longer passages, but read the poems, or they may have reread the poems but not the longer texts.

Other

Teachers encourage students to guess at unknown questions. This is because a blank on the answer paper will always be marked wrong, whereas a guessed answer carries a measurable probability of being marked correct. All students in the poor comprehender group admitted to guessing answers. The reasons for these guesses were not investigated further in this study.

A further four students had made errors because they had looked at the next question to get the answer. One student chose an answer because as she said “I thought it didn’t look right. I had too many ‘c’s.

4.3 Summary

The results are considered in response to the research questions. The first research question considers foundation language skills. The results indicate that the poor comprehender group still have foundation language difficulties at Year 8. While phonological knowledge is developed equally in both the poor comprehender and the proficient reader groups, both syntactic awareness and morphological awareness are significantly lower in the poor comprehender group. Vocabulary in the poor comprehender group is also less well developed.

The second research question asked to what extent an analysis of the question-answering behaviours of the Year 8 poor comprehender group could demonstrate or highlight examples of ineffective reading comprehension strategies. The results show several key areas contributing to their errors. Students have difficulty with comprehending passages due to their weaknesses in comprehension strategies such as making inferences and using their prior knowledge. Compounding these weaknesses the poor comprehender group used ineffective test-taking strategies such as the key word 'search and destroy' technique, and failing to completely read passages before attempting to answer questions. In regard to the influence of questions, the examination of errors showed the final passage caused the greatest number of errors, but other individual questions caused difficulty due to their specific cognitive demands. An analysis of question types under the QAR framework (Pearson & Johnson, 1978) showed no question type was particularly difficult for students to answer.

Overall the findings suggest the poor comprehender has numerous difficulties with reading comprehension including those involving foundation skills and at the text level. Test-taking strategies appear to further contribute to the poor results of these students.

Chapter 5

Discussion

The present study was designed to find why a group of Year 8 poor comprehenders made errors when taking the multiple choice PATC assessment. It was hypothesised that poor comprehenders would have greater difficulty in specific aspects of their foundation language skills and therefore would perform more poorly on these assessments in comparison to the proficient comprehenders. It was further hypothesised that there would be differences between proficient and poor comprehenders in syntactic and morphological awareness, and that no difference would be found between groups on the measure of phonological knowledge. Assessments of the phonological, syntactic and morphological abilities of these students were compared to their more proficient peers in order to find if these foundation skills might be an ongoing contributing factor to their poor grades. Results showed the poor comprehender group scored significantly lower on measures of syntactic and morphological knowledge. Phonological knowledge in both groups was well established. The results supported the hypotheses.

The second research question concerned the question-answering behaviours and comprehension strategies of the poor comprehender group. It was hypothesised that this group would use ineffective strategies and further that they would have difficulty with the cognitive demands of some types of questions. Building on previous work by Greaney (2004), the retrospective analysis of the answers given in the PATC assessment provided rich information on how and why students made errors. Results emphasised the multifaceted nature of poor comprehension and further illuminated the role of test-taking strategies as a factor in poor results. An analysis of the PATC questions revealed which questions were most difficult for students to answer. The hypothesis that different types of questions would prove more difficult was unsupported by the results.

The results are discussed and the implications of the study for both the assessment and instruction of reading comprehension are presented with recommendations for future research. The chapter closes with a discussion of the limitations of the study.

5.1 Foundation language skills

The SEDL framework (Wren, 2000) is derived from the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) and describes the linguistic skills required for successful reading. The results of the foundation language assessments supported the hypothesis that poor comprehenders would have gaps in their foundation language skills. While the results

highlight foundation skills difficulties, due to the phonological knowledge results, it should be noted issues are not generalised to the linguistic domain, but specific to morphology and syntax. The groups did not differ on measures of phonological knowledge, with both groups showing high levels of proficiency in the Wepman's Auditory Discrimination Test. These results support previous findings that phonological skills are well established at this age across both groups (Kirby et al., 2003; Landerl & Wimmer, 2008). The sentence correction task, measuring syntactic awareness, showed significant differences between groups, confirming previous studies which have found poor comprehenders have difficulties in this metalinguistic skill in comparison to their more skilled peers (Nation & Snowling, 2000; Tong et al., 2014).

