Autism and reading comprehension: Bridging theory, research and practice

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Abstract

Existing research investigating the reading abilities of children with a diagnosis of an Autism Spectrum Condition (ASC) has consistently identified reading comprehension difficulties in this group alongside well-developed word recognition (decoding) skills. However, this is currently an under-researched area, particularly in relation to identifying impairments in component discourse level comprehension skills involved in the complex task of deriving meaning from text, and developing interventions to improve reading comprehension for children with an ASC. Study One investigated the reading, cognitive and receptive language abilities of 24 children (10 - 12 years) with a clinical diagnosis of an ASC. All children attended a mainstream primary or secondary school in an outer London Local Authority. Children were involved in the research during the period of primary to secondary transition, either in the final term of primary (Year 6) or first two terms of secondary school (Year 7). Standardised measures of reading accuracy, reading comprehension, word reading, cognitive ability and receptive language abilities were obtained and a number of discourse level comprehension skills assessed: comprehension monitoring, anaphoric reference, knowledge of story structure, identification and agreement of pronouns, prediction, text-connecting and global coherence inference. Semi-structured interviews were carried out to gain an insight into children with ASC's as 'readers'. Findings highlighted the heterogeneity of reading and cognitive profiles and receptive language abilities in children with ASC's. The majority of the sample scored within the average range for both standardised measures of reading accuracy and comprehension, however a discrepancy between standard scores for the two component skills (accuracy > comprehension) characterised the sample. Measures of verbal abilities and receptive language abilities were found to be significantly associated with both reading comprehension, reading accuracy and word reading. Individual differences were found in relation to strengths and weaknesses in component comprehension skills, however common difficulties with comprehension

monitoring, global coherence inferences and prediction were apparent within the sample.

Study Two involved the development of a reading comprehension intervention involving three children from Study One, in their first term of secondary education. Analysis of the children's component comprehension skills informed the development of an individually tailored intervention; facilitating the children's awareness and development of skills and processes involved in reading comprehension. The intervention utilized a think-aloud procedure and incorporated the "Fab Four" strategies from the reciprocal teaching approach. Individual case synopses illustrated areas of competence and difficulty, approaches to learning and use of strategies to facilitate the development of metacognitive skills. Pre and post intervention measures indicated gains for all children in reading comprehension, but to differing degrees. Findings are discussed with reference to the theories of autism and implications for parents, teachers and Educational Psychologists supporting the learning of children with ASC's. Opportunities for future research in this field are discussed.

I hereby declare that, except where explicit attribution is made, the work presented in this thesis is my own.

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Chapter 1
Introduction

1.1 Reading is a life skill

The complex process of learning to read is a fundamental task in children's development; a life skill:

> *"The ability to read is essential for successful functioning in society and therefore is one of the most important "survival" skills to teach our children. In virtually all instances, the goal of reading is to identify the meaning or the message of the text at hand. Doing so involves the execution and integration of many processes".*
>
> *(Van den Broek, Kendeou, Kremer, Lynch, Butler & White cited in Paris & Stahl, 2005 p 107)*

As a response to concerning levels of children leaving primary education without gaining sufficient reading and literacy skills, there has been renewed interest in both the teaching of and processes involved in learning to read. In 2005, the House of Commons Education and Skills Committee acknowledged that nationally, an unacceptably high number of children were failing to reach reading levels expected for their age. Government statistics for 2005 highlighted that 15% of children failed to reach expected reading levels by age 7, 16% by age 11 and 32% by age 14 (DfES, 2005a; 2005b; 2006a). It was deemed necessary to conduct a review of the approach to the teaching of reading as outlined in the National Literacy Strategy (DfEE, 1998) in recognition that acquiring and achieving competence in reading is a fundamental skill; one that mediates an individual's ability to access and attribute meaning throughout their learning experience.

> *"Reading is the gateway to learning; without it, children cannot access a broad and balanced curriculum".*

(The Parliamentary Office of Science and Technology, October 2009, p 1)

1.2 Reading - The Simple View

In the Independent review of the teaching of early reading (Rose, 2006) a key recommendation was for practitioners to adopt 'The Simple View of Reading' (Gough & Tunmer, 1986; Hoover & Gough, 1990). Whilst not underestimating the complexities involved, the Simple View separates the process of reading into two distinct components, of equal significance: decoding and linguistic comprehension. The Simple View holds that both the development of word recognition processes (the ability to recognize and decode print) and comprehension processes (to understand and interpret spoken and written text) are essential for reading development. Thus, a profile of a 'good reader' would be placed in the top right quadrant of the diagram below, demonstrating comparable competencies in both word recognition (depicted on the horizontal axis) and language comprehension skills (depicted on the vertical axis).

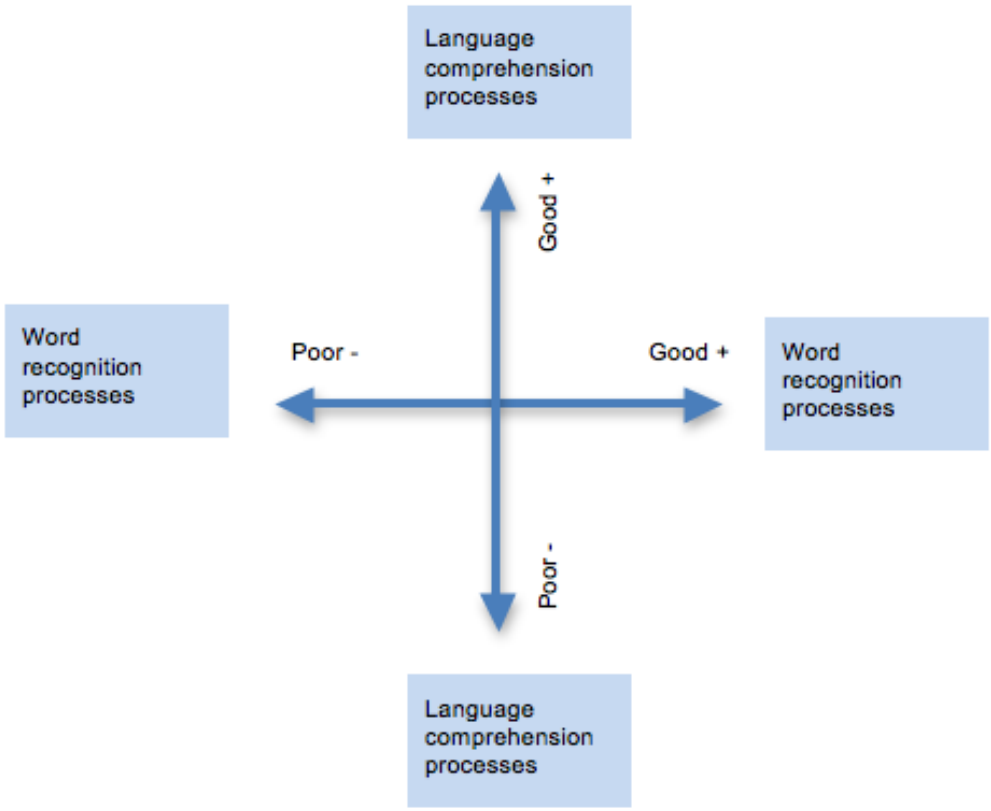


Figure 1 The Simple View of Reading

According to the Simple View, a linear relationship between listening comprehension and reading comprehension is predicted, with increasing levels of decoding skill (Hoover & Gough, 1990). Whilst research has indicated that correlations of reading and listening comprehension are high for college students (Gernsbacher, Varner & Faust, 1990), correlations are found to be low in beginning readers but gradually increase (Sticht & James, 1984 cited in Cain & Oakhill, 2007).

Research by Catts, Hogan & Fey (2003) provides support for the use of the model to identify different groups of individuals experiencing difficulties with reading. The researchers used the 'Reading Component Model' (Aaron, 1997) based largely upon the 'Simple View of Reading' (Gough & Tunmer, 1986; Hoover & Gough, 1990) to identify subgroups of 183 poor readers on the basis of relative strengths and weaknesses in word recognition and listening comprehension. Findings indicated that the poor readers were characterized by considerable individual differences in measures of word recognition and listening comprehension. The researchers identified four subgroups: a) Language Learning Disabilities – poor performance on measures of word recognition and listening comprehension; b) Dyslexia – poor performance on measures of word recognition with at least adequate listening comprehension and c) Poor readers with adequate word recognition but poor performance on listening comprehension (which the authors identified as 'Hyperlexia'). A fourth and smallest subgroup (not predicted) were poor readers who had adequate word recognition and listening comprehension despite poor reading comprehension. Several explanations for this particular group were explored, including that another factor may be contributing to their reading difficulties. Research by Gregoriou, Das & Hayward (2009) also identified this subgroup, finding that a large proportion of variance in reading comprehension was not accounted for by decoding and listening.

A possible limitation of the 'Simple View of Reading' relates to important differences in the comprehension of spoken and written forms of language, for

example, vocabulary and syntactic constructions (Perfetti, Landi & Oakhill, 2005). However, overall the model has made a significant contribution to the current understanding and principles underlying the teaching of reading. It has also facilitated the investigation of children who experience difficulties acquiring reading skills; identifying individual differences (strengths and weaknesses) in word recognition and language comprehension processes. Through identifying different 'profiles' apparent within the 'poor readers' group (see Figure 2), this has in turn, highlighted the necessity for further exploration to identify specific types of reading difficulty and thus, the development of more targeted and focused interventions.

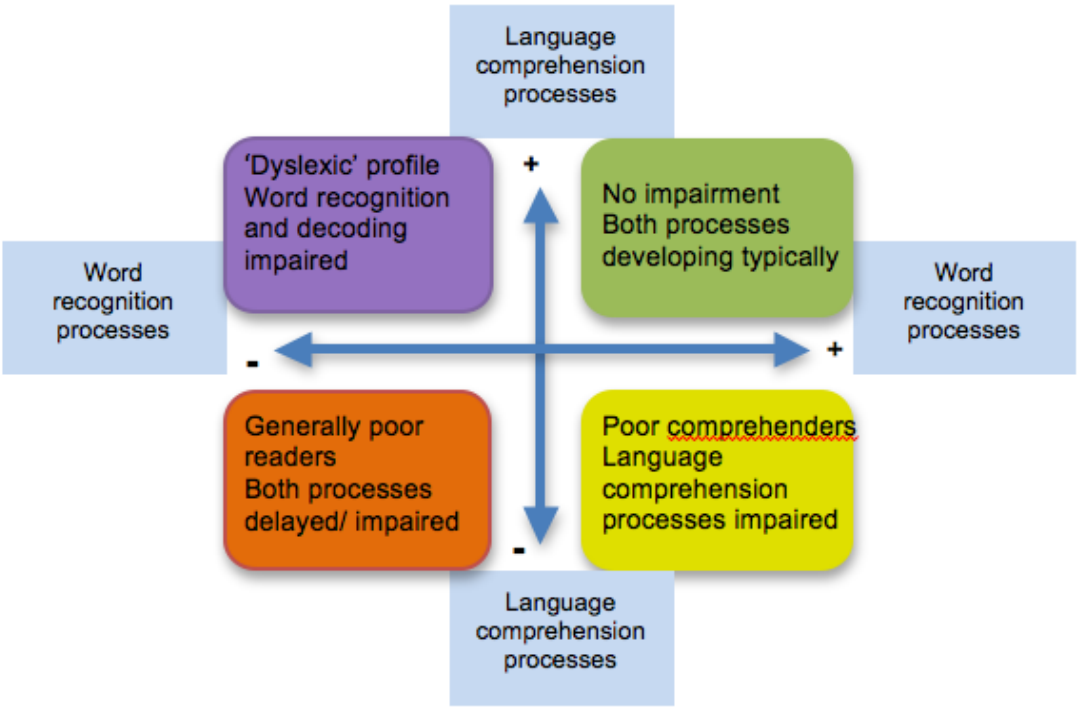


Figure 2 Mapping specific reading profiles onto 'The Simple View'

1.3 Current theory, policy and practice in the teaching of reading

Following the Rose Report (2006) there has been a clear focus for the implementation of high quality teaching of synthetic phonics as the main approach in the teaching of early reading. This involves the teaching of sounds (phonemes) with their corresponding graphic representation (letter/s). The phonemes are identified and blended in order to read words. It is proposed that a programme of synthetic phonics (delivered daily and systematically) will enable young readers to develop automaticity in decoding and word recognition processes – one component of the reading process.

The reasoning behind a systematic phonics approach is that once fluency in word reading and decoding is established, capacity is freed for comprehension. However, the notion that basic word reading skills *precede* comprehension skills has been strongly questioned. Research focusing on the early use and understanding of narrative suggests that narrative language skills develop before reading; reading comprehension has its roots in early language skills (Van den Broek et al., cited in Paris & Stahl, 2005). The concept of 'emergent comprehension' refers to the period prior to conventional reading, where young children engage in meaning-making experiences (Dooley & Matthews, 2009). The authors propose that such early experiences "stimulate the development and use of meaning-making strategies with potential to affect later reading comprehension" (p269). Such research strengthens the proposal that basic word reading (decoding) and comprehension skills develop simultaneously, rather than sequentially (decoding first and comprehension, second). Whilst not disputing the potential gains from a focus on phonics in the early years, research would suggest that it is not *sufficient* to ensure future progress in reading comprehension.

Reviews of the early teaching of reading in both the UK (Rose Report, 2006) and the US (National Reading Panel, 2000) emphasise phonics instruction as the principal strategy for the teaching of early reading. However, others have

adopted a critical stance. Dooley & Matthews (2009) take the perspective that the current bias toward phonics and decoding, “is a product of an understudied phenomenon (comprehension) rather than an undeniable truth about literacy development” (p272). The Independent Review of Reading (Rose, 2006) acknowledged that for children to become skilled readers who read for meaning, phonics work should occur within a ‘broad and language rich curriculum’. However, the report did not extend to considering the practices and experiences that would facilitate the development of children’s reading comprehension skills. It is the opinion of many researchers and educators alike that increased knowledge, awareness and guidance for developing comprehension is needed, and the teaching of reading comprehension remains a priority throughout primary *and* secondary education. Indeed, the inspection arrangements for maintained schools and academies (Ofsted, 2012a) place greater emphasis on early reading and literacy in judging the quality of teaching and achievement of all pupils, including those with SEN. The subsidiary guidance (Ofsted, 2012b p10) outlines key aspects of reading that extend beyond the teaching of phonological awareness and decoding skills. This includes a consideration of higher-order reading skills (including inference and appreciation of an author’s style), attitude and enjoyment of reading, pupils’ awareness of their own development as a reader and the school’s expectations and reading culture.

Although publications are available offering guidance to educators on teaching and developing reading comprehension (Primary National Strategy, 2006) the degree to which practitioners are able to access such subject-specific information and apply it within the classroom (in the absence of any specific training or programme) is questionable. Significant resources were dedicated to developing and rolling out the ‘Letters and Sounds’ (DfES, 2007) phonics programme nationally, including incorporating training in Initial Teaching Training courses (Ofsted, 2008). It appears that implementing interventions targeting reading comprehension is dependent upon practice within the Local Authority, individual schools and educators themselves.

1.4 Researcher's background and interests

The researcher's interest in the area of reading and more specifically, reading comprehension, originates from previous experience as a primary school teacher, together with experience supporting children and young people with Autism Spectrum Conditions (ASC's). The researcher embarked upon additional training in the teaching and learning of Literacy, adopting the position of lead practitioner in the teaching and development of early reading in Key Stage One.

As an educator in a mainstream setting (within an Inner London community associated with significant levels of deprivation), the researcher taught a large proportion of children experiencing difficulties with learning, many identified as having SEN. Amongst this group were a number of children with a diagnosis of an ASC. The researcher observed that whilst generally, children with ASC's responded well to the systematic phonics approach (making expected progress in decoding and sight reading of high frequency words), they did not appear to be making comparable progress in reading comprehension. As a Trainee Educational Psychologist, the researcher embraced the opportunity to undertake a research study to specifically explore the reading profiles of children with ASC's; to establish whether the word reading and reading comprehension abilities of individual children observed by the researcher in her primary classroom were characteristic of other children in this group, and to consider how such research could inform teaching methods and interventions for children with ASC's in mainstream educational settings.

Chapter 2:
Literature review and rationale

This chapter reviews the existing literature related to the reading abilities of children with ASC's, with particular focus on reading comprehension. Systematic searches of the current literature revealed a dearth of research in this field and thus, a wider literature base was drawn upon. This included an exploration of the research investigating comprehension difficulties in the typically developing population. An examination of the literature relating to cognitive theories of autism was undertaken, providing a framework to identify potential difficulties with the complex processes involved in reading comprehension. This was followed by a review of the existing research on assessment and intervention to identify, address and remediate reading comprehension difficulties experienced by individuals with an ASC. Finally, upon reviewing the literature, this leads to the development of a clear rationale for the current research project.

The researcher has selected the term, 'Autism Spectrum Conditions' to encompass the family of overlapping or related conditions identified by a number of diagnostic labels (including Autism, Autism Spectrum Disorder and Asperger Syndrome). The term therefore reflects the heterogeneity of individuals on the autism spectrum and further, in using the term 'condition' rather than 'disorder', this is considered a more neutral term, whereby the strengths and alternative thought processes associated with individuals with an ASC are acknowledged, alongside apparent difficulties. Therefore, throughout the review, the researcher reports on existing literature using the term 'Autism Spectrum Conditions' (ASC's).

2.1 Comprehension problems in typically developing children

As the primary function of reading is to understand the written text, a relatively large amount of research has focused specifically on the comprehension component of reading, although thus far, this has had very limited impact upon practice. Several researchers in the field highlight the need for further exploration of the underlying cognitive skills and processes involved in the comprehension of connected text or discourse, as it is an inherently complex process (e.g. Paris, Carpenter, Paris & Hamilton, cited in Paris & Stahl, 2005). The comprehension of written discourse involves building a 'coherent mental representation of the situation' (Asberg, 2010, p534) through gaining both a representation of the text itself and appreciating the state of affairs described. There is also a consensus that the act of reading is a highly interactive process, whereby a "reciprocal interchange of ideas occurs between the text and the reader and the message of the particular text" (Cohen & Cowen, 2008, p178). Thus, the interactions and processes involved in reading comprehension are influenced by the individual reader's knowledge and skills (language, cognitive resources and world knowledge) and experiences (attitude and motivation) that occur within a particular socio-cultural and emotional context (DfES, 2006b).

In a review of research on word reading fluency and reading comprehension, Paris et al., (2005) report that although low levels of word reading are positively correlated with low levels of comprehension, fluent word reading skills do not *ensure* good reading comprehension. Referring to the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990), such pupils fitting this profile would be located in the bottom right quadrant: 'good word recognition, poor comprehension' (Figure 2). Research has shown that this particular group of children (with age-appropriate reading skills but poor reading comprehension) account for approximately 10% of typically developing 8 to 11 year olds (Yuill & Oakhill, 1991 cited in Cain & Towse, 2008).

A growing number of studies in the literature have focused on children who present with specific reading comprehension difficulties, often comparing their skills and abilities to age-matched children with good comprehension (e.g. Nation, Clarke & Snowling, 2002; Cain, Oakhill & Bryant, 2004; Cain & Oakhill, 2006a). This has enabled some of the skills and processes that contribute to good comprehension and consequently, those lacking or underdeveloped in poor comprehenders, to be identified. Cain & Oakhill (2007) provide a review of studies that have investigated different cognitive skills and processes involved in reading comprehension. The authors categorized them into *word level* (phonological, word reading and semantic skills), *sentence level* (syntactic knowledge and awareness) and *discourse level* skills, described as related yet distinct higher level skills needed for whole text understanding and extracting meaning from larger units of text. These include: inference and integration, cohesive devices (anaphors), use of context, metacognitive skills (e.g. comprehension monitoring), knowledge of story structure and the role of working memory. Such higher level skills have received particular attention within research as fundamentally, these skills facilitate the reader in constructing an 'integrated and coherent model of a text's meaning' (Cain et al., 2004).