The results in the morphological awareness tasks differ from previous findings which reported differences depending on the choice of task assessing morphological knowledge (Tong et al., 2014; Tong et al., 2011). Poor comprehenders in those studies performed better on the task with sentence context (the sentence completion task) than the task with no sentence context (the word analogy task). These differences were not observed here, with both morphological tasks showing significant differences in means. This may reflect a developmental trend. Tong et al. (2011) found a trend from Grade 3 to Grade 5 (age 8 to 10) towards a difference in the groups on the sentence completion task. Extrapolating out from these results might predict the difference to become significant at this later age (Year 8 is the equivalent of Grade 7), confirming and extending the observed trend. It is possible that there is a reciprocal relationship between reading comprehension and morphological awareness; as students read and understand more complex texts their understanding of word morphology grows and vice versa (Tong et al., 2011). The gap found here would only be expected to widen further as students encounter increasingly more difficult texts and are perhaps increasingly reluctant to read. A second possibility is that an as-yet unidentified third factor influences both reading comprehension and morphological awareness.

The lack of correlation between the sentence completion task and the word analogy task was unexpected as these tasks both purported to be measuring morphological awareness. This result indicates they are either not measuring the same concept, or as suggested by Tong et al. (2014), the sentence completion task might be completed using morphological, syntactic or semantic cues, and is not a measure purely of morphological awareness. This finding demonstrates the challenges in selecting tasks suitable for measuring the required linguistic skill and emphasises the difficulties in singling elements out for study.

In terms of reading development, these readers show that they are bringing existing unresolved foundation language difficulties to the task of the PATC. Because of this they are in effect disadvantaged in comparison to their peers before they attempt the assessment.

5.2 Reading comprehension

Inferencing

The process of comprehension has been characterised as a “landscape of inferences and fluctuating activations” (Van Der Broek, Ridsen, Fletcher, & Thurlow, 1996, p. 166). This aptly describes the active processing and flexible thinking that is occurring as a reader negotiates a text. As students grow older, they are engaging with increasingly more complex texts and must expend effort in order to comprehend what is written. While skilled readers appear able to respond to the requirements of this complex series of interactions, poor comprehenders have difficulty achieving the balance and flexibility required by the demands of the task (O'Brien et al., 2010).

The greatest number of errors in this study of the PATC assessment came from students making faulty inferences. Student difficulties in this area were further highlighted as 37 of the 38 questions in the assessment required students to infer meaning. PATC assessments at younger year levels include higher proportions of retrieval questions but at this stage students are expected to be engaging with and understanding texts which contain deeper meanings and sifting out information that is irrelevant to the comprehension task. The composition of the assessment reflects this requirement for increased inferencing, although the overwhelming majority of questions (35 out of 38) require local inferences to be made, with minimal requirement for global inferences.

Many students were not referring back to the passage to check their answer choice, preferring to rely on their initial recollection of what they had read. Where their recall of the text was imprecise, their understanding of the text was compromised and consequently incorrect inferences were drawn. Compounding the potential for errors generated by their poor recollection of the passage, the multiple choice format presents answer choices rather than requiring an answer to be generated. Students may have chosen an answer that jogged their memory, rather than going back and checking their initial interpretation of the text is consistent with their answer choice. Many multiple choice answer banks include distractor items which are incorrect answers designed to be an appealing option. Students relying on their memory may have been unduly influenced by these distractor items.

A possible reason for students to rely on a single reading may be due to the time constraints of the test. Students are required to read eight passages and answer 38 questions in 45 minutes. Many students felt they only had time to read the passage through once, or in some cases they did not read the text completely, before answering the questions. Answering from their memory of what they had read was therefore a time saving measure. However, this in itself generates concern because of the poor level of understanding shown. If their comprehension on any other text read only achieves a similar level to what was shown, it reveals these students are not attending to the text closely enough on a single reading to achieve full meaning.

Another reason that incorrect inferences were drawn was because students made an inference early on while reading a passage and failed to alter this understanding as new information became available. The interpretation may have been initially consistent with the text, but students did not adjust their interpretation as more information was revealed. This updating is a continually evolving process and should involve rejecting previous information as more detail becomes available (O'Brien et al., 2010). Similarly to Rapp and Kendeou (2009), readers were likely to rely on their early understandings of text even when new information became available that was contradictory. Failing to revise understanding as reading progresses means ultimately understanding is compromised. The process may be understood with reference to schema theory (Anderson & Pearson, 1984). As reading progresses, the reader must reconcile new information with that in an existing schema. Any conflict between the text and the reader's schemata should produce the desire to reconcile the text with previous knowledge (Spiro, 1979). The old understandings need to be replaced and the schemata reconstructed. Here, this comparison and reconstruction process was either not occurring, or any comparison between old and new information was resulting in the new information being rejected.

Readers may be required to make a bridging inference in order to link the explicit information in the text with the implicit intentions of the author. The number of inferences that are required to be made in this way will depend on the level of cohesion in the text (Sheehan, 2014). Poor comprehenders showed that while they were attempting to draw inferences and were referring specifically to the text, the inferences they drew were not those the author intended or in some cases did not make sense in the context of the entire passage. Students may have failed to make these coherence inferences because they were not aware one needed to be made or they may have inferred something beyond what the author intended (Cain et al., 2001).

What may be generalised from the inferencing behaviours of these poor comprehenders is that they are often content with a superficial understanding of what they are reading and do not demand that the text be fully coherent. There are two possible reasons for this; they are less active and flexible in their processing than is required by the demands of the text or they have a lower expectation that the text will be coherent. This may be in response to their expectations from previous reading experiences that texts will not be fully comprehensible.

Vocabulary

Greaney (2004) found vocabulary errors accounted for 2.3% of errors in the students he studied at the Years 4-6 levels. This is a considerably smaller percentage than was found here (16%) and is likely to reflect the increasing breadth of vocabulary knowledge expected as students mature. While 16% of the assessment errors were attributed to unknown vocabulary, the poor comprehender group reported that in 48% of the passages they encountered there were words they did not understand. This represents a considerable barrier to comprehension if it is indicative of the scale of unknown words at the expected text-reading level of these students. The PPVT vocabulary level of the poor comprehender group was significantly below that of the proficient readers. Additionally the morphological data shows this group are less adept with morpheme meaning and use, and when data from the younger age groups in the Tong et al. (2011) study is considered, developmentally this gap appears to be growing.

Students' vocabulary knowledge must become increasingly sophisticated to cope with the demands of the more complex and specialised texts encountered as they move through the school system. The National Reading Panel (2000) notes vocabulary development occurs through oral language and print experiences. At Year 8, the vocabulary required for academic success is more nuanced and specialised than that found in typical oral exchanges and some words may only be encountered in texts (Farrall, 2012). Poor comprehenders are less likely to read both in the school setting and as a choice in their leisure time and so opportunities to meet new words and add them to their knowledge bank are limited in comparison to skilled readers. This results in a widening gap between the poor and proficient readers.

Prior Knowledge

There is a strong connection between prior knowledge, inferential thinking and comprehension (Farrall, 2012). This can be considered cyclical. Understanding a text leads to improved knowledge, this assimilated knowledge assists inferential thinking, inferential thinking leads to understanding of the text and so on. So to some extent at least, there may be an overlap when categorising errors as the result of prior knowledge or inferencing. The prior

knowledge errors coded here refer to those errors where the student specifically referred to knowledge they had from outside the passage in question.

Errors attributed to prior knowledge were generated in three ways. In the first of these, students used their prior knowledge even when it disagreed with the passage. In effect, these students prioritised what they already knew ahead of what they found in the text. The second issue occurred when the prior knowledge used to support comprehension was itself faulty. Finally, when students responded to the questions using their own opinions or according to their emotional response, they were again choosing to utilise their prior knowledge ahead of the text. The commonality between these error types was that students were attempting to find a balance between their prior knowledge and what they were reading in the text. This balance may have been acceptable to their thinking, but would not be generally agreed between all readers of the same text. If reading is considered as an interaction between the reader, the text and the task (RAND Reading Study Group, 2002), students had overemphasised their contribution and the three attributes were unbalanced.

This balancing act may be particularly relevant when considering non-fiction or expository text. Here the author's intent when writing the text is paramount and there is little room for alternative interpretation. It is more likely answers will be in the text and so there is not the requirement for background knowledge to be utilised to the same extent as in a narrative or poem. Some errors in the PATC on the transactional passage 'Why Does Popcorn Pop?' may have been due to a lack of understanding on the part of the reader that the purpose of the text was to provide information.

Strategy use

Students should be taught strategies with the goal of consciously using them when understanding breaks down (O'Reilly, Sabatini, Bruce, Pillarisetti, & McCormick, 2012). The results of the interview on strategy use and knowledge indicate that students have been exposed to these strategies, as when prompted they recognised many of them and recalled that they used them in their reading. However, they appeared to have no or only a limited repertoire of unprompted strategies, indicating they do not have conscious control of these strategies and so are unlikely to deliberately use them when meaning breaks down. To effectively use these 'fix up' strategies, the reader must be able to regulate the reading process, monitoring their understanding and calling on these strategies as required. While initially the use of these strategies requires conscious effort, longer term they may be internalised and become automatic. The results here indicate the need for students to learn that some strategies (e.g. visualising, rereading) may be used purposefully when meaning is

lost. The goal is to create a group of strategies under consciously control that may be accessed in response to the different demands created by the requirements of different types of texts. Additionally, students must realise that those skills and strategies must be carried over into their independent reading (Edmonds et al., 2009).