2.1.1 Inference making

The ability to make inferences when reading involves both generating links between different parts of the text and drawing on general or world knowledge in order to fill in details not explicitly stated by the author (Cain & Oakhill, 2007). As outlined in the guidance for developing reading comprehension (DfES, 2006b) there are many different types of inference, but these fall under two main categories: *coherence inferences* and *elaborative inferences*. Coherence inferences either use 'cohesive devices' (including pronoun and anaphoric resolution), requiring the integration of information within or between sentences in the text, or they are 'knowledge-based'. Such inferences require readers to 'bridge' a gap in the text by integrating real-world knowledge with the information that is given in the text, also referred to

as ‘bridging inferences’. Elaborative inferences differ as they are not necessary to establish text coherence, but they ‘enrich the mental representation of the text’ (DfES, 2006b). Research comparing the inference-making abilities of skilled and less skilled comprehenders (e.g. Bowyer-Crane & Snowling, 2005) has found that poor comprehenders experience difficulties in making both cohesive and elaborative inferences, performing better when they are required to retrieve literal information only. Cain, Oakhill, Barnes and Bryant (2001) found that despite controlling for knowledge (to make knowledge-based inferences), less skilled comprehenders were able to make fewer inferences than skilled comprehenders.

2.1.2 Anaphoric resolution

As referred to above, anaphors are cohesive devices that “are an important means of maintaining cohesion both within and between sentences” (Webber, 1980, cited in Yuill & Oakhill, 1988, p173) and are resolved by the reader referencing the word or text back to earlier parts of the passage. Four different types of anaphor have been identified: reference (pronouns), ellipsis, substitution and lexical (see Yuill & Oakhill, 1988, p179) that are necessary to resolve when comprehending written text. Pronouns are the most common form of anaphora, whereby a word is used in place of a noun or name (e.g. he or she), thus avoiding repetition but maintaining coherence. Further, the distance between the anaphor and the antecedent (the word or words the anaphor refers back to) can vary, from within the same sentence or more than two sentences away in the text. In their study, Yuill & Oakhill (1988) found that poor comprehenders experienced more difficulties in anaphoric resolution than good comprehenders and as predicted, for both groups, performance was further impaired as distance between the anaphor and antecedent increased.

2.1.3 Comprehension monitoring

Within the literature it is acknowledged that comprehension monitoring is a metacognitive skill, and that metacognition refers to the process of "thinking about thinking" (Cohen & Cowen, 2008). Comprehension monitoring is the process of monitoring for text coherence, enabling the reader to identify where comprehension has failed and subsequently, attempt to regulate and restore their understanding through strategies to facilitate comprehension (Wagoner, 1983; Perfetti, Landi & Oakhill, 2005). Research focusing on comprehension monitoring (measured by tasks requiring detection of errors or inconsistencies in text) has shown that children experiencing comprehension difficulties are poorer at identifying inconsistencies than skilled comprehenders (Ehrlich, 1996; Ehrlich, Redmond & Tardieu, 1999).

2.1.4 Knowledge of story structure

Acquiring and being able to draw upon knowledge and understanding of story structure is particularly relevant when readers encounter narrative text. Developing knowledge of story structure includes understanding story structure and organisation, story features (titles, beginnings and endings), goal-directed actions and also, an awareness of genre (e.g. traditional stories often read by younger children) that helps the reader to invoke appropriate background knowledge and schemas to construct a meaningful representation of the text (Perfetti, 1994, cited in Cain & Oakhill, 2007; Cain et al., 2004). Studies focusing on this particular component found that individuals with specific comprehension difficulties have greater difficulty structuring stories than 'good comprehenders'; limited understanding of story features is characteristic of 'poor comprehenders' (Cain, 1996 cited in Cain & Oakhill, 2007).

2.1.5 *Working memory*

The investigation of working memory within the task of reading comprehension has received considerable interest within the literature. Swanson, Howard & Saez (2007) provide a detailed review of research studies in this area, and highlight the consensus that there is a strong relationship between working memory resources and reading comprehension. The authors explain that working memory plays an important role in reading comprehension in two main ways. Firstly, it allows recently processed information to be held so that connections can be made and secondly, it helps gain an overarching representation of the text by maintaining the gist of the information. Some researchers have suggested that impairments in working memory may be related to individual difference in other higher level component skills, including comprehension monitoring and inference making (e.g. Cain, Oakhill & Lemmon, 2004). Using a longitudinal design, Cain Oakhill & Bryant (2004) investigated the relations between working memory and component comprehension skills (comprehension monitoring, inference making, knowledge of story structure) and found at the ages of 8, 9 and 11 years, both working memory and component comprehension skills predicted unique variance in reading comprehension. Of particular note was the authors' finding that comprehension monitoring and inference making made their own unique contribution to the prediction of reading comprehension, after working memory was accounted for.

Cain & Oakhill (2006a) assessed a wide range of language and cognitive skills in children with specific reading comprehension difficulties, comparing their performance with good comprehenders. This included the assessment of word reading, text comprehension, vocabulary, syntax, cognitive ability, working memory and comprehension sub-skills: comprehension monitoring, inference and integration and knowledge of story structure. They also looked at educational attainment (SATs), listening and reasoning scores three years later. The intention of conducting a thorough investigation of the profiles of such children was to enable any consistent skill weaknesses to be identified.

The results of the profiling indicated no common or underlying skill weakness was associated with poor comprehension; poor comprehenders had deficits on a range of the skills assessed, consistent with other research (Cornoldi, De Beni & Pazzaglia, cited in Cornoldi & Oakhill, 1996; Nation, Clarke, Marshall & Dunrand, 2004). However, the finding that poor comprehenders obtained lower SATs scores than good comprehenders highlights that this group are at particular risk of poor educational achievement. Acknowledging that poor academic achievement associated with underlying difficulties in reading comprehension are far-reaching, (potentially impacting on access to further education and gaining employment) continued research and investigation is warranted in order to identify and support children with reading comprehension difficulties.

2.2 Reading profiles of children with Autism Spectrum Conditions

The clinical term 'autism spectrum disorders' (ASD) is used to classify the broad range of developmental disorders characterized by deficits in communication, social interaction and rigid, repetitive thinking and behaviour (ICD-10, 1993 World Health Organisation; DSM-IV, 2000 American Psychiatric Association). Those individuals on the spectrum present a wide range of intellectual abilities, from below average to above average and often present an uneven profile of verbal and non-verbal cognitive abilities (Joseph, Tager-Flusberg & Lord, 2002). Those with above average intelligence are often referred to as at the 'high functioning' end of the spectrum, including those with a diagnosis of Asperger Syndrome (Howlin, 2000). However, with the impending publication of the DSM-V, the definition of autism is currently in flux, owing to the proposal of several changes to the diagnostic criteria. As outlined by Pellicano (2012) a single diagnostic category, "Autism Spectrum Disorder" is proposed (i.e. Asperger Syndrome will no longer exist as a diagnostic category) and the criteria will focus on two (rather than three) domains: 1) deficits in social communication and interaction, and 2) restricted, repetitive patterns of behaviour, interests or activities. It has been proposed

that a new diagnostic feature will be incorporated into the second domain, acknowledging the sensory sensitivities associated with individuals on the autism spectrum; including both hyper and hypo sensitivity to sensory input from the environment (e.g. avoidance or sensory seeking behaviours).

Recent research has found the prevalence of ASC's in a population cohort to be 116.1 per 10,000 (Baird, Siminoff, Pickles, Chandler, Loucas, Meldrum & Charman, 2006) with a consistently higher predominance of diagnosable ASC's in males than females (e.g. Giarelli, Wiggins, Levy, Kirby, Pinto-Martin, & Mandell, 2010). Therefore, comprising 1% of the child population, children with ASC's form a significant group (the majority entering mainstream provision), requiring varying and specific support to meet their educational needs and to prepare them to be able to function within society. Due to the nature of impairments in autism, particularly the profound and pervasive language difficulties experienced by a significant proportion of individuals with an ASC, it is surprising that until recently, relatively little research has been undertaken to establish levels of reading ability.

One of the very few studies to systematically investigate reading in children with ASC's was carried out by Nation, Clarke & Wright (2006). The authors investigated patterns of reading ability in a sample of 41 children with ASC's, through an assessment of four components of reading skill: word recognition, non-word decoding, text reading accuracy and text comprehension. The results highlight the heterogeneity of reading skills in children with an ASC. Whilst a total of 9 children were unable to read at all, 20 children achieved word-reading levels in the average range or above. However, they found that 10 of these children showed impaired reading comprehension as well as impairments in vocabulary and oral language comprehension. Overall, the majority of children showed a discrepancy between reading accuracy and reading comprehension. In 10.3% of the sample, the comprehension score was markedly below their reading accuracy score. This seems to suggest that

although many children with ASC's develop age-appropriate word reading skills, reading comprehension does not develop concurrently.

Whilst the authors identified a significant group of children experiencing comprehension difficulties in comparison to age appropriate word reading skills, the sample may be regarded as too small to generalise to the wider ASC population. In response, Huemer & Mann (2010) aimed to establish a comprehensive profile of decoding and comprehension skills within a larger sample of 384 children with ASC's. The large sample was accessed through 41 private nationwide learning centres in the US, and 1 based in the UK. The centres provided one-to-one reading and comprehension instruction for children with learning disabilities or developmental disorders. The sample comprised 3 sub-groups: 171 children with autism (mean age 10.41 years), 119 with PDD-NOS (Pervasive Developmental Disorder Not Otherwise Specified – mean age 10.08 years) and 94 children with a diagnosis of Asperger Syndrome (mean age 11.37 years). All children in the sample were able to communicate verbally and had measurable reading abilities. The authors also included a comparison group of 100 children with Dyslexia (mean age 11.21 years). Whilst the authors did not have the data available to include a typically developing comparison group, they used standard scores as a way of making a comparison to population norms. The data analysed by the authors comprised a battery of 9 standardised measures of decoding, word recognition and reading comprehension (including both oral and written tasks) administered upon enrolment to the learning centres[1]. Based upon the previous smaller-scale research (namely Nation et al., 2006) it was predicted that children with ASC's (all groups) would achieve lower scores on all reading comprehension measures than those with Dyslexia. Conversely, it

[1] WRMT-R: Woodcock reading mastery test—revised (Woodcock 1987); GORT-4: Gray oral reading test-revised, 4th edition (Wiederholt 1991); LAC-3: Lindamood auditory conceptualization test (Lindamood and Lindamood 2004); PPVT-III: Peabody picture vocabulary test third edition (Dunn and Dunn 1997); DTLA-4: Detroit tests of learning aptitude-4th edition, word opposites (Hammill 1991); DTLA-2: Detroit tests of learning aptitude-2nd edition, oral directions (Banas, 1989); GORT-4 comprehension (Wiederholt 1991).

was predicted that the Dyslexia group would achieve lower scores on measures of decoding and word recognition than the ASC groups. Findings upheld the authors' predictions and thus, provide further support for the presence of impaired comprehension skills relative to decoding skills in the ASC population. Further, as predicted, the children with Asperger Syndrome outperformed the autism and PDD-NOS groups on measures of decoding and reading comprehension, which the authors associated with the higher verbal and oral language skills reported for this group (e.g. Igwanga, Kawasaki & Tsuchida, 2000). Interestingly, whilst the Aspergers group showed an improvement in performance with increased age, the other groups fell further behind population norms.

A study by Jones, Golden, Simonoff, Baird, Happé, Marsden, Tregay, Pickles & Charman (2009) provides further support for the prevalence of reading comprehension problems in individuals with ASC's. Through examining the intellectual abilities and academic achievement of adolescents with an ASC, they found that 73% of the sample had one or more areas of literacy or mathematical achievement that was highly discrepant from full-scale IQ. A large number of individuals presented a 'dip' in reading comprehension compared to full-scale IQ. The authors propose that reading comprehension falls further below general intellectual ability with increasing social and communication impairments.

Norbury & Nation (2011) aimed to further investigate the variability of reading abilities found in individuals with ASC's. The authors obtained standardised measures of reading (word, non-word, accuracy and comprehension) for 26 adolescents with an ASC in full-time specialist education, together with a comparison group of 19 typically developing (TD) children, matched for age and non-verbal ability. Additionally, the authors incorporated an experimental measure, to assess comprehension monitoring skills and inferencing ability. The adolescents with ASC's were divided into two groups, according to their language skills: those with age-appropriate structural language skills (ALN)

and those with structural language impairments (ALI). The authors predicted that the ALI group would achieve significantly lower scores on all reading measures than the ALN and TD groups. Findings showed that as a group, the ALN and TD children achieved significantly higher levels on word reading abilities than the ALI group, although individual variability was acknowledged (some children with language impairments had age-appropriate word reading skills). As predicted, the ALI group achieved lower reading comprehension scores than the other groups and were particularly poor at inferencing. The authors concluded that, "deficits in oral language are intimately related to reading comprehension deficits" (p 205). Indeed, Norbury (2004) found that language ability was strongly associated with idiom acquisition and understanding in a sample of children with a profile of language disability and others with features on the autism spectrum.

There has been particular interest in studying those children with ASC's who display highly elevated single word reading and decoding abilities in relation to reading comprehension and general intellectual functioning; a phenomenon termed 'hyperlexia' (e.g. O'Connor & Hermelin, 1994; Newman, Macomber, Naples, Babitz, Volkmar & Grigorenko, 2007). However, there is some contention surrounding the definition and identification of hyperlexia, with respect to the presence of precocious reading development and an obsessive interest in words (Grigorenko, Klin & Volkmar, 2003). Nation et al., (2006) concluded that although some children in their sample fitted a 'hyperlexic' profile, reading comprehension impairments were apparent for the majority of children in the sample (>65%) and thus, the difficulties with comprehension appear common to children across the autistic spectrum.

A particular limitation of the research on reading in children with ASC's (as acknowledged by Norbury & Nation, 2011) is that the development of decoding and reading comprehension skills in this group has not been investigated longitudinally. A second limitation, highlighted by Nation et al., (2006) as an important direction for future research, is that although reading

profiles in relation to a discrepancy between decoding skill and general measures of reading comprehension have been reported, investigation of component comprehension skills (focusing specifically on the higher-level processes involved in reading comprehension) has thus far, received very little attention.

Although focusing on listening comprehension rather than reading comprehension, Asberg (2010) investigated the patterns of language and discourse level comprehension skills (involved in the comprehension of extended segments of language in a connected text) in 16 Swedish school-aged children with ASC's, comparing them to typically developing children (matched according to non-verbal ability). All children were assessed to gain measures of oral receptive vocabulary, reception of grammar and discourse level comprehension skills. The participants listened to narrative texts, followed by comprehension questions (whereby either the narrative details or main ideas were explicitly stated or implied, i.e. required inference making). Findings showed that children with ASC's performed significantly lower on measures of narrative discourse comprehension than typically developing children. The author highlights the potential benefits of children with ASC's receiving targeted support to develop discourse level comprehension skills. Whilst inherent differences between listening comprehension and reading comprehension have been acknowledged (Perfetti et al., 2005), this finding further highlights the need for an exploration of discourse level skills involved in reading comprehension, in children with an ASC.

In response to the paucity of research in this area, a very recent study by Williamson, Carnahan & Jacobs (2012) sought to understand how cognitively able individuals with autism interact with and make meaning from text, and to consider what influences comprehension for these individuals. The research involved 13 children (aged 7 to 13) with ASC's. Using a 'think–aloud' procedure (Brown & Lytle, 1988) the authors elicited the thinking processes and strategies used by participants as they were reading. The children read

aloud a total of 16 passages and were asked comprehension questions following each passage. The think-aloud sessions were recorded, transcribed and analysed using grounded theory, a qualitative method to produce theoretical knowledge.

The authors' analyses revealed three reading comprehension profiles: 'Text-bound', 'Strategic' and 'Imaginative' comprehenders. 'Text-bound' comprehenders brought meaning to the text without making interpretations, and experienced particular difficulty answering implicit questions but were able to make text-based inferences. 'Strategic' comprehenders were able to answer a high percentage of both explicit and implicit comprehension questions correctly and made inferences at all levels (sentence, paragraph and passage). The authors noted that these individuals asked a variety of questions as they read, made connections between their own knowledge and the text and constructed visual images. However, they experienced difficulty making predictions and ascertaining the emotional states of characters. Finally, 'Imaginative' comprehenders were referred to by the authors as being, 'visually orientated', preferring to convey their comprehension using pictures and written words rather than verbalizing. They were most successful comprehending texts that were accompanied by pictures, organized in individual sentences and based upon familiar topics. Such individuals tended to make both syntactic and semantic errors when reading and recalling information. The factors influencing comprehension for the pupils with ASC's were highlighted and discussed by the authors. These included: level of processing (reflecting text base processing or situation model processing - integrating text based mental representations with prior knowledge), action strategies, text factors (familiarity of content, pictures) knowledge differences, and language differences.

2.3 Cognitive theories of autism - a framework for understanding and explaining comprehension difficulties

Whilst exploring reading comprehension skills within the ASC population has received recent interest, it is pertinent to note that reported difficulties with reading, alongside particular reading styles and behaviours, are present in the original observations and descriptions of autism by Kanner (1943):

> *"The children read monotonously, and a story… is experienced in unrelated portions rather than its coherent totality"*

(Kanner, 1943 reprinted in Kanner, 1973 p42, cited in Nation & Norbury, 2005 p25)

Not only does this early description allude to a difficulty for individuals with autism to comprehend written narrative; to establish a global sense of meaning, it also resonates with the notion that an explanation for this may lie in the cognitive processes characteristic of individuals with ASC's. Since the first detailed descriptions and accounts of cases by Leo Kanner (1943), together with those made independently by Hans Asperger (1944), researchers have endeavoured to develop substantiated theories to identify the causes of and thus, establish an explanation of autism. Frith (2003) outlines the extensive research literature that exists within this field, exploring the theories and numerous research studies seeking to establish an underlying aetiology of autism - both from a genetic or biological basis and environmental risk factors.

The search for underlying genetic or biological causes of autism alongside advancements in neuroscience and genetics remains a central focus for research in autism. However, the proposal and continued development of key neuro-cognitive theories of autism provide a framework to explore and offer plausible explanations for the behavioural and observable features of autism.

According to Hill & Frith (2003), cognitive theories of autism, attempting to provide explanations for the core features of autism in terms of impairment in brain mechanisms or atypical cognitive processing, “have provided a vital interface between brain and behaviour” (p283).

Reading comprehension is a complex skill dependent on a number of cognitive processes and thus, it follows that efforts to explain the difficulties experienced by individuals with ASC’s have centred on the three main cognitive theories of autism: the ‘Theory of Mind’, ‘Weak Central Coherence’ and ‘Executive dysfunction’ hypotheses. Whilst each theory and its associations with reading comprehension are explored in turn, it is acknowledged that the theories are no longer considered in isolation. Research has shown that a combination of deficits in Executive Functioning, Theory of Mind and Weak Central Coherence exist in individuals with ASC (Happé, Ronald, & Plomin, 2006). Further, Pellicano (2010) found that the cognitive skills of children with ASC’s are varied; some children had difficulties in one or two cognitive domains rather than all three.

2.3.1 Theory of Mind

Arguably the most prominent cognitive theory, Baron-Cohen, Leslie & Frith (1985), first proposed that individuals with ASC’s fail to acquire an intuitive ‘theory of mind’ that typically develops between the ages of 4 and 6 years. Children with an ASC are impaired in their understanding of mental states (e.g. beliefs) and experience greater difficulty attributing mental states to themselves and others, than typically developing children. Their well-known research involved presenting children with ASC’s, Down Syndrome and typically developing children with the Sally-Anne ‘false-belief’ task. One doll (Anne) moved Sally’s marble from the basket where she had hidden it, to the box whilst she was gone. Over 80% of the typically developing and Downs Syndrome group responded correctly when asked, “Where will Sally look for her marble?” They understood that Sally would look in the basket (she held a

'false belief'). However the performance of the ASC group was strikingly impaired, with only 20% able to predict correctly.