5.3 Assessment

As part of the consideration of the additional demands placed on the reader when undertaking an assessment, the questions of the PATC were examined to find what influence they may have had on the understanding of the poor comprehenders. Those questions which generated the most errors were analysed. The errors were found to be made for a variety of reasons and there did not appear to be any common theme. It is likely the final passage caused students the most difficulty because time constraints meant that this poem was often read quickly and the answers were not given the same consideration as earlier passages. This again emphasises the difference between comprehension errors and errors attributable to the assessment situation. If this passage was elsewhere in the assessment, or if time was unlimited, results may have been different.

Almost all the PATC questions required students to infer information. An alternative analysis of question types was offered by the QAR framework (Raphael, 1982; Raphael & Au, 2005). This analysis of the questions showed students made errors in proportion to the question types, showing that the type of question did not influence error patterns. This result was contrary to the expectation that some question types would prove more difficult to answer due to the higher cognitive processing demands. It seems in this group of poor comprehenders the requirements of the question were not limiting their ability to answer correctly; rather errors were due to other factors.

Ideally students should only rely on reading strategies as they attempt to answer assessment questions, but this is not necessarily what happens in practice. There are three strategies a reader may call on to answer a comprehension question; reading strategies, test management strategies and test wiseness strategies (Cohen, 2006). During the interview process, it was apparent the poor comprehenders used a combination of the three strategies as they navigated their way through the assessment.

In line with previous findings (Greaney, 2004; Guenther & Anderson, 1991; Huddleston & Lowe, 2014; Nicholson, 1984) a considerable percentage of poor comprehenders (74%) used the key word search and destroy technique. This is considered a test wiseness strategy as it is employed to circumvent the need to use language strategies. Nicholson (1984) found some

high school students were able to use the technique effectively if they knew what they were looking for, however students who had a poor grasp of the text were less successful at the technique. Greaney (2004) found 38.2% of errors analysed were attributable to students using 'search and destroy' at the Year 4-6 level. While it is encouraging to see a lower percentage here (19%), this number is still large enough to be of concern, demonstrating as it does the unwillingness or inability of the student to fully engage with the text. The proficient comprehenders were also making errors using this strategy, although a lower percentage of their total errors were generated in this manner (12.5%).

Huddleston and Lowe (2014) imply search and destroy is a form of skimming. What was found here, however, could not be described as skimming. In the classroom, skimming is taught as a speed-reading technique where students are encouraged to selectively and strategically read parts of the text. Introductory and concluding paragraphs and the first sentences of all other paragraphs are focussed on, permitting the reader to understand the main concepts without reading the text in its entirety. The strategy is usually encouraged for non-fiction texts. What is occurring with the students in this study is closer to the strategy of scanning. When taught to scan, students are encouraged to discount large sections of the text as they search for the word or phrase they are matching. An example of when it is appropriate to use scanning would be when reading a train timetable. A destination is focussed on, then a particular timeframe, and the greater part of the text may be discounted with no loss of understanding. The use of scanning is indicated when the text is structured in a specific way e.g. alphabetically, chronologically or according to categories. In the PATC poor comprehenders were discounting much of the text as they searched for a particular word or phrase, but the texts are not structured in a way that lends itself to the appropriate application of this strategy.

Rather than considering search and destroy as a poor reading strategy, it is argued here that the technique is a test-taking strategy. The focus of the students was not on reading the text for understanding, but on searching the text for the correct answer. Farr, Pritchard, and Smitten (1990) found college students' attention swung continuously between the text and the questions with the nature of the questions dictating how the passage was read. He described the questions and passage as "a totally intertwined task" (p. 222) and noted students did not first try to read and understand the passage before attempting the questions. This is very similar to the situation here. Students using search and destroy appear satisfied because they have referred to the text when choosing their answer, but this is done in only the most superficial manner. The students show themselves as reluctant to search for the deeper meaning of the text.

5.5 Implications

Implications for Assessment

The results of this study show the central issue in reading comprehension assessment is to gather meaningful data that is instructionally relevant; it is no longer sufficient to merely identify skilled and poor readers. This broad-based approach of examining trends within stanine groupings is unsuitable as a source of information to direct teaching and learning. Assessments that identify the sources of reading difficulty are demanded by our increasing knowledge of the cognitive foundations of reading. These should reflect the range of components required for proficient reading, and even at the Year 8 level will need to consider foundation skills.

There is a dilemma posed by the need to build an individual profile of each poor comprehender and the complexity of skills and cognitive processing detailed in this study. To define and assess all aspects in detail is unlikely to be achievable in the classroom due to constraints on time and funding. However, it has been argued a system of assessment to enable subtyping of poor comprehenders is required (Cain & Oakhill, 2012; Snow, 2003). This would need to account for developmental progression, assess the skills known to support comprehension, direct instructional purposes and be user friendly for teachers. The goal would be to understand which components of reading comprehension the individual finds difficult so that appropriate and targeted measures might be put in place. Alternatively, the PATC might act as an initial screening assessment and identified poor comprehenders might then undergo a retrospective interview as in this study to uncover individual needs.

There is an assumption at Year 8 that students have been assessed on the PATC using the multiple choice format since Year 4 and should be familiar with the format and expectations of the assessment. The persistence of the search and destroy technique implies this is not the case. Teachers have a responsibility to ensure students are prepared for the assessment by ensuring they are familiar with the format. This will include teaching the structure and layout of the assessment, suggesting time allowances for each section, and instruction in how to approach multiple choice questions. A meta-analysis by Samson (1985) investigated the efficacy of training primary and secondary students in 24 studies of test-taking skills. The mean of the effect sizes was reported as .33 across all grade levels, subjects and types of assessment, indicating training in test-taking skills would tend to decrease the influence of test wiseness on results.

Specific to the PATC, two direct implications arise from this study. The first of these is the need to explain that at Year 8 almost all questions will require inferences to be made. Teachers do not generally alert students to the need for considering the requirements of a question. Instruction here might focus on considering the type of question being asked ('local' or 'global', or 'in the book' versus 'in my head'), or the strategies the reader must activate to find an answer. The second is that using the search and destroy technique should be discouraged. The goal of this test-taking instruction is not to pre-teach concepts or prior knowledge from within the assessment, but to minimise errors arising from confusions about the test format. This means results will only reflect the student's comprehension ability without the attributes of the task as a factor contributing to results.

Implications for Instruction

The key question for teachers is how they can change their practice to better support the poor comprehender group. Some needs have been highlighted concerning teaching around assessment preparation, but the primary need is for improvements so that students are better able to understand what they are reading. While the needs of the poor comprehender are individualised, the following generalised comments may be made.

Firstly, the explicit teaching of syntactic and morphological skills should still be occurring at the Year 8 level for this group. Vocabulary needs to be extended. The relationship between comprehension and vocabulary is complex but vocabulary training is successful in improving comprehension, particularly for students with reading problems (Elleman, Lindo, Morphy, & Compton, 2009). The benefits of a larger vocabulary are likely to be both due to increased background knowledge and also because cognitive resources will not be consumed by considering word meanings, but may be focused on text meaning. Growth in vocabulary happens implicitly though encountering new words in texts and explicitly through instruction, however students may not understand the correct meaning of words presented through contextual clues (Pressley, 2002). Teachers should have a programme in place for vocabulary development, which may include teaching the rules of English, connecting new words with those already known, unravelling words with multiple meanings, and analysing words so that roots, prefixes and suffixes are clarified (Bromley, 2007). While reading can build word knowledge, direct instruction in vocabulary does not rely on inferring the meaning of words from text.

Secondly, students should be encouraged to be active comprehenders. The use of the search and destroy technique and a lack of rereading show poor comprehenders are content to engage in practices that result in only a superficial understanding of text. The teaching of

comprehension strategies should emphasise they are to be used flexibly and independently when understanding breaks down. Students should be encouraged to use the strategies explicitly and frequently with the ultimate goal that they will be internalised.

Skill at inferring develops over many years and the issues facing Year 8 poor comprehenders are unlikely to be solved before high school. However, this analysis clearly shows the need for students to become more flexible in their inference making, and to be willing to update their understanding as they move through a text. Teaching might also be directed towards showing students how and when to apply their prior knowledge and to make inferences balancing the text and their prior knowledge.