The potential relevance of impairments in theory of mind with the cognitive processing required in order to comprehend written discourse, has been illustrated with experimental studies involving the understanding of narrative. In the stories, the reader was required to attribute mental states to the character in order to understand their motives and cause and effect relationships. White, Happé, Hill & Frith (2009) adapted a series of stories originally developed by Happé (1994) in order to measure advanced theory of mind or 'mentalizing' ability. The original study (Happé 1994) consisted of a set of short story vignettes followed by a question requiring the attribution of mental states (e.g. desires, beliefs, intentions). For example, being able to reason that a character did not answer a question truthfully to spare another character's feelings (a 'white lie'). There were six control stories that required the attribution of physical states (for example, understanding that a burglar alarm was set off by an animal breaking the detector beam).

In the original study, Happé (1994) found that autistic subjects were impaired when providing context-appropriate explanations for the mental state stories compared to controls (even those who passed the theory of mind tasks). White et al., (2009) adapted the stories to include five different sets: mental state, human physical, animal physical, nature physical and unlinked sentences. The authors found that the children with ASC's, with poor performance on theory of mind tasks, were significantly impaired on the mental state, human physical and animal physical stories but not the nature stories. The highest degree of impairment was observed on the mental state stories and lowest on the animal stories.

Considering that books written for very young children contain many references to mental states, it is not surprising that children with an ASC experience reading comprehension difficulties when higher order

understanding of narrative is required. One audit reported that in 317 preschool texts, 78% referred to internal states, 34% contained a false belief and 31% contained deception (Cassidy et al., 1998 cited in Westby, 2011). Thus, if the attribution of mental states is required to understand simple childhood texts (such as fairy tales), deficits in theory of mind may have a significant impact upon such individuals' ability to understand more advanced narrative.

2.3.2 Weak Central Coherence (WCC)

The term 'central coherence' was first coined by Frith (1989) and refers to:

" … an information processing style, specifically the tendency to process incoming information in its context: that is, pulling information together for higher-level meaning" (Hill & Frith, 2003, p284).

In other words, it is the tendency for typically developing individuals to process information to establish a global sense of meaning or to see the 'big picture', at the expense of paying attention to or remembering specific details. However, for the autistic individual, it is proposed that they demonstrate "weak central coherence'" - a processing bias for local and featural aspects and details, at the expense of extracting the 'gist' and contextual meaning. Thus, this theory is closely aligned with the original observations by Kanner (1943), who noted that autistic individuals tended to focus on the details, exhibiting an, "inability to experience wholes without full attention to the constituent parts" (Kanner, 1943, p246).

Rather than reflecting a core deficit in cognitive processing, it is widely accepted that weak central coherence reflects a particular 'cognitive style and superiority' in local processing (Happé and Frith, 2006). Research providing support for the weak central coherence hypothesis has focused upon the consistent superior performance of individuals with ASC's (compared to controls) where tasks require attention to specific details (Happé and Frith,

2006). For example, the embedded figures test (where the participant is asked to locate a smaller part within the whole picture) and the block design task incorporated in the Wechsler intelligence scales for both adults and children (Wechsler, 1997; Wechsler, Golombok & Rust, 1992).

It is acknowledged that reading comprehension is critically dependent upon integrating information not only from within the same text, but from prior or external knowledge, to ultimately establish meaning (Nation & Norbury, 2005). Therefore, the notion of 'weak central coherence' presents a rational explanation of how a particular cognitive style characteristic of individuals with an ASC may contribute to difficulties when comprehending written text. When reading, a predisposition to focus on details (e.g. individual words or specific parts of the text) together with the tendency to avoid combining the parts to form a coherent whole, may contribute to difficulties at the text or discourse level, involving higher level aspects of comprehension (including inference making and comprehension monitoring). Put simply, it is possible to have an understanding at the word or sentence level, without establishing the message conveyed in the text in its entirety, a process referred to as 'word-to-text' integration (Perfetti, Yang & Schmalhofer, 2008).

With reference to inference making, a study by Wahlberg & Magliano (2004) assessed whether high functioning readers with autism are able to draw upon background knowledge, and to integrate the knowledge to facilitate their understanding of ambiguous text. Their findings supported the suggestion that individuals with ASC's have particular difficulties making use of relevant background knowledge compared to typically developing individuals. Considering the component skill of comprehension monitoring, Perfetti, Landi & Oakhill (2005) highlight that readers who endeavour to establish a thorough understanding of the reading material, i.e. their goal and purpose is to derive meaning, are described as having a 'high standard for text coherence' and thus, are more likely to self-monitor than those readers who have a 'low standard for text coherence'. In light of the weak central coherence theory, it

is plausible to suggest that individuals with ASC's, due to their bias for local processing, may have particular difficulties in monitoring their comprehension as they are reading, however this metacognitive skill has yet to be thoroughly investigated in individuals with an ASC.

Although not widely accepted within the field due to a lack of empirical evidence, a construct that holds a close position to weak central coherence is referred to as 'monotropism' (Murray 1992, cited in Murray, Lesser & Lawson, 2005). Fundamentally, the theory is based upon the 'restricted range of interests' outlined in the diagnostic criteria for ASC's (DSM-IV: American Psychiatric Association, 2000; ICD-10: World Health Organisation,1993), together with 'patterns of subjective experiences' as reported by individuals with ASC's (Murray et al., 2005, p139).

The authors propose that strategies for the allocation of attention resources in autistic individuals are inhibited due to available attention being channelled to a small number of highly aroused interests. Individuals with ASC's are described as having a 'monotropic tendency' (few interests, highly aroused) and this differs from a 'polytropic tendency' (many interests, less highly aroused) in typically developing individuals. Murray et al., (2005) make the assertion that, "Attention is the resource which is competed for by task demand, and a task is an enacted interest" (p141). It is reasoned that 'monotropic' individuals are likely to experience difficulties with the four stages preceding successful task performance: 1) to see the point or goal of the task, 2) to value and be motivated by the task, 3) to understand precisely what the task entails (step by step) and 4) know how to perform each step. To illustrate, the authors draw upon research by Plaisted, Swettenham & Rees (1999) indicating that problems experienced by autistic individuals in integrating information (due to a bias for local processing) may cease when attention is directed to the goal of the task – to establish global coherence.

2.3.3 Executive Dysfunction

Within the literature, executive function is referred to as an, 'umbrella term' for "related, yet distinct cognitive abilities that enable intentional, goal-directed problem solving" (Gioia, Isquith, Kenworthy & Barton, 2002, p122). As Hill & Frith (2003) explain, this includes functions such as planning, controlling impulses, working memory, shifting set, initiating and monitoring action and inhibiting predominant responses. Many studies investigating executive functioning in individuals with ASC's report markedly impaired performance on tasks designed to measure particular aspects of executive functioning, including the Tower of Hanoi and the Winconsin Card Sorting Test (e.g. Hughes, Russell & Robins, 1994; Ozonoff & Jensen, 1999). Investigating executive dysfunction in a number of developmental disorders, Gioia et al., (2002) found that the ASC group showed impairments in all tests of executive functioning, with profound difficulties with shifting.

Meltzer (2007) argues that executive functioning plays an important role in reading comprehension tasks as they 'require that cognitive resources are dedicated to word decoding and attending simultaneously, in order to synthesize the information', and thus demand metacognitive skills. Cutting, Materek, Cole, Levine & Mahone (2009) note that generally, whilst research in reading comprehension has involved the assessment of skills that would "theoretically involve executive function" (including self monitoring, the capacity to plan and organise information and working memory), these skills have not been considered as "falling within the rubric of executive function" (p37). The authors propose that the exploration of executive function through metacognitive skills (such as comprehension monitoring) may be particularly fruitful in both furthering understanding and informing the design of interventions for children with ASC's experiencing reading comprehension difficulties.

Keene & Zimmerman (2007) highlight seven metacognitive skills and

strategies used by competent readers, as they are engaged in a text: monitoring for meaning, using and creating schema, asking questions, determining importance, inferring, using sensory and emotional images, and synthesizing. It is of note that research highlighting difficulties individuals with ASC's experience when resolving inferences (e.g. Myles, Hilgenfield, Barnhill, Griswold, Hagiwara & Simpson, 2002, Norbury & Nation, 2010) could be attributed to all three theories of autism. Whilst deficits in theory of mind may inhibit an individual's ability to infer characters' emotions and the attribution of mental states (Happé, 1994; White et el., 2009) weak central coherence may be linked to difficulties integrating background knowledge to facilitate comprehension of text (Wahlberg & Magliano, 2004) and finally, impairments in executive function (Cutting et al., 2009) may impact upon metacognitive skills involved in reading, including inference making.

Clearly, there remains scope for further research in the domain of cognitive theories of autism. Nevertheless, considering the complex skills involved in reading comprehension alongside the three main theories has facilitated the identification of skills that may present challenges for children with ASC's. Drawing on such theory may be of particular use when exploring aspects of the comprehension process further and subsequently, developing interventions to ameliorate specific reading comprehension difficulties for children with an ASC.

2.4 The shift from 'learning to read' to 'reading to learn'

It is consistently acknowledged within the literature that the transition from primary to secondary school can be a problematic period for many pupils (and in particular, those with ASC's), due to discontinuities in both the curriculum and context of the two settings (Anderson, Jacobs, Schramm & Splittgerber, 2000; Gumaste, 2011). Curriculum discontinuities include pedagogical differences, a shift to subject-specific learning and increased expectations for pupils to be more independent and autonomous (Galton, Hargreaves & Pell,

2003). For example, in relation to the teaching of reading, whilst in primary schools, both time and resources are dedicated to developing reading skills (for example, through planned 'Guided Reading' sessions and daily delivery of phonics instruction) opportunities for focus specifically on reading are far more limited within secondary schools.

In a review of the research on reading comprehension in developmental disorders (including ASC's), Ricketts (2011) acknowledges the significant shift from 'learning to read' throughout early childhood to 'reading to learn' as children progress to adolescence and adulthood. This illustrates a shift in both the focus of reading as a subject taught in its own right and the expectation of existing reading skills, as children move from primary to secondary school. As students progress through the education system, there is a greater emphasis upon reading comprehension in terms of the extent to which pupils are able to access the school curriculum with increased independence and autonomy (both within the classroom setting and during individual study), as well as information more generally (Ricketts, 2011). Further, as expectations of independent learning increase, so too do the demands of the curriculum, particularly in relation to the reading material and texts that the learners engage with. Wilhelm, Baker & Dube (2001) found that often, teachers underestimated the difficulty of the texts students were expected to read. Thus, the authors found that the teachers did not provide the level of guidance and support that the pupils needed in order to successfully access the more sophisticated narratives and expository texts they encountered.

It is therefore pertinent to raise questions regarding the support and strategies available for the 1 in 5 children leaving primary school who do not reach the standard expected for reading (Ofsted, 2010) and providing the context for the current research, those children with ASC's who experience particular difficulties with developing higher level reading comprehension skills. If reading is indeed the 'gateway' to learning, impairments in reading comprehension in a secondary educational setting (where the explicit

teaching of reading is largely discontinued) undoubtedly presents a potential barrier to learning and achieving academic success for individuals with an ASC.

2.5 *Assessment of reading comprehension to inform intervention*

Although the profile of reading comprehension skills that lie below decoding skill is not observed in all children with ASC's (e.g. some children's decoding *and* comprehension are considerably impaired), those children who do experience specific comprehension difficulties may be difficult to identify, as superficially, they appear to have mastered reading. Moreover, Leach, Scarborough & Rescoria (2003) found that typically developing pupils experiencing specific comprehension difficulties (i.e. with age appropriate decoding abilities) were identified later than those pupils with decoding or both decoding and comprehension problems. Therefore, to ensure reading comprehension difficulties do not go undetected, it is crucially important to carry out a thorough and accurate assessment of reading comprehension.

According to Klingner (2004) the most effective way to assess reading comprehension is through a combination of different measures and tools, utilising both standardised and dynamic assessments. With respect to the limited literature investigating the reading profiles of individuals with ASC's, it is noted that research has tended to use standardised measures alone to assess reading comprehension (e.g. Nation et al., 2006; Huemer & Mann, 2010). Considering the complex nature of reading (in particular the task of deriving meaning from text) a number of higher-order discourse level skills and processes, including metacognitive skills, are involved in reading comprehension (Oakhill, Cain & Bryant, 2003; Paris & Paris, 2003; Cain & Oakhill, 2007; Keene & Zimmerman, 2007). Therefore, the assessment of participants' reading comprehension using a standardised measure is restricted by the assessment tool itself; the skills involved in reading comprehension that it is designed to measure. Further, as standardised tests

are designed to measure particular constructs (such as comprehension) a test will be designed according to the authors' definition of these constructs (Salvia & Ysseldyke, 2004, cited in Iland, 2011).

Notably, a proportion of questions in many widely used standardised reading assessments require students to retrieve literal information presented in the text (e.g. NARA-II[2]: Neale, 1997; YARC[3] Primary & Secondary: Snowling, Stothard, Clarke, Bowyer-Crane, Harrington, Truelove, Nation & Hulme, 2009; Stothard, Hulme, Clarke, Barmby & Snowling, 2010). Thus, whilst the well-developed decoding abilities of children with ASC's may mask comprehension difficulties, their overall performance on standardised assessments (particularly if they demonstrate competency in answering literal questions) may indeed mask specific difficulties with higher-order skills involved in reading comprehension. As reported by Iland (2011) several authors were surprised that using standardised measures of reading comprehension, their autistic participants tested in the average range (e.g. Holman, 2004; Newman et al., 2007).

A further criticism of assessing reading comprehension via standardised assessments alone is that they typically focus on the product of reading and as such, they do not provide information about the underlying processes (Rapp, van den Broek, McMaster, Kendeou, & Espin, 2007). McNamara & Kendeou (2011) distinguish between the product and processes of reading comprehension; the product referring to the construction of a coherent mental representation of the text, whilst the process of comprehension is concerned with *how* the construction occurs 'moment-by-moment' as the individual reads. The authors emphasize the importance of assessing both processes and products of reading comprehension, due to the fact that the relationship between the two is causal: failures in specific processes underlying comprehension compromise an individual's ability to form coherent mental

[2] Neale Analysis of Reading Ability, Second Edition
[3] York Assessment of Reading for Comprehension

representations of the text.

Whilst standardised tests can be used effectively to assess progress over time, dynamic assessments, including observation, interviews and approaches to explore students' thinking processes and strategies, such as think-alouds (Brown & Lytle, 1988) can be extremely useful in order to develop effective interventions, using ongoing assessment to inform progress (Ward & Traweek, 1993). Knowing at which points and *why* the comprehension process fails will subsequently facilitate the development of appropriate interventions to both target and remediate the specific problems (McNamara & Kendeou, 2011). Indeed, Williamson et al., (2012) utilized the think-aloud procedure (whereby individuals explicitly verbalize their moment-by-moment thoughts, questions and reflections) in order to elicit the thought processes and strategies used by children with ASC's.

Notably, within the existing research, taking the opportunity to question and listen to the perspectives of individuals with ASC's on the reading process, their reading behaviours, experiences and their awareness of strategies, has been thus far, neglected.

2.6 Interventions to support reading comprehension for children with Autism Spectrum Conditions

2.6.1 Acknowledging methodological research issues within the field

Whilst it is accepted that the 'gold standard' of research in education is achieved through experimental designs involving randomized controlled trials, research relating to educational outcomes rarely involve both controlled trials and random assignment (Seethaler & Fuchs, 2005). Therefore, although there has been a shift towards evidence-based practice in education (particularly to demonstrate effectiveness of intervention programs), if reviews were conducted including only 'gold-standard' research, this would result in a very

small number of studies available (Carter & Wheldall, 2008). The authors propose an alternative model for evaluating supportive evidence and research to determine the efficacy of educational interventions and programs. This places research into five categories, with Level 1 referring to the 'gold standard' (offering the highest degree of confidence in relation to efficacy) moving down to the fifth level, referring to those programs that are viewed as being, 'educationally unsafe' owing to the lack of credible evidence and theory to support their assumptions (Carter & Whedall, 2008, p 15).

It is acknowledged that methodological limitations are apparent amongst the existing research focusing on reading interventions for children with ASC's, including sample size, variation in ability levels of the subjects, recruitment of participants 'by convenience' and lack of control groups (Iland, 2011). Indeed, such difficulties are typical of research with this population generally, and it is argued that the individual differences between people with ASC's mean it is not viable to meaningfully compare data between groups (Howlin, 2010). According to Jordan (1999) it is seldom possible to conduct 'true' experiments in real-life settings as the random assignment of individuals with ASC's to experimental and control groups is neither ethical nor feasible, and finding large numbers of individuals with an ASC with similar characteristics is very challenging. Therefore, the 'silver standard' or 2nd level of educational programs (Carter & Wheldall, 2008) are of particular relevance to both reviewing literature on interventions to support individuals with ASC's, and designing and evaluating the effectiveness of reading intervention programs. Such research studies are based upon existing scientific evidence, current theory and practice, but not necessarily involving randomized controlled trials.

2.6.2 Systematic reviews of reading comprehension interventions involving individuals with Autism Spectrum Conditions

Although it is consistently reported within the literature that children with ASC's show deficits in reading comprehension, there has been very little

research carried out to investigate reading comprehension instruction and interventions for students with an ASC. In a review of the existing literature on improving reading comprehension, Chiang & Lin (2007) found that of 754 potentially relevant articles, only 11 reported on peer-reviewed studies with an experimental design, that had at least one participant with an ASC (none with Asperger Syndrome). Whilst seven studies focused on single word comprehension, only four studies focused on text comprehension (Kamps, Locke, Delquadri & Hall, 1989; Kamps, Leonard, Potucek & Garrison-Harrell, 1995; Kamps, Barbetta, Leonard & Delquadri, 1994; O'Connor & Klein, 2004).

Similarly, Whalon, Otaiba & Delano (2009) conduced a review in order to synthesize the literature on evidence-based reading instruction for individuals with ASC's. They outlined the following criteria for inclusion: peer-reviewed, one or more subjects with an ASC, an experimental design and that the research study tested the effectiveness of code-focused or meaning-focused skills, as defined by the National Reading Panel (NRP; NICHD, 2000). They highlighted a total of 11 studies that met this criteria, and of relevance to specifically improving reading comprehension, 5 studies exclusively targeted meaning-focused skills (Dugan, Kamps, Leonard, Watkins, Rheinberger & Stackhaus, 1995); Kamps, et al., 1995; O'Conner & Klein, 2004; Rosenbaum & Breiling, 1976; Whalon & Hanline, 2008). The studies by Dugan et al., (1995) and Kamps et al., (1995) focused on the instructional approach of integrating pupils with ASC's in co-operative learning groups with typically developing peers. Whilst overall, the authors noted improvements for all children, teacher reports indicated some concerns regarding the progress of the students with ASC's (Dugan et al., 1995). Indeed, the tendency for individuals with an ASC to prefer to work alone, together with the individual differences inherent to this group, indicates that individualized interventions may be necessary for training in academic skills as well as those focusing on behaviour (Koegel, Robinson & Koegel, 2009, cited in Randi, Newman & Grigorenko, 2010).

As acknowledged by Randi et al., (2010) only two of the aforementioned studies have investigated interventions specifically focusing on the underlying cognitive processes involved in reading comprehension. O'Connor & Klein (2004) investigated three facilitation techniques related to the component skills of integrating and activating prior knowledge, understanding and resolving anaphoric reference and comprehension monitoring. This involved 20 participants with ASC's (aged 14-17 years). It was hypothesized that one or more of the three facilitation techniques would improve comprehension of passages of text compared to a control condition (where participants received no facilitation). The authors found that only anaphoric cuing (to aid anaphoric resolution) significantly increased students' understanding of the text.

The second study (Whalon & Hanline, 2008) reported improvements in three students with an ASC in generating and responding to questions, through the use of a reciprocal questioning strategy (alongside story maps). The children with ASC'S were randomly assigned to work in co-operative pairs with peers in a mainstream classroom environment. The students were taught to generate and respond to *"wh"* questions as they took turns to read aloud. The researchers utilized a think-aloud procedure in the initial session, in order to explicitly teach the cognitive processes involved in constructing questions. The authors reported that both the pupils with ASC's and their typically developing peers made gains in question generation, and both required prompting to ask questions beyond what was explicitly stated in the text.