Finally, students should understand the requirements and purpose of the reading task. It is not expected that every word of every text will be read; however students should be making appropriate choices about how thoroughly to read in different contexts. No student should understand the purpose of a reading comprehension assessment is that minimal attention should be paid to the text itself. Likewise students should not be using the strategies of skimming or scanning in the context of a reading comprehension assessment. It is likely the purpose of the test in these students' minds was to find the answer to the questions rather than to demonstrate their comprehension skill.

Implications for Future Research

The findings of this study support the need for a system of comprehension assessment (Snow, 2003); one assessment is insufficient to fully assess the needs of a poor comprehender. While the scope of what is required is wide, this study shows in particular the need to continue clarifying the expected development of foundation skills so that assessments and classroom support will be timely and appropriate. Intervention studies aimed at improving these language skills with a focus on syntactic and morphological aspects are also indicated.

While one assessment may not be sufficient as a measure, clarification of the assessments in use may also be required. The results of the morphological assessments raise questions around their validity in terms of measuring single linguistic components. It may be that a closer inspection of these assessments is required and the development of assessments that more clearly delineate the specified component.

The sample size in this study was small for quantitative analysis purposes, and a larger sample in a future project might allow further detail to emerge including comparisons across groups, for example differences in foundation skills across socio-economic or cultural groups.

Finally, many of the poor comprehender group in this study complained that the time allowance of the PATC placed them under pressure. It would be interesting to allow students to take the assessment twice, firstly in a timed situation and then untimed to see how this affects their results. This may also uncover to what extent the test-taking strategies seen here are masking the true comprehension capabilities of these students.

5.6 Limitations

The first limitation concerns student responses. These were not always clear and coherent and the researcher was sometimes required to make inferences, generating a potential source of error in interpretation. In any study of behaviour the researcher makes observations which are then coded according to the inferences made by the researcher. This coding is interpretive, and another researcher might emphasise or code the data differently.

A second limitation concerns the measure of reading comprehension. This study has used the PATC, Britain uses the Neale Analysis of Reading Ability-II (Neale, 1997), and North America uses the Passage Comprehension section of the Woodcock Reading Mastery Test (Revised). It is possible these different test types draw on different skills so that construct validity when making comparisons between studies might be questioned. For example the Woodcock Passage Comprehension assessment has a cloze format, the PATC is multiple choice, and the Neale Analysis of Reading Ability is administered orally.

Finally the sample size is small for the purposes of quantitative analysis. It is possible that because of this linguistic aspects have been masked or missed.

Chapter 6

Conclusions

This study set out to explore the reasons why a group of Year 8 poor comprehenders chose incorrect answers in the multiple choice Progressive Achievement Test of reading comprehension. These students were successful decoders, so further investigation of their comprehension was indicated by their poor PATC results.

It was first hypothesised that these students might have poor foundation language skills. This hypothesis was generated from the SEDL framework (Wren, 2000), which depicts the requirements for early progress in reading. It was considered that these skills might remain weak at the Year 8 level and thus be a contributing factor to poor comprehension results. The findings in this study indicated that foundation skills such as morphological and syntactic awareness continue to affect the comprehension of the poor comprehender group at Year 8. Vocabulary knowledge was also considerably poorer when compared to the proficient reader peer group.

It was further hypothesised that the question-answering behaviours of the poor comprehenders would reveal ineffective reading comprehension strategies. The retrospective interviews showed students had particular difficulty with making inferences, and with utilising their prior knowledge effectively and appropriately. Further to these issues, poor test-taking strategies contributed to the low PATC results of the poor comprehender group. It is suggested that these poor test taking strategies, particularly the key word 'search and destroy' technique, exacerbate the results of these poor comprehenders as they utilise them as a way to compensate for their poor understanding.

The study contributes to the theoretical knowledge of reading comprehension by further clarifying foundation skills developmental trends as described by the SEDL framework (Wren, 2000). The persistence of syntactic and morphological issues through to the upper primary level is confirmed, although phonological knowledge is established. A noteworthy finding was the extension of the trend seen in the morphological data confirming that found in the study by Tong et al. (2011).

The multiple choice format of reading tests such as the PATC provides teachers with a convenient and time efficient assessment recognised within the Overall Teacher Judgement criteria for the National Standards framework. The PATC does not intrude on instructional time, allows a generalised form of comparability and provides results in a format suitable for reporting National Standards data. What it does not do is provide teachers with the richness of

data essential for formulating individualised support. In this study, asking students to talk about their thinking gave an insight into the processing that occurs during comprehension and indicates where teaching might be directed. Further, the results of this study demonstrate the need for interventions and assessments that focus on the processes of reading, rather than the products.