2.6.3 Scope for the use of interventions initially designed for the typically developing population, with children with Autism Spectrum Conditions

Acknowledging the prevalence of specific comprehension difficulties in typically developing children (Yuill & Oakhill, 1991 cited in Cain & Towse, 2008), in addition to the limited research focusing on individuals with an ASC, it has been suggested that interventions developed for typically developing children may also benefit children with ASC's and vice versa (Randi et al.,

2010). In comparing the effectiveness of directly taught reading comprehension strategies for general education pupils, the NRP found that question generation was the single most effective strategy (NICHD, 2000). Indeed, Whalon & Hanline (2008) found this strategy to be effective for children with ASC as well as their typically developing peers.

Question generation forms one of the four strategies within the 'Reciprocal Teaching' approach (Palinscar & Brown 1984), used widely within the literature to improve reading comprehension skills. The authors define Reciprocal Teaching as a method of instruction that explicitly teaches four main strategies: predicting, clarifying, questioning and summarizing. Through teaching and supporting students to use the strategies (commonly through teacher-led groups) pupils learn, gain awareness of and develop cognitive strategies and processes to improve reading comprehension skills. In a meta-analysis of 16 experimental research studies using the Reciprocal Teaching method, Rosenshine & Meister (1994) found that despite variations in the individual studies, significant gains were evident in comprehension following this intervention. The authors noted that when standardized tests were used to assess comprehension, the median effect size was .32 and when experimenter-developed comprehension tests were used, the median effect size was .88. Takala (2006) reported that involvement in a Reciprocal Teaching intervention led to positive gains for mainstream students (particularly in the fourth grade, ages 9-10) and some positive development was also noted for children attending a specialist class for specific language impairment (SLI).

As previously discussed, research indicating that early oral language skills provide a foundation for later reading comprehension (Van den Broek et al., cited in Paris & Stahl, 2005) is particularly relevant for children with ASC's who often present with limited verbal communication and demonstrate a lack of reciprocity (DSM IV, American Psychiatric Association, 2000). In response, research is beginning to explore early interventions in relation to reading

comprehension development in children with ASC's (Murray, 2009). A recent study exploring the effects of interventions designed to improve reading comprehension in typically developing school age children, found that interventions focusing on text comprehension, oral language and those combining both were all effective, but those focusing on oral language training produced the greatest improvements (Clarke, Snowling, Truelove & Hulme, 2010).

'Direct Instruction' is one approach that has been used to address comprehension problems in typically developing children (MacIver & Kemper, 2002; Ryder, Burton, & Silberg, 2006) and those with learning disabilities Carlson & Francis, 2002). This approach has been recently investigated by Flores & Ganz (2007; 2009) to explore its effectiveness for individuals with ASC's and developmental disabilities (2 children with an ASC were included in both studies). Direct instruction comprehension programmes are designed to address both oral language skills and reading comprehension (Flores & Ganz, 2007) and are based on the principles of modelling and guiding learners to practice skills, leading towards learners applying skills independently. A direct instruction reading comprehension program was adopted to teach three components (thinking operations) of reading comprehension: statement inference, using facts and analogies. The authors reported gains for all students on all three aspects of reading comprehension, which were maintained one month after the intervention.

Both systematic reviews (Chiang & Lin, 2007; Whalon et al., 2009) clearly illustrate a dearth of research investigating the effectiveness of reading comprehension interventions to address comprehension difficulties experienced by children with ASC's. This is in contrast to the more extensive body of research focusing on behavioural interventions for this group (e.g. Eldevik, Hastings, Hughes, Jahr, Eikeseth, & Cross, *2010*). Whilst findings from the existing research are reassuring, as they demonstrate that children with ASC's are able to respond positively to several reading comprehension

interventions, such research is in its infancy. Thus, there is a clear need for further research to contribute to a deeper understanding of the difficulties individuals with ASC's experience with the cognitive processes and component skills involved in reading comprehension. This will in turn facilitate and inform the design and implementation of reading comprehension interventions for this group (both in mainstream and other educational settings).

2.7 Rationale and structure of the current research project

2.7.1 Rationale

The present research project aims to build upon research that has consistently identified reading comprehension difficulties for children with ASC's in the presence of well-developed (age appropriate) word recognition skills. This will entail an exploration of component discourse level comprehension skills in children with an ASC, highlighted as contributing to the degree of competence in deriving meaning from text in the typically developing population. It is the intention of the research to develop understanding of the cognitive processes and higher-order skills involved in reading comprehension, but also, to purposefully gain an insight into the unique perspectives of children with an ASC as 'readers'. Research focusing on reading abilities for this particular group is limited in scope, with existing research tending to utilize standardised assessments to provide measures of reading comprehension. Whilst such measures are useful for baseline assessments and to track progress over time, they do not provide information on the processes underlying reading comprehension and thus, cannot be used alone to identify *where* and *how* difficulties in the process occur. This study will therefore combine both standardised and non-standardised (dynamic) measures in order to further explore the processes involved in reading comprehension in the ASC population.

The need to implement and develop evidence-based practice to improve educational outcomes for children and young people on the autism spectrum is acknowledged by researchers and educators alike (e.g. Odom, Collet-Kilingenberg, Rogers & Hatton, 2010; Parsons, Guldberg, MacLeod, Jones, Prunty & Balfe, 2009). However, dissatisfaction with the educational provision for children with ASC's (both in specialist and mainstream schools) has been reported by both parents and teachers (Parsons, Lewis, Davison, Ellins & Robertson, 2009; Barnard, Broach, Potter & Prior, 2002). For example, 75% of schools reported that they were not satisfied with the extent of training for teachers with regard to their knowledge of autism and strategies to support these students (Barnard et al., 2002). Together with higher exclusion rates and greater gaps in progress and achievement for these pupils (Wilkinson & Twist, 2010), this highlights that there is still considerable progress to be made with regard to meeting the educational needs of this group. In particular, there is a requirement for continued focus to ensure current scientific research (furthering knowledge and understanding of autism and identification of effective strategies) can be translated into everyday practice in schools.

Indeed, the current research project attempts to bridge theory, research and practice. The collection and analysis of data will enable an exploration of reading profiles and component comprehension skills of children with ASC's, which will then inform the design and implementation of a reading comprehension intervention for individuals with an ASC as they embark on their secondary educational career. The author's decision to develop an intervention for children during the primary to secondary transition period was based upon research highlighting the need for fundamental reading comprehension skills as students progress through the education system. Facilitating the development of such skills would therefore help to prepare and equip children with ASC's to cope with the increasing expectations upon literacy and autonomy within the curriculum: to 'read to learn'.

With reference to the alternative standards for educational research and programs discussed previously (Carter & Wheldall, 2008), the current research design would be placed under the 'silver' classification. Thus, the research is securely underpinned by current scientific evidence and theory, however it does not satisfy requirements of the 'gold' classification (namely, incorporating a randomized control trial within its design).

2.7.2 Structure of the research project

The current research project was divided into two separate studies. In Study One, the researcher focused upon identifying the reading profiles of children with ASC's and carrying out an exploration of their component comprehension discourse level comprehension skills. Furthermore, the individual children's attitudes and approaches to reading were explored. It addressed the following question and specific aims:

"Do children with Autism Spectrum Conditions experience difficulties developing the skills and processes required to understand what they read?"

Aims:

1. To establish patterns of reading (and cognitive abilities) in a sample of pupils with an ASC in Year 6 and Year 7 (aged 10-12 years).

2. To identify whether discrepancies exist between reading accuracy and reading comprehension in the sample.

3. To identify whether verbal abilities and oral comprehension skills are correlated with reading comprehension.

4. To explore patterns in discourse level component reading comprehension skills and wider issues related to reading development (including attitudes, behaviours and knowledge and awareness of strategies) in the sample of pupils with an ASC.

Study Two built upon knowledge gained in Study One and entailed the development and piloting of an individually tailored reading comprehension intervention, using a multiple-case design. This allowed for an in-depth study of the pupils' experiences of learning and developing reading comprehension skills and strategies, through different activities and approaches. Study Two asked the following question and addressed two specific aims:

"Does a detailed assessment and exploration of a child's reading comprehension skills facilitate the development of an effective intervention to improve the knowledge, awareness and skills needed to understand what they read?"

Aims:

1. To develop, pilot and evaluate an individually tailored weekly intervention (7 individual sessions) for children with an ASC experiencing specific reading comprehension difficulties.

2. To explore in-depth from the perspective of individual pupils with ASC's, the experiences of the 'poor comprehender' and how effectively they are able to access learning activities and strategies to develop reading comprehension skills.

Chapter 3
Study One: Methodology

This chapter firstly outlines the rationale for the methodological approach and design chosen for the present study (of relevance to both Study One *and* Study Two). This is followed by details of the methodology, analysis and presentation of results for Study One. This includes a description of the sample, quantitative and qualitative measures utilized and the procedure, together with information regarding the methods of analysis applied to the data collected.

3.1 Rationale for methodological design

With respect to studies one and two, the researcher subscribes to the philosophical paradigm of pragmatism. Inherent to the pragmatic worldview is the premise that there are multiple realities that research can explore, and that the research questions themselves are of principal importance; methods are selected based upon a practical "what works" approach to best address the research questions (Mertens 2005; Cresswell & Clark, 2011). Within the literature, pragmatism is a philosophical position aligned with mixed methods research and as highlighted by Tashakkori & Teddlie (2003), advocates the use of both quantitative and qualitative research methods within a single enquiry.

In recent years, the use of mixed-methods or 'methodological pluralism' rather than a mono-method approach in both education and social science research has received increased attention and subsequent support. Proponents of the mixed methods approach argue that it provides the scope to explore and answer research questions in the fullest sense (e.g. Gorard and Taylor, 2004; Burke, Johnson and Onwuegbuzie, 2004). According to Onwuegbuzie & Leech (2005) there are many advantages to be gained through taking the perspective of a pragmatic researcher and an associated applied philosophy, of particular relevance for the aims of the present study. For example, through

utilizing mixed methodologies, this allows the researcher to “delve further into a dataset to understand its meaning” (p384). It also allows a merging of the motivations typically associated with quantitative and qualitative research, offering the possibility to capture the participant’s voice whilst also pursuing the researcher’s concerns (Madey, 1982 cited in Onwuegbuzie & Leech, 2005).

The mixed methods approach was considered by the researcher to provide the most appropriate and effective framework to explore the different research questions in both Study One and Study Two. Embracing the pragmatic view, the most appropriate data collection methods in order to answer each question were carefully considered and selected. Specifically, Study One incorporated both quantitative methods (allowing descriptive and statistical analysis of the data in the sample) and qualitative methods in the form of semi-structured interviews. Study Two adopted the use of a multiple-case study design (this is explored further in Chapter 5).

3.2 Participants

3.2.1 Recruitment and selection criteria

Participants were recruited using an opportunity sampling approach. An initial email (followed by a telephone conversation) was sent to the head teacher or Special Educational Needs Co-ordinator (SENCo) of a selection of primary schools and four mainstream secondary schools, within the Local Authority. The aims of the project and selection for identifying appropriate children were outlined, as below:

Diagnosis of Autism Spectrum Condition (ASC)

The children were required to have a formal clinical diagnosis of ASC, including Asperger Syndrome or co-morbid diagnoses, for example ASC’S and Attention Deficit Hyperactivity Disorder (ADHD).

Chronological age

Children in Year 7 of secondary and Year 6 of primary school were considered for the study. This criterion was established as by the final stages of Key Stage 2 (Year 6) and the beginning of Key Stage 3 (Year 7) fundamental reading skills are usually well established and this would allow exploration of higher-level comprehension skills. Only those children whose teachers considered would be able to access National Curriculum Level 3 reading material were included.

Oral language skills

Teachers and SENCo's were asked to consider whether children's language skills were sufficient (measurable) in order to participate. This criterion was necessary as the chosen instrument to assess reading comprehension (Neale Analysis of Reading Comprehension: NARA-II; Neale, 1997) poses open-ended questions to which children give a verbal response. Further, the use of interviews requires that children are able and willing to engage in verbal communication.

Once children meeting the criteria were identified, letters were sent to parents to provide information about the study and to gain informed written consent. Informed consent was also gained from participants themselves on the first occasion of meeting the researcher (see Appendix A for parent and child consent forms).

3.2.2 Characteristics of participants recruited

A total of 24 participants (19 male, 5 female) aged 10-12 years (mean age 11:05) met the selection criteria (details provided in Table 1). All children in the sample were of White British ethnicity with the exception of one child. Participant 14 spoke English as a second language, but was included as he had lived in the UK for over 6 years and learned to read in English. A total of 14 participants were pupils in their first year of secondary education (Year 7)

and 10 in their final year of primary education (Year 6), in the academic year 2011-2012. All participants in the Year 6 cohort attended mainstream primary schools and those in the Year 7 cohort attended one of three mainstream secondary schools, with an ASC resource provision. The extent to which pupils accessed the provision varied from no access, access during unstructured times (break and lunch) to several participants who accessed the resource for curriculum support. A total of 15 participants had a Statement of Educational Need.

Data collection commenced with participants in Year 7, followed by those in Year 6. During the period of data collection, 2 children in the Year 7 cohort (participants 23 and 24) could no longer be involved in the research. One child was school refusing (associated with issues affecting his emotional wellbeing) and the other child transferred to a specialist provision.

Table 1 Participant Information

Ps	*Gender*	*Ethnicity*	*Language(s) Spoken*	*Diagnosis*	*Chronological age (first assessment)*	*Primary (Y6) or Secondary (Y7)*	*Level of Special Educational Needs*
1	Male	White British	English	ASD	11 yrs 4 mths	Secondary	Statement
2	Male	White British	English	ASD	11 yrs 5 mths	Secondary	Statement
3	Female	White British	English	ASD	12 yrs 1 month	Secondary	School Action+
4	Male	White British	English	ASD	12 yrs	Secondary	School Action+
5	Male	White British	English	ASD	11 yrs 6 mths	Secondary	Statement
6	Female	White British	English	ASD	11 yrs 11 mths	Secondary	School Action+
7	Male	White British	English	ASD	11 yrs 6 mths	Secondary	Statement
8	Male	White British	English	ASD	11 yrs 6 mths	Secondary	Statement
9	Male	White British	English	ASD	11 yrs 3 mths	Secondary	Statement
10	Male	White British	English	ASD/Aspergers/ADHD	11 yrs 4 mths	Secondary	Statement
11	Female	White British	English	ASD	11 yrs 8 mths	Secondary	School Action
12	Male	White British	English	ASD	11 yrs 5 mths	Secondary	School Action+
13	Male	White British	English	ASD	11 yrs 5 mths	Primary	Statement
14	Male	White European	Lithuanian/English	ASD	10 yrs 11 mths	Primary	Statement
15	Male	White British	English	ASD/Aspergers	10 yrs 11 mths	Primary	School Action+
16	Male	White British	English	ASD	11 yrs 2 mths	Primary	School Action
17	Male	White British	English	ASD	11 yrs 4 mths	Primary	School Action
18	Female	White British	English	ASD	11 yrs 8 mths	Primary	Statement
19	Male	White British	English	ASD	10 yrs 11 mths	Primary	Statement
20	Female	White British	English	ASD	10 yrs 11 mths	Primary	Statement
21	Male	White British	English	ASD	11 yrs 10 mths	Primary	School Action+
22	Male	White British	English	ASD	11 yrs 4 mths	Primary	Statement
23	Male	White British	English	Autism/ADHD/ Anxiety Disorder	11 yrs 4 mths	Secondary	Statement
24	Male	White British	English	ADHD/ASD	11 yrs 3 mths	Secondary	Statement

3.3 Ethical Considerations

From the initial research proposal and throughout the duration of the study, the researcher adhered to the British Psychological Society Code of Ethics and Conduct (2009). This was of particular importance due to the sensitive nature of the sample, namely having a diagnosis of an ASC and being under the age of 16 years. Ethical approval was gained from the Ethics Board at the Institution of Education, University of London, (a copy of the ethical consideration form is provided in Appendix B). Both the research proposal and ethical considerations were discussed with the Principal Educational Psychologist in the Local Authority.

As previously stated, written parental consent was gained for all children involved in the research. Parents were made aware of the aims of the study and the researcher's contact details were provided. It was also made clear that all data would be treated confidentially and reported anonymously, ensuring that information was not traceable to individual children (by assigning an identification number). Informed consent was gained from the participants in the initial assessment session (see Appendix A) but also, at the beginning of each session when invited to work with the researcher. Children were also reminded of their right to withdraw from the research at any time or request a break. Liaison with the school SENCo ensured children were aware of changes to their school routine in advance. Upon participants communicating preferences to avoid being withdrawn during particular lessons, this was upheld.

On completing the assessments, the researcher debriefed each participant (through informal verbal feedback) and they received a certificate to acknowledge their participation in the project. After scoring and analysing the data, the researcher wrote an informal report for each participant, which was sent to both school and parents. This outlined each child's strengths, areas for development and suggested future learning opportunities and recommendations (an example is provided in Appendix C).

3.4 Quantitative measures: standardised assessments

3.4.1 Cognitive abilities

The Wechsler Abbreviated Scale of Intelligence (WASI, Wechsler, 1999) was used to gain a measure of verbal and non-verbal abilities. This brief measure of general intelligence is nationally standardised and designed for use with both children and adults. Due to the significantly reduced administration time (approximately 30 minutes) compared to full Wechsler test batteries (e.g. WISC III: Wechsler, Golombok & Rust, 1992) short forms such as the WASI are suitable tools to provide estimates of IQ for research screening purposes (Axelrod, 2002). The WASI has been extensively used within research on individuals with a diagnosis of ASD and further, Minshew, Turner & Goldstein (2005) report good predictive accuracy of performance on full scale versions when using short forms of the Wechsler intelligence tests (including the WASI) with individuals with ASC's who frequently present with atypical or uneven cognitive profiles (e.g. Siegel, Minshew & Goldstein, 1996). The WASI consists of four subtests, which yield the three traditional scores: Vocabulary and Similarities combine to measure Verbal IQ (VIQ), and Matrix Reasoning and Block Design combine to measure non-verbal IQ (PIQ). All four subtests combine to measure Full-scale IQ (FSIQ). A description of the four subtests and the cognitive abilities each purports to tap or measure is provided in Appendix D.

3.4.2 Oral receptive language ability

Two subtests from the Clinical Evaluation of Language Fundamentals, 4th UK Edition (CELF-4: Semel, Wiig & Secord, 2006): Concepts & Following Directions (C&FD) and Word Classes 2 (WC2) were used to gain a measure of receptive oral language skills (a description of the subtests is provided in Appendix D). The CELF-4 is nationally standardised on a representative sample of individuals from 5 to 21 years in the US and is a revision of the third edition (CELF-III, Semel et al., 1995). Of relevance to the study, both editions have been consistently used within the field of autism research to provide a

standardised measure of language abilities (e.g. Kjelgaard & Tager-Flusberg, 2001; Lewis, Murdoch & Woodyatt, 2007). The scores on the two subtests (using the receptive score on WC2) together provide a composite Receptive Language Index (RLI) score, a measure of listening and auditory comprehension.

3.4.3 Current autistic symptoms

The Social Responsiveness Scale (SRS, Constantino & Gruber, 2005) was used to provide a measure of the current autistic symptoms of each child in the sample, as reported by teachers and parents. The SRS is a 65-item questionnaire, with each question rated on a four point likert scale (1 – 'not true', to 4 'almost always true'). Respondents choose the number that best describes the child's behaviour over the past 6 months. Questions are related to five subscales: social awareness, social cognition, social communication, social motivation and autistic mannerisms. Scores are obtained for each subscale, which give a total SRS score. A higher score indicates a greater severity of social impairment associated with the presence of a clinically diagnosable ASC. The SRS has been widely used in clinical settings and as a screening tool for research purposes, and found to provide a reliable and valid measure of autistic traits (Constantino, Davis, Todd, Schindler, Gross, Brophy, Metzger, Shoushtari, Splinter & Reich, 2003; Bolte, Westerwald, Holtmann, Freitag & Poustka, 2011; Constantino, LaVesser, Zhang, Abbacchi, Gray & Todd, 2007).