The Year 8 poor comprehender is shortly to leave a learning environment where comprehension is specifically taught to enter a learning environment where the ability to understand texts is assumed. The profiles of these poor comprehenders show they are ill equipped to deal with the reading demands of secondary school and failing to address these issues may have far-reaching effects. Poor reading comprehension is likely to result in more generalised low achievement for this group because literacy skills will be reflected in achievement across subject areas at high school level. Conversely supporting reading comprehension will have positive consequences for the high school years and beyond. Considerable importance should be attached to ensuring adequate skill in text comprehension in the primary years. The findings of this study may go some way towards defining the needs of these students.

Finally, because the PATC is a test of silent reading comprehension, the teacher cannot be privy to the reasons why the students had selected the incorrect responses to the questions. However, the undertaking of one-on-one post-test interviews with particular students (as occurred in the current study), does give the teacher deeper insights into at least some of the strategies that the students may or may not have employed when they had originally completed the test. Furthermore, such insights would almost certainly have remained unidentified by relying solely on the raw and/or stanine scores that are the standard data that are used when reporting results from this assessment tool. A second benefit from undertaking such a post-test analysis might be that the teachers would be better informed when planning to address the particular learning needs of individuals who have demonstrated ineffective comprehension-enhancing skills and strategies. Multiple choice tests are likely to feature in greater frequency as the students progress through primary and secondary school, so it is particularly relevant that teachers are able to address some of the nuances that such tests present to the unwary students. The current study has highlighted some of these issues.

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Appendices

Appendix 1 Retrospective Interview Format

I am going to spend time with you to find out how you understand a piece of writing. We will work together for about an hour. We are going to go back to the PAT you did in Reading Comprehension and check over some of your answers. I want to find out what you were thinking when you chose your answers.

I am only going to focus on some of the text passages. The first thing I need to do is check you were able read the passage and the questions. I am going to ask you to read the passage, the questions and the answers out loud to me, and then we'll go over your answers.

Now, let's look at your PAT.

- 1. Running record to confirm passage accuracy >90%*
- 2. Running record on questions and answers*
- 3. Check vocabulary is not a barrier to comprehension. "Are there any words you don't know the meaning of?"*
- 4. Think aloud responses by student:*

<i>Multi choice answer</i>	<i>Researcher response</i>
<ul style="list-style-type: none">• Correct answer given to answer previously incorrect.	Student praised and asked why the previous answer was chosen.
<ul style="list-style-type: none">• Same incorrect answer given.	Student asked for explanation of choice. <i>What were you thinking when you chose that answer?</i>
<ul style="list-style-type: none">• Different incorrect answer given.	Student asked for explanation of both choices.

Appendix 2 Interview on Strategy Use and Knowledge

1. Test-taking Strategy:

How did you approach each section of the assessment?

Read text, read questions and answers and chose one.

Read questions and answers, then read text, then answered questions.

A process from above that involved rereading.

Did not read the text, just answered the questions.

Another strategy:

2. Strategy Use

What reading strategies can you remember being taught to you? (Checks if student has an unprompted repertoire of strategies).

When you are reading, do you notice that you are doing any of the following (checks to see if student consciously using strategies):

Visualising

Inferring

Skimming

Scanning

Summarising

Predicting

Asking questions

Rereading

Making connections

Appendix 3 Summary of Students' PATC Test 5

Initial Data (n=43)

ID	Gender	Chrono Age (Year.Month)	PAT Raw	Scale Score	PAT Stanine
1	F	12.01	10	46.2	3
2	F	12.11	20	58.5	4
3	M	12.11	28	68.5	6
4	M	13.00	28	68.5	6
5	M	12.06	10	46.2	3
6	F	12.06	10	46.2	3
7	F	12.06	18	56.2	4
8	F	12.03	27	67.1	6
9	M	12.11	12	48.9	3
10	M	13.01	15	52.7	4
11	F	12.11	14	51.5	4
12	F	13.01	15	52.7	4
13	F	13.00	10	46.2	3
14	M	12.10	10	46.2	3
15	F	12.01	14	51.5	4
16	M	12.05	27	67.1	6
17	M	12.08	25	64.5	6
18	M	13.00	15	52.7	4
19	F	12.01	18	56.2	4
20	F	12.03	19	57.3	4
21	M	12.07	14	51.5	4
22	F	12.10	15	52.7	4
23	F	12.06	17	55.0	4
24	M	12.07	12	48.9	3
25	F	12.04	13	50.2	3
26	F	12.05	10	46.2	3
27	M	13.00	10	46.2	3
28	F	12.03	10	46.2	3
29	F	12.03	16	53.9	4
30	F	12.04	18	56.2	4
31	M	12.07	25	64.5	6
32	M	12.02	25	64.5	6
33	F	12.09	19	57.3	4
34	F	11.11	14	51.5	4
35	F	12.08	19	57.3	4
36	F	12.03	30	71.6	7
37	F	12.05	11	47.6	3
38	M	12.03	15	52.7	4
39	M	12.11	14	51.5	4
40	F	12.05	26	65.7	6
41	F	13.09	30	71.6	7
42	M	12.08	31	73.4	7
43	M	12.00	29	70.0	7

Appendix 4 Errors Made at Each PATC Question

Passage title: Suit Yourself Genre type: Narrative

Question	Question Type	Number of errors
1 What would Glyn’s “suit yourself” noise sound like?	Local inference	14
2 Why did the teenage guys stop shoving?	Local inference	12
3 What can we tell about Glyn’s mum and Colin?	Global inference	16
4 In this text, what does Glyn say aloud?	Local inference	28
5 When Colin says “Nobody’s perfect...Not even me”, what is he trying to do?	Local inference	17

Passage title: Richard Pearse - Aviator

Genre type: Expository

Question	Question Type	Number of errors
6 When did Pearse work on his aeroplane invention?	Local inference	15
7 Who knew Pearse had made flights in an aeroplane?	Local inference	18
8 Where did Pearse get most of his ideas for building an aeroplane from?	Local inference	17
9 According to this text, one of Pearse’s main difficulties was	Local inference	11
10 What is the main idea of this text?	Global inference	19

Passage title: River Rescue Genre type: Narrative

Question	Question Type	Number of errors
11 Where was Hemi's observation platform?	Local inference	20
12 How did Baldy first become aware that Te Maika had fallen in the river?	Local inference	15
13 Why didn't Hemi warn Baldy that Te Maika was in danger before she fell in the river?	Local inference	15
14 By comparing Hemi with a primate this text suggests that Hemi	Local inference	17
15 Where had Hemi found the cargo net?	Retrieval	21
16 Which word best describes how Atawhai felt towards Hemi?	Local inference	21

Passage title: The Last Boy in Captivity Genre type: Poem

Question	Question Type	Number of errors
17 What does the boy do when he sees people staring at him?	Local inference	16
18 Which of these things are made to seem as if they are alive?	Local inference	16
19 What does the boy compare himself with?	Local inference	11
20 Which word best describes how the boy is feeling in the last verse?	Local inference	30

Passage title: Why Does Popcorn Pop?

Genre type: Expository

Question	Question Type	Number of errors
21 Before it is dried, how much water does the corn used for making popcorn contain?	Local inference	13
22 How is fresh corn made into popcorn kernels?	Local inference	13
23 Where is the best place to store popcorn kernels?	Local inference	17
24 According to the text, why are hot popcorn kernels like balloons?	Local inference	24
25 What makes popcorn pop?	Local inference	17

Passage title: Before Night Falls

Genre type: Narrative

Question	Question Type	Number of errors
26 What did the wind do to the tents?	Local inference	27
27 What was the most likely reason the tents had been “hastily” pegged out?	Local inference	20
28 What is the main reason Andy and Glen struggled with the map?	Local inference	17
29 Why did Glen shrug?	Local inference	11

Passage title: Opetaia Foa'I - Musician

Genre type: Expository

Question	Question Type	Number of errors
30 What does Opetaia mean when he says his “musical journey has come full circle”?	Local inference	26
31 Which language comes naturally to Opetaia for writing songs?	Local inference	16
32 Where does Opetaia get most of his ideas for his music from?	Local inference	17
33 What is the main reason Opetaia uses the knowledge of the old people?	Local inference	20
34 What is Opetaia’s main goal as a Polynesian artist?	Local inference	19

Passage title: The Far End of the Garden

Genre type: Poem

Question	Question Type	Number of errors
35 Where is the person with the cup of tea?	Local inference	22
36 What is the person with the cup of tea doing?	Local inference	30
37 About what time of day is it?	Local inference	25
38 In verse 3, the poet makes the deckchair seem human by saying the deckchair has	Local inference	24