3.4.4 Reading accuracy and reading comprehension

A measure of reading accuracy and reading comprehension was gained using the NARA-II (Neale, 1997). Children were required to read aloud short passages of text, and any errors made were noted. A reading accuracy score was derived from the total number of errors. After reading each passage, children were asked a series of questions to assess their understanding, requiring literal understanding, inference and deduction. The NARA-II was selected to provide a standardised measure of reading ability as it is suitable for the age group of the sample (standardised scores between 6-12:11 years)

and is well used within UK reading research (e.g. Nation et al., 2002; Cain & Oakhill, 2006a). Further, Cain & Oakhill (2006b) carried out an evaluation of the NARA-II, concluding that (assuming it is administered and interpreted appropriately):

> *"The NARA is an effective instrument to assess word reading accuracy and reading comprehension and to identify children with a dissociation between these two aspects of reading" (p697).*

The researcher was aware that a more recently standardised reading comprehension assessment was available, namely the York Assessment For Reading Comprehension (YARC Primary & Secondary: Snowling et al., 2009; Stothard et al., 2010). The YARC follows a very similar format to the NARA-II but comprises two separate sets of assessment materials: Primary (up to age 11, Year 6) and Secondary (from Year 7, ages 11 - 16). Therefore, the NARA-II was selected for stage one of the study as this assessment tool covers the entire age range of participants. Additionally, as the YARC Secondary passages are intended to be read silently, this does not yield a reading accuracy score and thus, a direct comparison of the two component skills (reading accuracy and comprehension) cannot be made.

3.4.*5 Word reading*

A measure of single word reading (recognition or decoding of printed words) was gained using the British Ability Scales, Third Edition (BAS 3, Elliott & Smith, 2011): Word Reading subtest (A). This measure of word recognition was gained in addition to reading accuracy as whilst the NARA-II measures text-reading accuracy, the BAS3 requires children to read aloud single words presented out of context. It was considered important to assess word recognition skills using both measures, as there may be differences when reading words within a passage and presented individually. The BAS 3 is a revision and update of the BAS II (Elliott, Smith & McCulloch, 1996) and was selected due to its recent standardisation. The BAS II has also been used to gain a measure of word reading in previous research (e.g. Nation et al., 2006).

3.5 Non-standardised assessments: Component comprehension skills

In order to gain a measure of component discourse level comprehension skills, four individual reading tasks were selected, adapted and developed from existing materials used in published research (Stein & Glenn, 1982; Yuill & Oakhill, 1988; Cain and Oakhill, 1999; Cain, Oakhill & Bryant, 2004). The tasks were originally developed for children in the Upper Primary age group (aged 10-11 years) and were therefore appropriate for participants in the current study (in the final year of Primary or first term of Secondary School). Task D also incorporated several researcher-developed activities, which were trialled during a preliminary research project (Roberts, 2011) and subsequently modified for use in the current study.

The comprehension tasks were piloted with a typically developing skilled and less-skilled comprehender (aged 11 years). This enabled the average time taken to complete each task to be established and the order of tasks to be considered. It also gave the opportunity for the researcher to observe a skilled and less skilled comprehender's approach to the tasks and to gain feedback from the pupils. A summary of the performance of the two children on the component comprehension tasks (child X and Y) is provided in Appendix J.

A brief description of each task is presented in Table 2, followed by a detailed description of the development of tasks A – D. The accompanying resources, instructions and scoring criteria (developed by the aforementioned authors) is provided in Appendices F, G, H and I.

Table 2

Brief description of component comprehension Tasks A - D

Task	***Component comprehension skill***	***Brief description of task***
A	*Inference and integration*	Children read aloud three short stories (1 practice). They then answered six questions: 2 literal information, 2 text-connecting inferences and 2 global coherence inferences.
B	*Knowledge of story structure*	Children were presented with 2 short stories cut up into 7 (practice) and 12 constituent sentences. They rearranged the sentences so that the story made sense.
C	*Comprehension monitoring (Global)*	Following a practice task, children read two short passages that contained incoherent information i.e. parts that 'did not make sense together'. They were asked to identify these parts.
D (i)	*Comprehension monitoring (Anaphors)*	Children read aloud a short story containing errors of pronoun use (children were not made aware of errors). Corrections and identification of errors were noted.
D (ii)	*Pronoun identification and agreement*	Children completed a cloze activity, selecting the correct pronoun(s) to complete sentences from the short story.
D (iii)	*Prediction (Part A & Part B)*	After reading the first part of the short story, children were asked to predict what would happen next (Part A). After reading the second part they were asked to identify clues or links from part 1 to the story events in part 2 (Part B).
D (iv)	*Anaphoric resolution*	After reading the short story, children were given a copy with anaphors highlighted in red. Children referred to this to answer 22 questions (2 practice) requiring them to resolve the anaphors (i.e. identify the previous text each word linked to).

3.5.1 Task A: Inference and integration

Originally developed by Cain and Oakhill (1999), following a practice story, children read aloud two short stories followed by six questions. Each set of six questions included two literal and four questions assessing their ability to make coherence inferences. Two questions required children to integrate information between two sentences and the other two required integrating real world knowledge with information in the text to fill in missing details. Children were presented with the questions in a written format and they were also read aloud by the researcher. Participants gave their answers verbally which were scribed verbatim by the researcher.

3.5.2 Task B: Knowledge of story structure

Cain et al., (2004) developed this task from an original sentence anagram task, used to assess children's understanding of story structure (Stein & Glenn, 1982). Children were present with a short practice story, cut up into its seven constituent sentences, which were placed randomly on the table. They were asked to arrange the sentences in the correct order, so that the story made sense. The children were then presented with another story, cut up into its twelve constituent sentences, which they were asked to order.

3.5.3 Task C: *Comprehension monitoring - Global*

This task was adapted from the materials developed by Cain et al., (2004). Following a practice task, the children were given two factual passages to read, containing two inconsistencies or 'parts that did not make sense together'. The children were told that the passages might contain one or more parts that do not make sense together and were asked to underline these. Children were informed that they were not required to read the passages aloud, but if they did choose to read them aloud, this was permitted. When the children indicated they had finished the activity, if the child had underlined any parts of the text, the researcher asked them to explain why they had underlined them. Responses were recorded verbatim.

3.5.4 Task D Parts (i) to (iv): Comprehension Monitoring (Anaphors), Pronoun identification and agreement, Prediction, Anaphoric Resolution

(i) *Comprehension Monitoring – Anaphors*

Participants were asked to read aloud part one of a short narrative developed by the researcher. The text contained seven errors in the form of incorrect use of pronouns. Participants were not informed that there were any mistakes beforehand. Corrections, hesitations and explicit identification of errors by the participants were recorded.

(ii) Pronoun identification and agreement– Cloze activity

Participants completed a cloze activity using sentences or short extracts from the story in part (i). Participants were required to circle or write the correct pronoun(s) to complete the sentence so that it made sense. This task was incorporated to assess participants' understanding and use of pronouns in a structured task-specific context.

(iii) Prediction – Part A & B

After reading the correct version of story one (correct pronouns), the participants were asked to predict what happened next in the story *(Part A).* Following the Anaphoric Resolution questions for part one of the story, participants were asked to read the second part of the story. They were then asked to explain what happened in part two, and to identify the links or clues to these events within the text in part one *(Part B).* Answers were given verbally and recorded verbatim.

(iv) Anaphoric Resolution

This task was developed from the original narrative material and questions used by Yuill & Oakhill (1988), as described in Chapter 2. The subject matter of the narrative passage developed by the authors (a fishing trip) was deemed inappropriate for the children in the sample, considering their environmental context and experiences. Therefore, a narrative with more familiar content (a bike ride) was developed from the preliminary research study (Roberts, 2011).

This narrative was based upon the same structure as the previous authors, incorporating the four different types of anaphor, of both immediate (preceding sentence) and remote distances (more than two sentences apart). Illustrative examples of each type of anaphor from the narrative are shown in Table 3. All examples show an immediate distance between the anaphor and antecedent (not more than one sentence apart). Remote examples require the full body of narrative text and are shown in Appendix I, p214). Whilst the researcher did not intend to analyse each anaphor type separately, it was important to include all four types to provide a valid overall measure.

Participants worked through the pre-task training developed by Yuill & Oakhill (1988). They were shown a task sheet to refer to during the activity, with anaphors highlighted in red (see Appendix p220). Children were asked two practice questions to ensure they understood the task. Participants were then asked a total of 20 questions, 13 relating to part one of the story and 7 to part two. Responses were given verbally and recorded by the researcher.

Table 3

Task D (iv) Anaphoric Resolution: Types of anaphor

Anaphor type	***Illustrative example from narrative material***
Reference (R)	Rosie felt the fresh summer breeze on her face as she pedalled her shiny new purple bicycle. It was the best birthday present she could have wished for and **she** *(IR; Rosie)* couldn't wait for Tom to see it!
Ellipsis (E)	Tom placed his water bottle inside his rucksack and zipped it up. "I made ham and pickle sandwiches. I hope you have remembered yours". "Of course I **have**!" (*IE; remembered my sandwiches*) said Rosie.
Substitution (S)	"Who bought you the new bike, Rosie?" "Mum **did**!" (*IS; bought her the new bike*) she shouted back.
Lexical (L)	When Rosie and Tom turned into the driveway, Tom's mum was busy watering the flowerbeds in the front garden. The **sunflowers** (*IL; in the flowerbeds in the front garden*) were almost as tall as she was.

3.6 Qualitative measures: semi-structured interviews

Insights into participants' perceptions of reading, reading behaviours and experiences were gained through semi-structured interviews. This interviewing method was adopted as it allows flexibility in the order questions are posed and gives scope for the researcher to ask additional questions in response to significant or interesting comments (Bryman, 2001). Flexibility within the interview process was important considering the sample, as noted during the preliminary study (Roberts, 2011). Individuals with an ASC varied greatly in terms of their verbal language abilities and the extent to which they were motivated to share their experiences verbally. Whilst some children gave full, detailed answers, others needed prompting to expand their short (often one-word) responses. The interview schedule included a series of open-ended questions, phrased using simple, child-friendly language (several closed questions were incorporated to purposefully engage participants, followed by open questions). If it appeared that a participant did not understand a question, it was rephrased. During the preliminary research study, 9 children with ASC's were interviewed using an original schedule that included 10 questions. This was subsequently modified following analysis and reflection by the researcher, to include 13 questions (see Appendix K).

3.7 Procedure

A suitable date and time for the assessment sessions were agreed in advance with the school SENCo, who shared this information with the child and their parents. Assessments were carried out in a quiet, familiar room in 3 - 4 sessions (between 30 – 50 minutes). This allowed rest breaks and could be adapted to fit within the structure of the school day, of particular importance for children with ASC's. If a child regularly received support from a Teaching Assistant, they were asked if they would like them to be present. The administration of assessments was designed to be accommodating for the participants with reference to the 'Standards for Educational Testing' (AERA et al., 1999 cited in Mertens, 2004).

3.7.1 Outline of individual assessment sessions

Session One:

In the first session, the participants completed the NARA II (Neale Analysis of Reading Ability, 2nd edition, Neale, 1997) and the 4 subtests of the WASI (WASI, Wechsler, 1999).

Session Two:

In the second session, participants completed the tasks measuring oral receptive language: two subtests from the Clinical Evaluation of Language Fundamentals, 4th Edition, UK (CELF-4, Semel, Wiig & Secord, 2006): Concepts & Following Directions (CFD) and Word classes 2 (WC2). They also completed component comprehension tasks A (Inference and Integration), B (Knowledge of story structure) and C (Comprehension monitoring – Global).

Session Three:

During the third session, participants completed the BAS 3 Word Reading subtest. They then completed component comprehension task D (Parts i – iv): Comprehension monitoring – Anaphors, Pronoun identification and agreement, prediction part A & B and Anaphoric resolution. Finally, the short semi-structured interview was carried out focusing on their reading perceptions, behaviours and experiences.

3.8 Data Analysis

3.8.1 Quantitative analysis

The standardised assessments were scored according to the instructions in the accompanying test manuals. Data tables were created for each measure, enabling the researcher to visually analyse data (e.g. noting range of scores and differences between subtest scores). Data for each participant was then input into the SPSS programme (PASW 20). This allowed descriptive statistics to be generated, paired sample t-tests to compare means and both Pearson (including partial correlations) and Spearman correlational analyses to be carried out. The scores calculated from the component comprehension tasks (A - D) were tabulated and analysed both descriptively and graphically.

All record forms were kept in a secure location and were only accessible to the researcher, to ensure confidentiality.

3.8.2 Qualitative analysis

The 22 interviews were saved as secure electronic files and transcribed verbatim (an example is provided in Appendix L). The aim of carrying out individual face-to-face interviews was to explore the views of children with an ASC on reading - thus far, a neglected area. As highlighted by Braun & Clarke (2006), investigating an under-researched area (where participants' views are unknown) lends itself to the type of analysis that allows a 'rich thematic description', identifying pertinent themes within the entire data set. There are two primary ways in which themes and patterns can be identified within thematic analysis: inductive or 'bottom-up' or in a deductive 'top-down' way (Boyatzis, 1998; Frith & Gleeson, 2004). The current research adopts an inductive approach as the data was coded without a pre-existing coding frame and the 'themes identified are strongly linked to the data themselves' (Patton, 1990 cited in Braun & Clarke, 2006). Further, referring to Boyatzis (1998) analysis of data can be undertaken at the semantic 'explicit' level or the latent 'interpretive' level. Due to the nature of the children with an ASC (particularly associated language and communication difficulties) the extent to which data provided rich explanations and dialogue was inevitably limited. Therefore, analysis was largely undertaken at the semantic level, however particular themes permitted analysis beyond the semantic content, involving a degree of interpretation to identify underlying ideas and conceptualizations.

To ensure that the analysis proceeded in a theoretically and methodologically sound manner, the six-phase guide for thematic analysis, outlined by Braun & Clarke (2006) was followed (see Table 4). As the authors themselves maintain, this does not intend to give the impression that the stages are distinct and linear; the researcher moved back and forth between the phases throughout the analysis.

Table 4

Phases of thematic analysis (Braun & Clarke, 2006)

Phases of thematic analysis	***Description of process with relation to the present research***
Phase 1 *Familiarizing yourself with the data*	All interviews were transcribed, allowing the researcher to become familiar with the data. The transcripts were read and re-read so the researcher was immersed in the data. During this process, initial notes were made to acknowledge regularly occurring themes, ideas or topics within the entire data set.
Phase 2 *Generating initial codes*	A systematic approach was adopted to code interesting features of the data manually across the data set. The transcripts were transferred into a table proforma, allowing the researcher to highlight relevant sections of data and develop initial codes by writing notes in the adjacent column.
Phase 3 *Search for themes*	After all data had been initially coded, extracts of data were copied from individual transcripts and collated into potential themes/sub-themes in a separate document. Within this phase, the researcher worked both independently and alongside a research supervisor who is experienced in conducting thematic analysis. Visual representations were used in order to sort the codes into themes, and post-it notes were utilized in order to organize themes into overarching themes and sub-themes.
Phase 4 *Review themes*	This phase involved the refinement of themes. The researcher engaged in a back and forth process from the collated extracts from each theme to the developing visual 'thematic maps'. In this stage, two of the five main themes identified were collapsed together to form one theme.
Phase 5 *Define & name themes*	Working titles assigned to the main themes and sub-themes were finalized, ensuring that they accurately captured and reflected the data.
Phase 6 *Producing the report*	The report was written, with a visual thematic map for each main theme produced alongside the narrative.

Chapter 4

Study One: Results and Discussion

This chapter firstly presents the quantitative analysis of the assessments of children's cognitive abilities, reading ability (accuracy, comprehension, word reading), receptive language ability and autistic symptomatology, gathered using standardised measures. This is followed by both quantitative and descriptive analysis of the non-standardised measures used to assess children's component comprehension skills. Finally, the qualitative analysis of the individual semi-structured interviews carried out with the children (using thematic analysis) is presented through a narrative account with accompanying visual diagrams.

4.1 Quantitative analysis[4]

4.1.1 Descriptive Statistics

Table 5 summarises the performance of all participants (N=24) on the WASI and NARA-II. It was noted that one child (participant 14) performed below the floor of standard scores for the NARA-II and was awarded a standard score of 69. It was not possible to gain further assessment data for two children in Year 7 (participants 23 and 24). Therefore, scores for word reading (BAS 3) and receptive language skills (CELF-4) are available for 22 participants. It was possible to obtain an SRS (autistic symptomatology) score for 22 participants based upon teacher ratings and 16 based upon parent ratings (a return rate of 100% and 73%, respectively). The results obtained from each measure will be discussed in turn, with further statistical analysis to interpret the data where appropriate. Scores for each individual participant on all measures are provided in Table 6 (see Appendix S for individual WASI and SRS subtest scores).

[4] A total of four participants (see Table 1) had additional diagnoses of other developmental conditions (such as ADHD). The exclusion of these children did not affect the pattern of the results and therefore, were retained in all analyses.

Table 5

Mean performance for all participants on measures of cognitive ability (IQ), reading ability, receptive language skills and autistic symptomatology

Measure	N	M	S.D	Range
WASI[5] (Standard scores)	24			
Verbal IQ		92.58	9.83	73 - 108
Performance IQ		98.38	16.71	67 - 124
Full-scale IQ		94.46	12.57	69 - 114
NARA-II[6](Standard scores)	24			
Reading accuracy		100.21	12.21	77 - 119
Reading comprehension		91.08	8.79	70 - 108
BAS 3[7] (Standard score)	22			
Word Reading (A)		94.41	12.82	69 - 113
CELF-4[8] (Standard scores)	22			
Concepts & Following Directions		83.18	16.22	60 - 110
Word Classes (Receptive)		95.68	16.42	65 - 135
Receptive Language Index		88.50	17.33	58 - 122
SRS[9]: Teacher respondent T-scores[10]	22			
Social Awareness subscale		57.77	8.23	43 - 74
Social Cognition subscale		59.77	9.78	42 - 79
Social communication subscale		58.50	8.11	46 - 75
Social Motivation subscale		57.23	8.66	38 – 70
Autistic Mannerisms subscale		57.36	9.76	44 - 77
Total T-Score		58.77	8.30	46 - 75
SRS: Parent respondent T-scores	16			
Social Awareness subscale		75.94	15.45	52 - 113
Social Cognition subscale		83.94	19.12	53 - 123
Social communication subscale		79.88	14.14	55 - 110
Social Motivation subscale		80.38	13.59	58 - 106
Autistic Mannerisms subscale		89.44	21.68	55 - 135
Total T-score		87.13	15.85	64 - 128

[5] WASI: Wechsler Abbreviated Scale of Intelligence;
[6] NARA-II Neale Analysis of Reading Ability – Revised
[7] BAS 3: British Ability Scales, 3rd Edition
[8] CELF-4: Clinical Evaluation of Language Fundamentals, Fourth Edition
[9] SRS: Social Responsiveness Scale
[10] SRS T scores: M = 50, SD = 10

Table 6: Scores for all participants on measures of cognitive ability, reading ability, receptive oral language skills and autistic symptomatology *(Standard scores unless otherwise indicated)*

Ps	Gender	WASI				NARA-II		BAS 3	CELF-4			SRS	
		VIQ	*PIQ*	*Significant Difference VIQ & PIQ*	*Full-scale IQ*	*Reading Accuracy*	*Reading Comprehension*	*Word Reading*	*Concepts & Following Directions*	*Word Classes (receptive)*	*Receptive Language Index*	*Teacher Total T-score*	*Parent Total T-score*
1	Male	98	111	p<0.05	104	97	91	86	70	100	83	63	-
2	Male	108	115	-	113	119	98	110	105	120	116	50	92
3	Female	87	89	-	86	101	93	97	65	80	70	68	84
4	Male	84	93	-	86	92	92	89	90	80	83	65	79
5	Male	79	92	p<0.05	84	94	91	89	65	80	70	59	91
6	Female	95	84	p<0.05	87	83	85	76	70	85	76	49	-
7	Male	83	67	p<0.05	73	92	86	88	65	80	70	75	-
8	Male	98	93	-	95	106	90	88	65	95	79	61	-
9	Male	101	119	p<0.05	110	112	95	106	100	135	122	46	95
10	Male	103	124	p<0.05	114	119	102	106	110	110	113	63	93
11	Female	76	82	-	77	98	78	84	70	75	70	59	128
12	Male	80	77	-	76	95	85	99	70	90	79	50	89
13	Male	101	93	-	97	110	96	109	110	110	113	52	78
14	Male	85	110	p<0.05	97	80	69	71	80	90	83	70	100
15	Male	105	106	-	106	104	108	91	100	105	102	61	98
16	Male	94	118	p<0.05	101	106	98	101	90	90	88	46	86
17	Male	96	96	-	95	114	99	113	85	100	90	-	-
18	Female	94	114	p<0.05	104	100	92	92	90	115	102	69	64
19	Male	105	95	-	100	111	95	104	80	100	88	58	-
20	Female	73	68	-	69	77	76	69	60	65	58	59	65
21	Male	92	124	p<0.05	107	114	100	96	100	100	99	-	87
22	Male	98	92	-	95	108	96	113	90	100	93	55	-
23*	Male	99	87	p<0.05	91	89	89	-	-	-	-	-	-
24*	Male	88	112	p<0.05	100	84	81	-	-	-	-	-	-

*Participant 23/24 unable to complete all assessments due to school refusal/managed move to specialist provision

4.1.2 Cognitive ability: WASI

Mean scores for Verbal IQ, Performance (non-verbal) IQ and Full-scale IQ in the sample fall within the average range. Verbal IQ has the lowest mean standard score of 92.58 compared to Performance IQ and Full-scale IQ (98.38 and 94.46). A paired t-test shows that the difference between mean VIQ and PIQ scores is not significant (t (23) = -2.04 p = .053). IQ scores in the sample range from the extremely low/borderline (<69/70-79) to the superior category (120-129). This wide range of performance (1st to 95th percentile) reflects the heterogeneity of the sample in terms of cognitive abilities. As illustrated in Table 6, a statistically significant discrepancy was observed between individual performance on verbal and non-verbal scores for 50% of the sample ($p < .05$). A total of 9 children scored significantly higher on measures of non-verbal than verbal abilities (PIQ > VIQ), whilst 3 children showed the opposite pattern of performance (VIQ > PIQ). For 6 children, a highly distinct difference was observed; a superior performance on non-verbal measures in the region of 20 - 32 IQ points. Due to the significant discrepancies between individuals' VIQ and PIQ scores, this decreases the reliability of the Full-scale IQ. Therefore both VIQ and PIQ were used in subsequent analyses, rather than the FSIQ.

4.1.3 Reading accuracy and comprehension: NARA-II

As shown in Table 5, the mean reading accuracy score in the sample is 9.13 standard points higher than the mean reading comprehension score (100.21 compared to 91.08). Analysis using a paired sample t-test shows this difference is significant t (23) = -6.22 p <. 001. In a similar pattern observed to cognitive abilities, whilst overall children's reading abilities fall within the average range, a wide variation in individual performance on reading accuracy and reading comprehension is apparent. Reading accuracy scores range from the 6th to the 90th percentile, with 75% of the sample attaining scores within the average range. Four children (17 %) scored 1 SD below and two children (8%) scored 1 SD above population norms. Reading comprehension scores range from the 1st to the 70th percentile, with 83%

scoring within the average range. Three children performed 1 SD below and one child 2 SD's below population norms (13% and 4% respectively), whilst no children performed above population norms. Overall, 83% of children scored within the average range (or above) for both measures of reading accuracy and reading comprehension. As a significant difference in mean standardised scores is evident, a comparison of the performance on both measures was carried out for individual participants (see Table 7).

A total of twenty children (83.3%) scored higher on reading accuracy than reading comprehension, whilst for two children (8.3%) the reverse was observed. Two children achieved an equal score for both reading measures. For the two children (participants 6 and 15) scoring higher in reading comprehension, the discrepancy was only marginal (2 and 4 standard score points, respectively). In contrast, calculated differences in standard scores where an accuracy > comprehension discrepancy was observed (N=20), show that for twelve children (60%), their reading accuracy is at least 10 standard score points higher than reading comprehension; seven children (35%) scored at least 15 points higher. To illustrate, participant 11 (highlighted in yellow) has a reading accuracy > comprehension discrepancy of 20 standard points (98 compared to 78) or 34 percentile points. At the chronological age of 11:10 there is a difference of over 3 years in the child's equivalent reading age for accuracy and comprehension (11:05 compared to 8:02). This indicates that for seven children, whilst their reading accuracy is developing as typically expected, their reading comprehension is considerably below the level expected for their chronological age.

Table 7: Comparison of NARA-II reading accuracy and reading comprehension scores for all participants

Ps	Age	Reading Age (Yrs:Mths)			Standardised score			Percentile		
		Accuracy	*Comprehension*	*Difference (+/-)*	*Accuracy*	*Comprehension*	*Difference (+/-)*	*Accuracy*	*Comprehension*	*Difference (+/-)*
1	11:04	10:10	9:10	+1:00	97	91	+6	42	28	+14
2	11:11	12:10+	11:04	+1:06	119	98	+21	90	45	+45
3	12:01	12:10+	10:07	+2:03	101	93	+8	52	32	+20
4	12:00	10:04	10:04	0:00	92	92	0	30	30	0
5	11:06	10:01	10:01	0:00	94	91	+3	34	28	+6
6	12:06	9:02	9:04	-0:02	83	85	-2	13	16	-3
7	11:06	09:11	09:01	+0:10	92	86	+6	30	18	+12
8	11:06	12:07	9:04	+3:03	106	90	+16	66	26	+40
9	11:05	12:10+	10:01	+2:09	112	95	+17	78	37	+41
10	11: 06	12:10+	12:02	+0:08	119	102	+17	90	55	+35
11	11:10	11:05	8:02	+3:03	98	78	+20	45	7	+38
12	11:07	10:06	8:10	+1:08	95	85	+10	37	16	+21
13	11:05	12:10+	10:04	+2:06	110	96	+14	74	40	+34
14	10:11	7:08	6:03	+1:05	80	69	+11	9	1	+8
15	10:11	11:07	12:08+	-1:01	104	108	-4	60	70	-10
16	11:02	12:02	10:08	+1:06	106	98	+8	66	45	+21
17	11:04	12:10+	11:01	+1:09	114	99	+15	82	48	+34
18	11: 08	11:08	9:10	+1:10	100	92	+8	50	30	+20
19	10: 11	11:05	9:10	+1:07	111	95	+16	77	37	+40
20	10:11	7:05	7:04	+0:01	77	76	+1	6	6	0
21	11: 10	12:10+	11:08	+1:02	114	100	+14	82	50	+32
22	11: 04	12:07	10:04	+2:03	108	96	+12	70	40	+30
23	11:04	9:01	9:02	-0:01	89	89	0	24	24	0
24	11:04	8:07	8:02	+0:05	84	81	+3	14	11	+3

4.1.4 Single word reading: BAS 3

The mean single word reading standardised score of the sample is 94.41, falling within the average range. Again, individual scores ranged widely (see Table 6) from 69 to 113 (2nd to the 81st percentile). A total of 82% of participants achieved a score within the average range, whilst 18% scored below population norms (three children within 1 SD and one child 2 SD's below).

4.1.5 Receptive language ability: CELF-4

As shown in Table 5, the mean score for the Receptive Language Index (RLI) is 88.50, falling within the average range. This a composite score derived from the Concepts and Following Directions (C&FD) and Word Classes – Receptive (WC-R) subtests. The mean score for the C&FD subtest is 83.18 compared to a higher mean score of 95.68 for the WC-R. Comparison using a paired sample t-test shows this difference is significant t (21) = -5.12 p<. 001. Scores on the C&FD subtest range from 60 (0.4th percentile) to 110 (75th percentile). Scores on the WC-R subtest range from 65 to 135 (1st to the 99th percentile).

The difference in individual performance on both subtests was calculated (see Appendix T). Whilst 77% of the sample scored higher on the WC–R subtest, only 4.5% scored higher on C&FD. The remaining participants obtained an equal score on both subtests. Due to the consistent difference in performance on both subtests, this made the use of the RLI score less reliable. Thus, both the C&FD and WC-R scores were used in further analyses in addition to the composite score.

4.1.6 Autistic symptomatology: SRS

Table 5 presents the mean total T-score and mean T-scores for the five SRS subscales, for both parent and teacher respondents. The mean total T-scores obtained via parent and teacher respondents differ considerably (87.13 compared to 58.77), with parents scoring their children's autistic symptoms as

28.36 points higher than their teachers. Analysis using a paired sample t-test confirms that this difference is significant t (15) = -6.24 p<. 001. On the SRS, a T-score of 76 or higher indicates a result in the “severe” range, providing strong evidence for clinical diagnosis. A T-score of between 60 and 75 indicates a result in the “mild to moderate” range typical for children with “mild” ASC’s (Constantino & Gruber, 2005). Therefore, whilst the mean parent T-score would place children in the “severe” range, the teacher T-score falls within the “average” range (i.e. suggesting an absence of an ASC). SRS scores obtained from parent ratings (16 participants) showed that 81% of children scored within the “severe”, whilst 19% scored in the “mild-moderate” range. In contrast, according to teacher ratings (obtained for 22 participants) no children scored within the “severe” range. A total of 10 participants (45%) scored within the “mild to moderate” range, and scores for 12 participants (55%) fell within the “average” range.

The difference between teacher and parent SRS scores for individual participants (where both scores were available) was calculated (see Appendix U). A total of 15 children received a higher parent than teacher SRS score (of note, participant 11’s parent score was more than double the teacher score). The striking differences observed between parent and teacher respondent scores raises questions regarding the validity of rating scales to obtain a measure of autistic symptomatology, particularly as the respondents’ ratings are based upon observations of the children in distinctly different contexts (home and classroom environments).

4.2 Relationship between measures

Pearson correlational analyses were carried out to examine the relationships between all measures, shown in the upper half of Table 8. A number of significant associations between measures were found and it was apparent that Teacher and Parent SRS scores were not significantly associated with any measure. Additionally, first-order partial correlations (shown in the lower half of Table 8) were calculated between measures of verbal ability, reading ability and receptive language abilities, controlling for the effects of non-verbal cognitive ability (Performance IQ).

4.2.1 Relationship between reading comprehension, verbal cognitive ability and receptive language abilities

Significant strong positive correlations were found between measures of reading comprehension and verbal ability (VIQ) $r = .70$, $p < .01$ and reading comprehension and both measures of receptive language ability: (RLI) $r = .64$, $p < .01$. The relationship between verbal cognitive ability (VIQ) and reading comprehension is shown in Figure 3. Thus, higher VIQ scores are associated with higher scores on reading comprehension and the same relationship is evident with participants' performance on measures of receptive language ability. There was also a significant positive association between reading comprehension and non-verbal cognitive ability (PIQ) $r = .46$, $p < .05$, although the strength of the relationship is weaker and less significant than verbal cognitive ability ($r = .70$, $p < .01$)

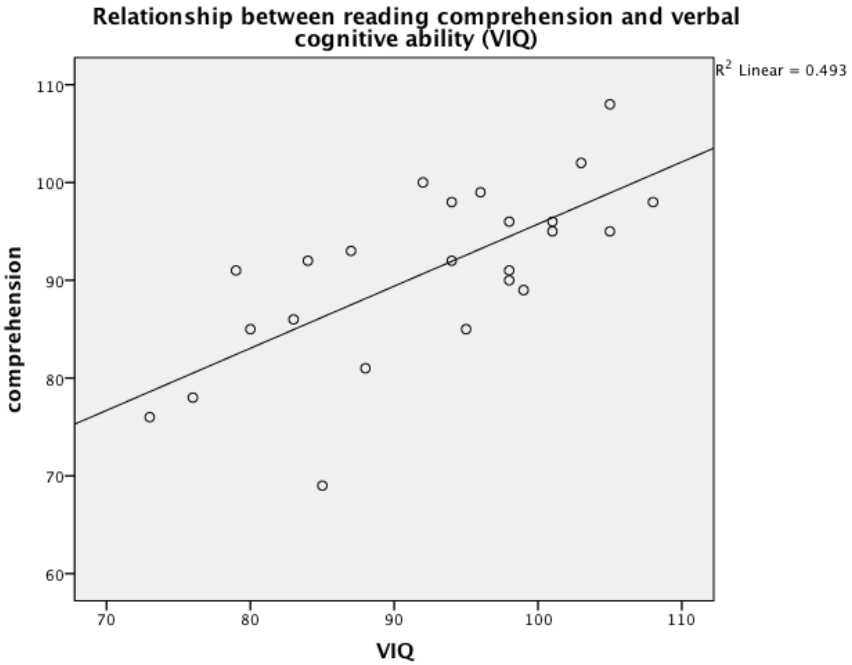


Figure 3

Table 8

Pearson correlations for measures of cognitive ability, reading, receptive language ability and autistic symptomatology.

Partial correlations for verbal IQ, reading and receptive language ability controlling for non-verbal cognitive ability (PIQ)

Measure	*Verbal IQ*	*Reading accuracy*	*Reading Comprehension*	*Word Reading*	*Word Classes - Receptive*	*Concepts & Following Directions*	*Receptive Language Index*	*SRS Teacher*	*SRS Parent*
Performance IQ	**.56****	**.51***	**.46***	.36	**.71****	**.71****	**.74****	-.25	.10
Verbal IQ	**-**	**.67****	**.70****	**.61****	**.81****	**.67****	**.79****	-.26	-.09
Reading Accuracy	***.65*****	**-**	**.81****	**.88****	**.71****	**.69****	**.74****	-.31	.11
Reading Comprehension	***.61****	***.69*****	**-**	**.74****	**.58****	**.65****	**.64****	-.25	.10
Word Reading	***.58****	***.85*****	***.66****	**-**	**.63****	**.62****	**.66****	-.32	.04
Word Classes-Receptive	***.69*****	*.49*	*.27*	***.57****	**-**	**.76****	**.94****	-.31	-.02
Concepts & Following Directions	***.56****	*.44*	*.45*	***.53****	*.51*	**-**	**.93****	-.34	.10
Receptive Language Index	***.73*****	***.56****	*.40*	***.66*****	***.89*****	***.83*****	**-**	-.36	.05
SRS Teacher								**-**	-.13
SRS Parent									**-**

***Significant at the 0.05 level (2-tailed); **Significant at the 0.01 level (2-tailed)**

Controlling for the effects of non-verbal cognitive ability (PIQ), a strong significant relationship remains between verbal cognitive ability (VIQ) and reading comprehension: $r = .61$, $p < .05$.

4.2.2 Relationship between reading accuracy, word reading and reading comprehension

Figure 4 shows a strong significant positive association between reading accuracy and reading comprehension scores in the sample $r = .81$, $p < .01$. As shown in Table 8, there is also a strong significant relationship between word reading and reading comprehension $r = .74$, $p < .01$. Partial correlations also find significant correlations between these measures, marginally decreasing in strength: $r = .69$, $p < .01$ for reading accuracy and comprehension; $r = .66$ $p < .05$ for word reading and reading comprehension. Therefore, accounting for the effects of non-verbal cognitive ability, individuals who obtained higher scores on measures of reading accuracy and word reading also achieved a higher reading comprehension score. As would be expected, there is a significant positive correlation between participants' performance on measures of reading accuracy (NARA-II) and word reading (BAS 3): $r = .88$, $p < .01$. Thus, individuals who attained a higher word reading score also attained a higher reading accuracy score (i.e. made less errors when reading a passage of text).

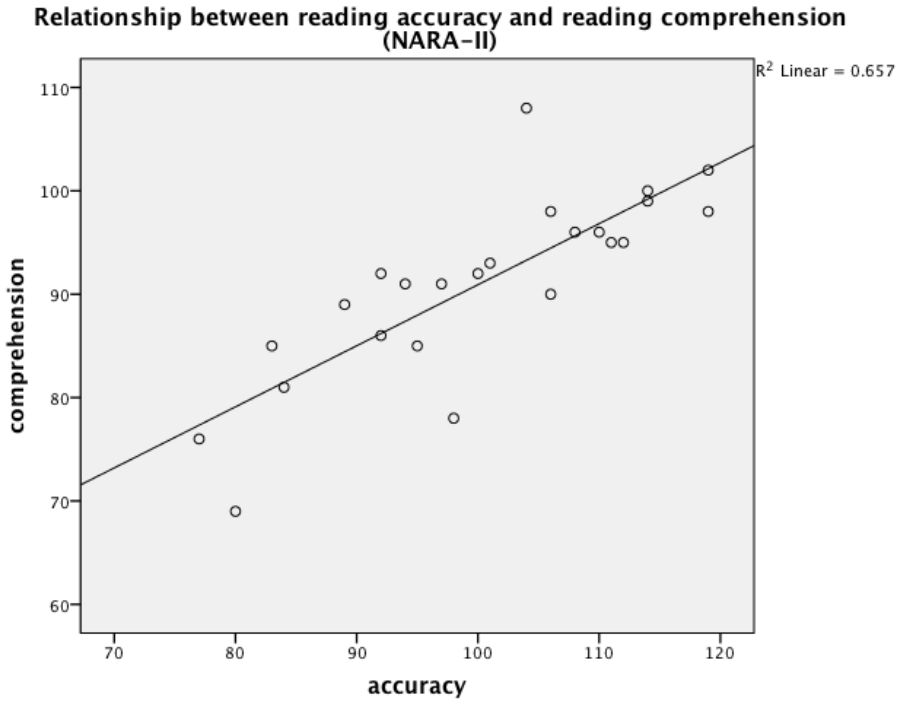


Figure 4

Overall, as shown in Table 8, there were significant positive associations between all measures of reading ability (accuracy, comprehension, word reading) and verbal cognitive ability. This includes a strong positive correlation between reading accuracy and verbal IQ: $r = .67$, $p < .01$ and word reading and verbal IQ ($r = .61$, $p < .01$). Partial correlations show that the previous associations remain significant when controlling for the effects of non-verbal cognitive ability (see Table 6).

Positive significant correlations were also found between all measures of reading ability and the individual receptive language subtests, Concepts & Following Directions (C&FD) and Word Classes-Receptive (WC-R). For example, reading accuracy and C&FD ($r = .69$, $p < .01$) and word reading and WC-R ($r = .63$, $p < .01$). Thus, those children obtaining higher reading accuracy and word reading scores had higher measures of verbal cognitive ability and receptive language ability. It is noted that partial correlations between C&FD, WC-R scores and word reading remain significant ($p < .05$), however, after controlling for the effects of non-verbal cognitive ability, correlations between reading comprehension, reading accuracy and both individual measures of receptive language no longer reach statistical significance.

There was also a significant positive association between reading accuracy and non-verbal cognitive ability (PIQ): $r = .51$, $p < .05$, although it is a weaker, less significant relationship than verbal IQ ($r = .67$, $P < .01$). There was no significant association between word reading and non-verbal cognitive ability.

4.3 Analysis of component comprehension skills

4.3.1 Patterns of strengths and weaknesses in component comprehension skills

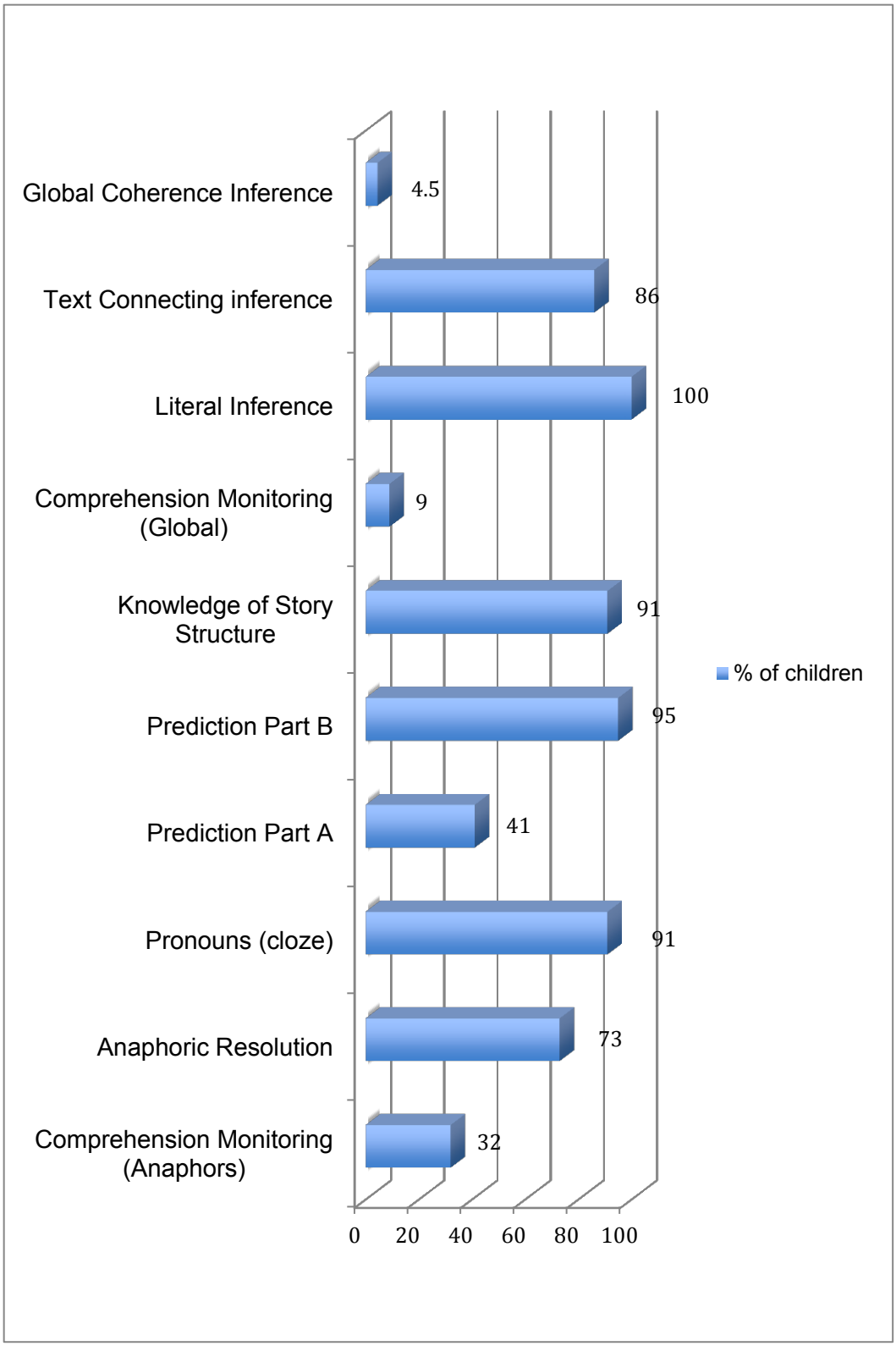
Individual scores on component comprehension tasks are shown in Table 9. Therefore, a 'profile' of comprehension skills for each participant is presented, allowing a comparison of performance (i.e. identifying areas of competence and difficulty) on the different component comprehension skills. It also highlights patterns of competence and difficulty across the whole sample. To illustrate, Figure 5 shows the percentage of children scoring 50% or higher on each individual component comprehension task. This clearly indicates that the children in the sample demonstrate competence in the following areas: Anaphoric resolution (73%), Identification and agreement of pronouns (91%), Knowledge of story structure (91%), Literal understanding (100%), Prediction – Part B: linking clues in the text to known story events (95%) and resolving Text-Connecting Inferences (86%). Conversely, participants experienced particular difficulties in the tasks involving Comprehension Monitoring – Anaphors (32%), Comprehension Monitoring – Global (9%), Prediction – Part A: making predictions about future events (41%) and resolving Global Coherence inferences (4.5%).

Table 9: Scores for all participants on component comprehension skill tasks

Ps	Comprehension monitoring: Anaphors (Max 7)		Anaphoric resolution (Max 20)	Pronouns (cloze) (Max 7)	Prediction parts A & B (Max = 2+ 2 = 4)		Knowledge of story structure (Max 19)	Comprehension monitoring: Global (Max 8)	Inference Literal/Text Connecting/ Global Coherence (Max= 5+5+5 =15)			
	Before prompt	*After prompt*			*A: Ps Predict*	*B: Linking clues to events*			*Literal*	*Text*	*Global*	*Total (15)*
1	5	0	12	6	0	1.5	13	8	5	3.5	2	10.5
2	2	0	15.5	6	0	1.5	19	4	4.5	4	2	10.5
3	2	0	9.5	6	1	2	19	2	5	3	0	8
4	1	0	9.5	4	1	2	17	2	4.5	3	0	7.5
5	1	0	10.5	5	0	1	19	2	4	4	1	9
6	3	2	12	7	0	1	15	0	3.5	3.5	1	8
7	1	0	10	6	1	1.5	17	2	4	4	1	9
8	5	0	14	7	1	1.5	13	0	4.5	2	1	8.5
9	2	0	18.5	6	2	2	12	6	4.5	4	1	9.5
10	5	0	18.5	7	1	2	19	6	5	3.5	4	12.5
11	3	0	9	6	0.5	2	11	0	5	2.5	2	9.5
12	1	0	15.5	2	0	1	8	0	5	3	2	10
13	7	N/A	17.5	6	1	2	19	3	4.5	2	2	8.5
14	0	0	7	4	0.5	1	7	0	4.5	3	1	8.5
15	2	0	15	5	1	1	18	4	5	3	1	8
16	1	1	14.5	6	0	2	19	2	4.5	3	1	8.5
17	5	0	9	5	0	2	19	7.5	5	3.5	0	8.5
18	0	1	12.5	7	0	1.5	17	0	5	3.5	1	9.5
19	0	0	13	5	0	1	17	4	4.5	3	2	9.5
20	0	0	3	0	0	0	12	0	5	2	1	8
21	5	0	15.5	6	0	2	19	4	5	5	2	12
22	1	0	13.5	6	1	2	19	6	3	4	1	8

Figure 5

Percentage of children scoring 50% and above on component comprehension skill tasks



4.3.2 Correlational analyses of component comprehension skills and standardised measures of reading accuracy and reading comprehension

Visual analyses of data distributions for all component tasks, together with results from the Kolmogorov-Smirnov test of normality (see Appendix V) confirm that 7 measures are significantly different from a normal distribution. Therefore, Spearman correlation coefficient analyses were carried out (see Table 10) to establish associations between component comprehension skills and standardised reading accuracy and comprehension measures (NARA-II).

As shown in Table 10, significant associations were found between reading comprehension (RC) and performance on four component comprehension skill tasks: Anaphoric resolution ($r = .60$, $p < .01$); Prediction Part B ($r = .50$, $p < .05$); Knowledge of story structure ($r = .78$, $p < .01$); Comprehension monitoring - Global ($r = .74$, $p < .01$). Thus, children obtaining higher standardised reading comprehension scores also gained higher scores on measures of the four comprehension skill areas. Participants' performance on the aforementioned comprehension tasks was also significantly associated with reading accuracy (RA) scores: Anaphoric resolution ($r = .67$, $p < .01$); Prediction Part B ($r = .56$, $p < .01$); Knowledge of story structure ($r = .59$, $p < .01$); Comprehension monitoring – Global ($r = .68$, $p < .01$). Additionally, there was a significant association between reading accuracy and Comprehension monitoring – Anaphors: $r = .48$, $p < .05$. Children achieving higher scores on the task requiring comprehension monitoring in relation to anaphora (pronouns) also gained higher standardised reading accuracy scores.

With respect to the component comprehension skill tasks, a number of significant associations were found. This included a significant positive relationship between Comprehension monitoring – Global and participants' scores on the task requiring Text-connecting inferences ($r .50$, $p < .05$). Also, those children gaining higher scores on the Anaphoric resolution task also performed better in the task requiring global coherence inferences to be made

(r = .54, p < .01). As would be expected, participants' scores on the Comprehension monitoring - Anaphors task were positively correlated with scores on the Pronoun task (r = .59, p < .01). It is interesting to note that performance on the task requiring retrieval of literal information was not significantly correlated with either standardised measure, or performance on any other component comprehension skill task. This concurs with the finding that answering literal questions was an area of strength within the entire sample; those children showing competence in this skill do not necessarily obtain a higher standardised reading comprehension score, nor demonstrate competence in tasks measuring other component comprehension skills.

Table 10 Spearman correlations for component comprehension tasks and standardised reading measures (RA, RC)

Measure	*RA*	*Comp monitoring (Anaphors)*	*Anaphoric resolution*	*Pronouns (cloze)*	*Prediction Part A*	*Prediction Part B*	*Story Structure*	*Comp monitoring (Global)*	*Literal*	*Text - connecting inference*	*Global coherence Inference*
RC	**.85****	.40	**.60****	.21	.14	**.50***	**.78****	**.74****	.15	.34	.11
RA	-	**.48***	**.67****	.36	.12	**.56****	**.59****	**.68****	.15	.30	.35
Comp monitoring (Anaphors)		-	.39	**.59****	.11	**.50***	.32	.33	.20	.02	.25
Anaphoric resolution			-	.39	.21	.25	.30	.39	-.03	.25	**.54****
Pronouns (cloze)				-	.19	.38	.24	.07	-.12	.24	.20
Prediction Part A					-	**.42***	.00	.15	-.18	-.11	-.21
Prediction Part B						-	**.47***	**.43***	.09	.16	-.05
Story structure							-	**.52***	-.11	.37	-.05
Comp monitoring (Global)								-	.05	**.50***	.17
Literal									-	-.26	.20
Text-connecting inference										-	.04
Global coherence inference											-

*** Significant at 0.05 level; ** Significant at 0.01 level**

4.4 Qualitative analysis

A thematic analysis was carried out to analyse the 22 semi-structured interviews. It is important to note that the participants varied considerably in the extent to which they were able to give full answers and explanations to the 13 questions, as was reflected in the variable length of the interviews (ranging from 0:3:41 to 0:9:09). Some participants gave very limited answers, whilst others gave detailed responses and discussed examples related to their own experiences. This was expected in light of the participants' varied verbal and language abilities, as measured by scores of verbal cognitive ability (VIQ) and receptive language ability (RLI).

Having undertaken a qualitative analysis, following the stages of the process as outlined in Chapter 3, four main themes were identified: Purpose of reading for children with ASC's; ASC 'style' affects reading; Extracting meaning and Concept of reading and the reading process. A discussion of each individual theme is accompanied by a visual figure in order to present the overall theme and sub-themes (solid lines) and to visually represent the links between the sub-themes (broken lines). Quotations from the individual participants' transcripts are incorporated within the narrative, to further illuminate the theme and sub-themes identified.

4.4.1 Theme 1: Purpose of reading for children with Autism Spectrum Conditions

A total of 20 of the 22 children thought that reading was important, however their responses indicated many individual differences in terms of their own perspectives on the purpose of reading. The five sub-themes that were identified within this theme were: Special interests, "Just to read", Solitary time, Life skills and Functional role. A further sub-theme 'Literal vs. holistic understanding' was found to mediate the final two sub-themes, as illustrated in Figure 6.

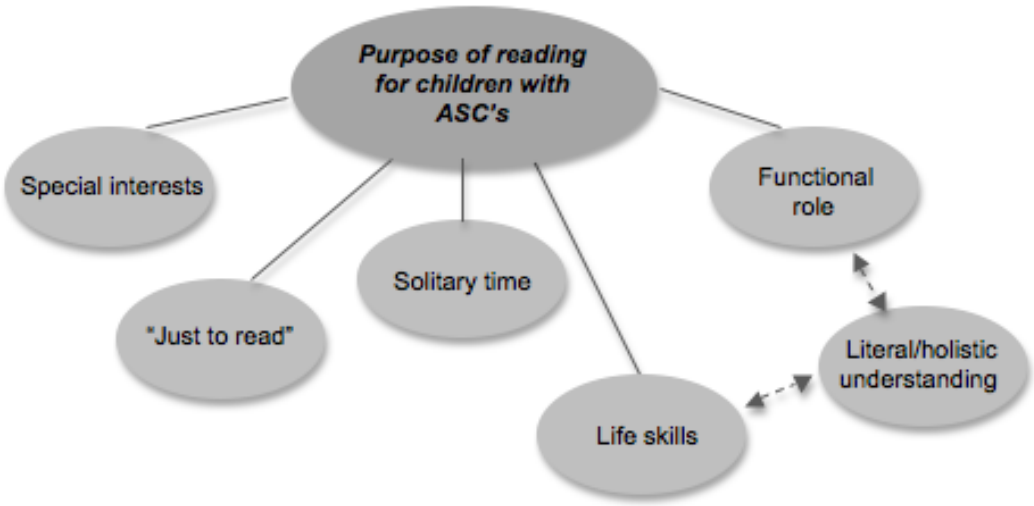


Figure 6: Theme 1

For five of the children, reading gave them the opportunity to pursue their own special interests; a particular subject or topic on which they sought further information and for one participant, reading material on an area of interest in her own words, fulfilled an 'obsession'.

"I do (read fact books) about dinosaurs… I want to be a palaeontologist." (Participant 17)

"I've got the Titanic…it's a real girl's diary made into a book. I'm obsessed with the Titanic. I've finished it and I've restarted it… I've read it about fourteen times." (Participant 3)

The majority of children (seventeen) indicated that reading was an activity that was undertaken on their own, rather than a shared experience with others. This response was seen as fairly typical in light of the nature of reading itself. However, five children went on to express that reading actually provided an opportunity for solitary or private time and space alone.

"I sneak books into my bed and read at night… my mum doesn't know I do it unless she catches me." (Participant 10)

"(I read at home) when I need a bit of time alone" (Participant 12)

The responses of fourteen participants portrayed reading as serving a functional role, linking reading either to the ability to complete specific tasks or gain a specific achievement. Examples given by the children included making a speech, signing a contract, getting a job, achieving a good grade in reading, being able to write and spell words, and following a recipe.

"…because if you want to know a recipe which is like in a cook book which I cook a lot sometimes, you need to read it to see how to you know you need to mix the strawberries in mix the apples in yeah and stuff like that". (Participant 19)

However, it was clear that five children conveyed a more holistic perception of reading, viewing it in terms of being a 'life skill'. It appeared that those participants who viewed reading as having a functional purpose tended to take a more literal interpretation, demonstrating a more literal level of understanding than those who reflected upon the purpose of reading in a wider, more holistic sense (as illustrated by participants 8 and 15).

"Well reading is just like one of the greatest experiences in your life really. It will be very important to you, one of the most important lessons of your life."
(Participant 8)

"There's a lot of things you need to read. First of all my sister my little sister is six-sevenish and she can't read yet and there's a lot of things she can't do just cos she can't read….you've got to read signs, junctions, books, work, all sorts of stuff."
(Participant 15)

Although participants reflected upon the different purposes of reading, there was a strong sense that two children perceived reading as self-contained, an activity in its own right, without linking it to other purposes and thus, engaged in reading, "just to read".

"I just want to read the book. I don't really like having any questions asked of me I just want to read the book."
(Participant 16)

4.4.2 Theme 2: Autism Spectrum Condition 'style' affects reading

From the initial stages of analysis, the individual nature and characteristics of each participant with an ASC was inherent within the interview transcripts. It became apparent through further stages of analysis that the different 'styles' of individuals with ASC could be linked to several aspects of reading.

The sub-themes identified within this theme were: Literary preference: fact vs fantasy (this was also found to be mediated by gender), Specific interests, Approach and attitude to reading, Motivation, Monotropism/Polytropism and Self-awareness and reflection. As shown in Figure 7, links were evident between several sub-themes.

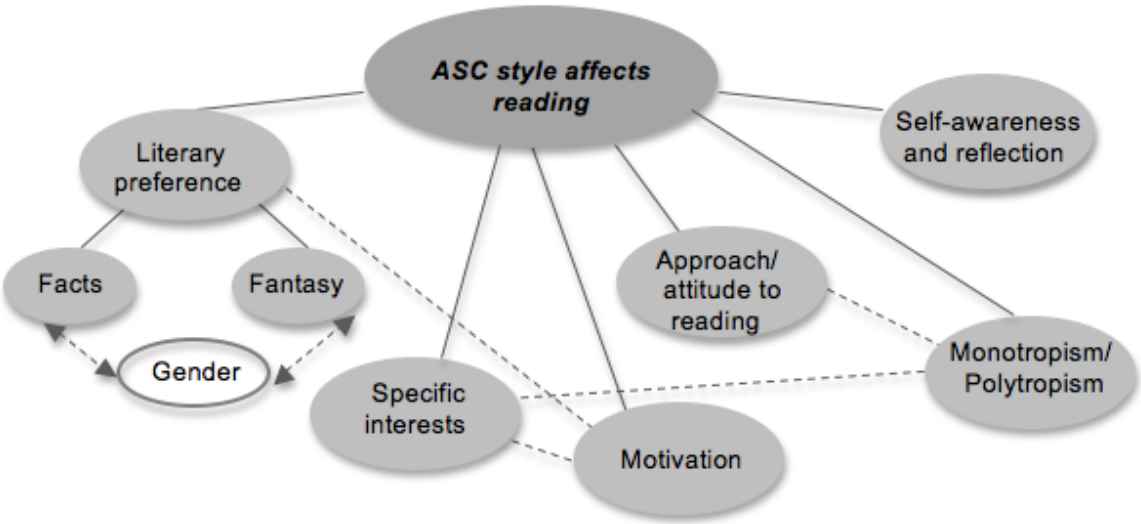


Figure 7: Theme 2

A total of nineteen participants expressed particular preferences in relation to their choice of reading material. Six children indicated a strong preference for fact and information books, and for some children this was also linked to a particular topic. Thus, as highlighted in theme 1, pursuing specific interests continued to be pertinent for several children (including participant 16).

(Why don't you like reading?) "It's just like I have to read fiction books and I like to read non-fiction" (Participant 12)

"Either books like D-Day or something like Battle of Britain trenches or a biography or something like that …they're all to do with the Second World War". (Participant 16)

It was interesting that all female participants (five) expressed a preference for stories and narrative, as did six of the males. These children spoke about reading specific genres (including adventure, horror and comedy) and several children followed a particular author or series of books. It appeared that the type of reading material and level of interest was associated with a child's motivation to engage in reading activities, as illustrated by participant 15.

"It depends if it's on action stories or like Pokemon but if its something I've read like something really dull like princesses or work I just don't like it". (Participant 15)

"I do like you know Anthony Horowicz? I like my favourite book is 'Crocodile Tears' by him… I like the stuff about spies and things like that." (Participant 17)

It became clear that the individual participants differed considerably in their approach and attitude to reading. Some children took a pragmatic stance, whereby reading was viewed as an activity linked to a particular outcome (e.g. academic achievement) and not as something they engaged in through choice. However, conversely, for other children reading was undertaken regularly and was considered as fulfilling a more integral role for them. The two differing approaches are highlighted through the words of participants 4 and 8:

"I don't really like reading books. When I have to I read." (Participant 4)

"Well I have to say reading is very much a part of my life. I have needed it so importantly so much because it explains everything to me really well." (Participant 8)

Further, individuals' approach to reading appeared to be linked to the theory of 'monotropism' (Murray 1992 cited in Murray, Lesser & Lawson, 2005), specifically the extent to which they adopted a 'monotropic' or 'polytropic' style. Those children who expressed a desire to pursue areas of specific

interest appeared to exhibit a more 'monotropic tendency', referring to having a few, highly aroused and motivated interests. This can be highlighted through examining responses from participant 16, relating to his approach and attitude to reading. This child spoke animatedly about reading in terms of gaining and exploring information about World War II, his particular area of interest *(response a)*. However, when discussing reading more generally (aside from pursuing his personal interests) this revealed a more negative attitude and approach to reading *(response b):*

Response a:
"If you're reading about a biography (WW2) then it tells you about someone who's life and was like really really erm (oh god how do I put it?)… like full of erm all of like friends dying and all of that stuff or oh God and homes being bombed and family getting killed and all that sort of stuff... So basically, it talks about that person's life and what happened".

Response b:
"If they read, if they keep on reading and do what their parents tell them to they might not have the time to do the things they want."

In addition to being linked to participants' approach and attitude to reading, behaviours associated with a 'monotropic style' were also communicated by the children, particularly in relation to the allocation of attentional resources during reading. According to the theory of monotropism, individuals with a 'monotropic tendency' have inhibited attentional resources and have a narrower range of focus, thus impacting upon their ability to successfully undertake the activity of reading within their environment. The responses of both participants 5 and 17 seem to reflect this. Interestingly, participant 3 communicates the opposite style (more aligned with polytropism), as rather than limiting distractions, this child sought to increase environmental stimuli in order to help her to focus whilst reading. In light of the proposed changes to the diagnostic criteria for ASD (DSM-V), acknowledging the presence of sensory issues, these responses might also be reflective of individual sensory sensitivities. Whilst reducing sensory stimuli such as noise (participant 17)

appears to indicate hyper sensitivity, actively seeking a higher level of sensory stimuli (participant 3) indicates hypo sensitivity.

"Sometimes if you're reading a book and someone calls you to do something you go and do that and then you forget what happens. Then you feel like you've got to read it again". (Participant 5)

"I like reading somewhere quiet like in my room when there's nobody around then I can imagine what's going in my head… when they're making noise you can't really imagine it. Sometimes I sort of stick my fingers in my ears and then read it". (Participant 17)

"Usually cos I can't focus on one thing I can focus on like ten things, I'd put all the TV noise up then I'd start reading". (Participant 3)

The final sub-theme that emerged refers to the extent to which the individuals demonstrated self-awareness and were able to reflect upon themselves as readers. It became clear that participants differed considerably in terms of their level of self-awareness, not only in terms of reading but also, in terms of their ASC diagnosis. Only one child (participant 10) directly associated his diagnosis of Autism and ADHD to his reading experiences, communicating the difficulty he faces with the task of reading aloud in the classroom environment (in front of peers). However, several children were able to reflect upon their experiences of becoming a reader (i.e. learning to read). It was mostly communicated that they initially had difficulties with reading (specifically in relation to decoding the actual words and developing fluency), but these became less apparent over time.

"In front of my class I can't really read anything in front of my class, its just hard for me… I just get really nervous and I normally wouldn't know what to do. It's a bit of stage fright I mean it's hard for me in a position where I'm not comfortable. Which is hard for me because I have an Autism ADHD. It's basically like taking a fish out of water" (Participant 10)

Only three participants were able to reflect upon reading at a deeper level, in terms of conveying a sense of 'attunement' to the mental processes involved in reading. This was elicited through reflections showing a degree of awareness of mental processes, including imagination, visualisation and concentration.

"Well I do like erm I like doing reading because like with the different books it's like when I read its like I can picture the story in my head". (Participant 13)

"Concentration. Blocked mind basically" (Participant 15)

4.4.3 Theme 3: Extracting Meaning

The third major overarching theme emerging from the thematic analysis was assigned the broad heading, 'Extracting meaning'. This encompassed eight related sub-themes, presented in Figure 8: Weakness with spontaneous comprehension; Repetition and Rehearsal; Fragmented style; Concept of purpose of reading; Seeks mediation; Ignore/avoid upon difficulty; Interest promotes understanding (Motivation/memory) and Holistic sense of narrative. Again, links between the sub-themes are identified.

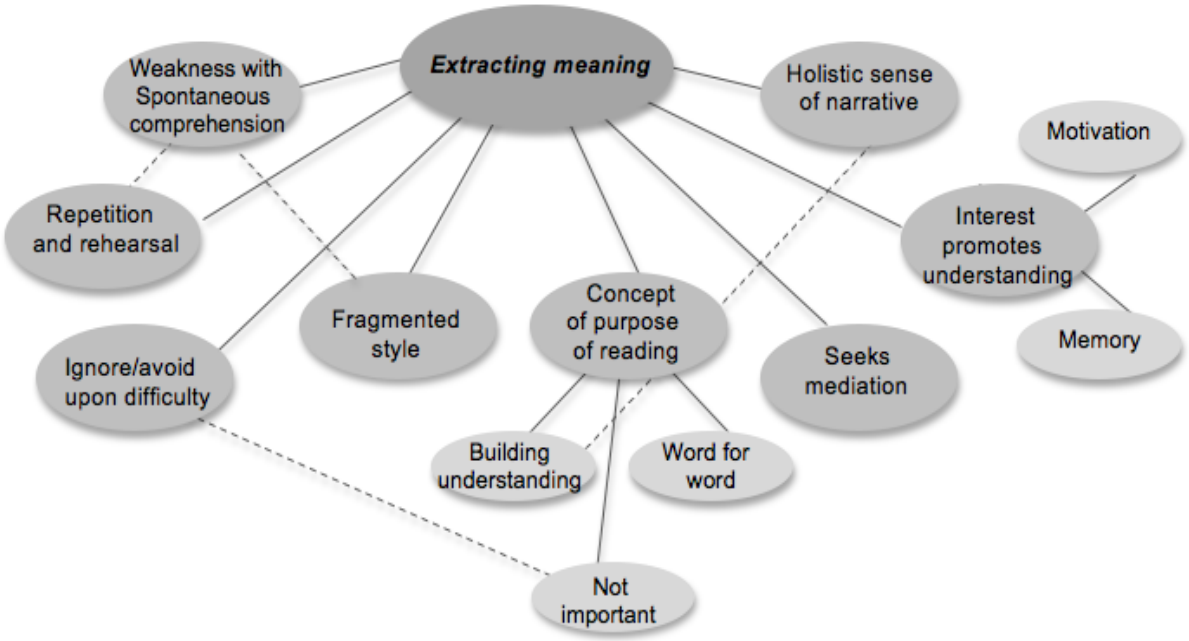


Figure 8: Theme 3

It emerged through the analysis that the majority of the children's responses indicated a general weakness with spontaneous comprehension in the sample. This was evident through the participants' discussions of their reading experiences and explanations of strategies they used upon encountering confusion. In particular, the strategies identified as the sub-theme 'repetition and rehearsal' were discussed by nine children. This included re-reading parts of text, or reading the whole text more than once to help gain understanding. The responses of several participants indicated that sometimes despite applying such strategies, their confusion and lack of understanding persisted.

"I like to read it again then I might read it again after that and then like I might get it in my head and know what it says but if I don't I just ask someone what it said." (Participant 2)

"Read it again usually, read it again and again until I actually know… If I've read it more than once and don't understand err, I will probably just skip it because it's not all that bad you can still understand the whole story" (Participant 19)

Only one child (participant 15) communicated that he didn't generally experience confusion when he was reading and if he occasionally did, he attributed this to losing concentration ('daydreaming'), which could be easily remedied by re-reading. This child identified himself as, 'quite an advanced reader'. It was also noted he attained the highest reading comprehension score in the sample on the NARA-II.

Another sub-theme that was identified referred to two participants whose responses revealed a 'Fragmented style' in their reading, which also linked to their weaknesses in spontaneous comprehension. Rather than making connections between different parts of the text (between different pages and chapters) these children appeared to read the different parts of text as unrelated chunks of information, and thus, were unable to establish links and build understanding.

"Cos you concentrate on one page and then on the other page, on the page before you forget what happened". (Participant 1)

However, several participants possessed a more holistic sense of narrative; the need to integrate different parts of the text but also, demonstrated an awareness of the fundamental elements of a narrative (including the protagonist and significant events). There also appeared to be a link between responses referring to making connections between different parts of the text to derive meaning and conveying a concept of the purpose of reading that acknowledged the need to build an overall understanding (see Figure 13).

"I'd normally read a little bit onwards and see if I can make sense of it, see if I can find anything that may help me link to it. If I can't find anything just go on with the story and ignore it" (participant 10).

"I would read the next chapter and see if I could make sense of the other one." (Participant 6)

As already highlighted, if strategies such as re-reading or 'reading on' to establish meaning were unsuccessful, a number of children acknowledged that they would then skip the confusing part and continue to read, or alternatively, seek mediation. For nine participants, opting to ignore a part of the text that caused confusion or to seek mediation (from a teacher or parent) did not follow an attempt to clarify understanding, but was their first response. For those four participants who opted to ignore a word or part of text upon difficulty, this also suggests that their concept of the purpose of reading does not place emphasis on extracting meaning from the text.

"I say its too confusing so I can't read it… I like ask the teacher or my mum". (Participant 11)

"Mmm nothing, I just skip it if I can't do it". (Participant 5)

Whilst some participants did acknowledge the purpose of 'reading for meaning', it was also apparent that one participant conceptualised this very literally, in terms of it being essential to understand every word and recall every detail within a text, so as to know the book, in his own words, "off by heart".

A sub-theme identified within themes 1 and 2, referring to children's 'special interests', is also relevant in relation to 'extracting meaning'. Two participants communicated that when reading material is of interest to them, this in turn promotes their understanding. Whilst participant 15 acknowledged the affect on his performance, participant 3 explained how this was conducive to her memory skills.

"If I've been thinking about something else no (I couldn't answer questions) but if its something I like I normally do much better work on it". (Participant 15)

'If I like something like Titanic then I'll remember everything about it. I don't remember stuff that I don't like'. (Participant 3)

4.4.4 Theme 4: Concept of reading and the reading process

The final theme that emerged through the analysis referred to the participants' concept of reading and the reading process. Although there are two main sub-themes: 'Holistic approach' and 'Reductionist/mechanistic' approach, the sub-themes were further broken down as illustrated by the headings in Figure 9.

As acknowledged through the narratives exploring themes one to three, considerable differences were evident in the responses of individual participants. Therefore, whilst the main sub-themes identify two different approaches, this does not portray a crude assumption that every participant adopted one approach rather than the other. Whilst the responses of some individuals did convey a particular approach, through the analysis, the two sub-themes were considered as a spectrum. Thus, individual participants

ranged from holistic to reductionist/mechanistic with regard to their conceptualisation of reading and the processes involved in reading.

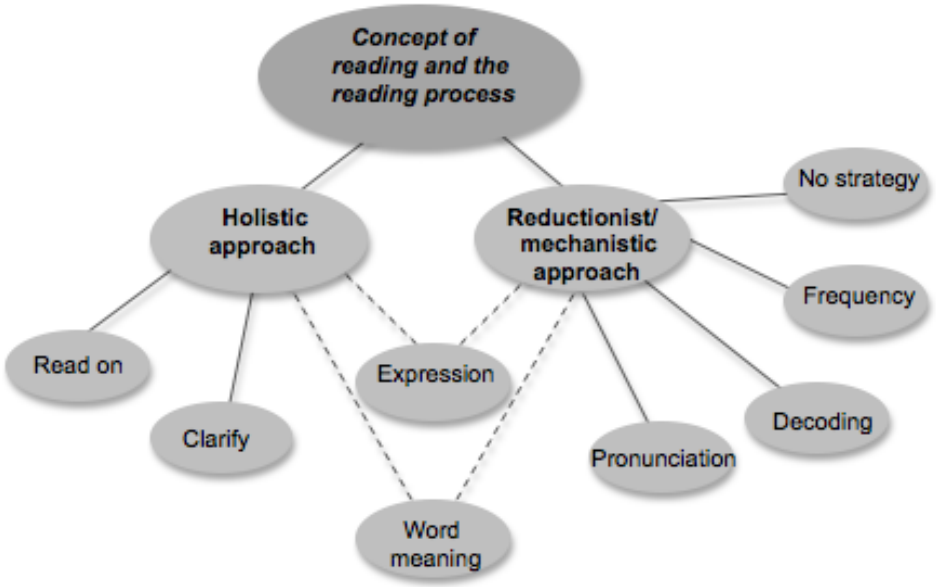


Figure 9: Theme 4

A total of eight participants shared responses that could be considered as reflecting a more reductionist approach to reading. Several children did not readily discuss the use of strategies when reading, nor acknowledge skills related to the reading process. Seven children expressed that the frequency of reading (i.e. practice) or actually having many books indicated competency. Whilst these may indeed be factors associated with individuals regarded as competent readers, it portrays a reductionist perspective.

"Do you know the only thing you can do to be good at reading is read? You should know that." (Participant 14)

"Well they (good readers) tend to have lots of books and read a lot". (Participant 10)

When children in the sample discussed their own experiences of using strategies to facilitate reading, there tended to be a greater focus on the mechanics of the reading process, including phonetic strategies and 'breaking down' enabling them to decode individual words. A total of twelve children

made reference to using such decoding strategies. Additionally, three children spoke about the importance of pronouncing words or knowing how to say the individual words clearly and accurately.

"Well sometimes I break the text into little extracts and then read from there. Sometimes if I come across a word for example, 'espreyalafranchinayesprey aladocious' I'll break it down into little parts, then I'd say the word slowly."
(Participant 12)

"Mmm I'm not sure to be honest, I don't know how… I'll just ask the teacher usually or spell it out. It doesn't matter that I don't know the meaning of it at the moment but it's just important that I say the word". (Participant 4)

As illustrated by the links between sub-themes in Figure 14, there were some participants who talked about strategies or skills that signified a position between a reductionist and holistic conceptualisation of reading and the reading process. For example, seven participants spoke about using a dictionary or thesaurus to support them in reading. Whilst for two individuals a dictionary would be used in order to spell out or say the word (referring to the syllables), the others showed an awareness that the purpose of using such materials was to establish word meaning. Additionally, participant 2 highlighted that a competent reader used expression whilst reading, giving an example to demonstrate this. As being able to identify the appropriate expression or intonation when reading involves having awareness beyond the individual words (reading within context), this appears to be less mechanistic than decoding strategies and moving toward a more holistic approach.

"Someone who like say there was like expression in it like an exclamation mark, someone who reads it like say 'Thomas shouted' or something they would say it in a loud voice like not just in a normal voice". (Participant 2)

Within the sample, a total of nine participants shared responses that could be considered as reflecting a more holistic concept of reading and the reading process. Many of these children also commented upon the use of mechanistic

strategies such as decoding, but they showed an awareness of more holistic approaches in order to derive meaning from text. Four participants explicitly associated the notion of a competent reader with the fundamental ability to understand what they were reading. A more holistic approach also became evident through the children's explanations of strategies they used, such as reading further ahead to gain understanding and being able to identify within the text where they had become confused so they could then remediate misunderstandings and gain clarification.

"If they can understand all of it, or say all of it or remember it. They take it all in and just understand what they was reading." (Participant 1)

"I usually go back, I go back where I thought it was confusing and I see what I read before and then I read it again and usually it makes sense after that". (Participant 9)

4.5 Interim Discussion: Summary of Study One and rationale for Study Two

The initial exploration of reading skills in a sample of children with an ASC allowed a comparison of reading accuracy (decoding) with reading comprehension skills. Analysis of standardised scores highlighted that although the majority of participants achieved scores within the broad average range, a discrepancy between reading accuracy and reading comprehension (higher reading accuracy scores) characterised the sample. These findings will be considered in more detail in the 'General Discussion' (see Chapter 7), and with relation to existing research in this field. However, overall, the results support the growing evidence base that has identified a tendency for young people with ASC's to experience difficulties with reading comprehension. Therefore, this further highlights the necessity for purposefully designed, evidence-based interventions for this group, in order to support them to develop their reading comprehension skills.

After having identified the reading and cognitive 'profiles' of the children in the sample (discussed in Chapter 7), an exploration of a number of component comprehension skills was carried out. These discourse level skills have been identified within the research literature as being involved within the complex process of comprehending written text. An analysis of the performance of the individual children in the sample on the component tasks enabled general patterns of competence and difficulty to be identified. This was of particular relevance in the development of the Reading Comprehension Intervention, as outlined in detail in Chapter 5 and accompanying appendices. Namely, those areas where participants demonstrated difficulties were identified as key skills to be targeted through the individual intervention sessions. Specifically, scores on the component tasks highlighted that the participants experienced difficulties with comprehension monitoring (both at the sentence level and to gain a holistic understanding of the main ideas in the text), resolving global coherence inferences (i.e. drawing upon and integrating their own background knowledge in order to achieve a full understanding) and making predictions about future events. Therefore, the analysis undertaken in Study One informed the researcher's selection of approaches and strategies to be incorporated within the intervention: they must directly target or facilitate the development of these skills. Additionally, the development of the intervention was further informed through the insights gained via a thematic analysis of the individual semi-structured interviews. The responses indicated that many of the children required support in order to develop a more holistic understanding of the reading process (i.e. to read in order to achieve meaning), to develop their awareness of their own reading abilities and the thought processes involved in reading (metacognition), together with the need to develop their knowledge and awareness of strategies to support reading comprehension.

As described in the following chapter, the researcher ensured that the approaches used within the intervention and both the structure and content of the sessions, would provide opportunities to develop the aforementioned skills. Considerable attention was also directed to the development of

strategies and materials that were particularly appropriate for learners with an ASC (for example, designing visual aids to support verbal explanations and discussions).

Chapter 5
Study Two: Methodology

This chapter describes in detail the development of the reading comprehension intervention. Firstly, the rationale for the use of a multiple-case study design is explained. This is followed by details of how participants from Study One were selected for involvement, and how the component comprehension data was analysed to inform the planning of the individually tailored intervention. The rationale for the use of particular approaches within the intervention is outlined, together with the quantitative and qualitative measures used in order to evaluate the intervention.

5.1 Rationale for a multiple-case study design

The potential value of incorporating multiple-case studies as part of larger mixed-methods research is acknowledged by Yin (2009), allowing the researcher to "collect a richer and stronger array of evidence than could be accomplished by a single method alone" (p63). It was decided that by incorporating a multiple case-study design, this would allow an in-depth exploration of children with an ASC and their reading comprehension abilities in several ways: 1) to illuminate individual difficulties associated with reading comprehension as identified through stage one; 2) to explore how the children participated in an individually-tailored reading comprehension intervention, in terms of their individual learning needs and adoption of strategies; and 3) to evaluate their involvement in the intervention, in terms of performance (including identifying areas of progression and continued difficulty) and their own awareness and reflections of their learning. It was deemed that a multiple rather than single case study would enable the researcher to explore and subsequently answer the research questions in the fullest sense, as endorsed by Yin (2009). Secondly, considering the heterogeneous nature of individuals with an ASC, a single-case approach would not enable individual differences to be acknowledged and captured.

5.2 Criteria for involvement in reading comprehension intervention

The standardised assessment data for all Year 6 participants in Study One was analysed in order to identify children who would be invited to take part in the pilot individual reading comprehension intervention. The intervention was planned to commence during the first term of secondary school, consisting of seven 50-minute weekly sessions, delivered on a one-to-one basis with each child. In order to ensure children were selected through a fair, transparent process but ensuring suitability for the intervention in terms of their reading abilities and areas of need, the following criteria were established:

1. The child must attend a secondary school within the Local Authority.

2. The child's comprehension reading age (NARA-II) must be below their chronological age by at least one year.

3. The child must have a reading accuracy > reading comprehension discrepancy (NARA-II) equivalent to at least 1 year, 6 months.

4. The child must have a word reading score (BAS 3) within the average range or above, as a) the intervention will not target decoding skills and b) sufficient decoding abilities are required in order to access text conducive to facilitating higher level discourse comprehension skills.
5. Permission must be gained from the child's secondary school in order for the weekly intervention to take place.

6. Consent must be gained from the child's parents for them to be involved in the reading comprehension intervention.

7. The child must be willing to participate in the intervention.

Expanding upon criterion 3 and 4, it is pertinent to acknowledge that the reading comprehension intervention was developed in order to focus on higher-level comprehension skills. Therefore, those participants selected for

the intervention did not necessarily have the lowest standardised reading comprehension scores in the sample (as measured by the NARA II). Participants with the lowest scores also required additional input to develop their word recognition skills (decoding and sight vocabulary), which was beyond the scope of the current intervention.

5.3 Selection of Cases A, B and C

Three children in the Year 6 cohort from Study One (participants 19, 13 & 22) fulfilled all the criteria outlined above, and thus were invited to participate in the intervention. In terms of eligibility for involvement, the children met three main criteria, ensuring that participation in the intervention (focusing solely on developing skills involved in higher-order comprehension processes) was appropriate. The analysis of standardised scores (NARA II and BAS 3) presented in Table 11 confirm that each participant had: 1) an equivalent reading comprehension age at least 1 year below their chronological age; 2) a reading accuracy > reading comprehension discrepancy of at least 1 year 6 months; 3) age appropriate (or higher) word reading scores. Thus, the participants did not require additional support to develop their word recognition process, but they did require targeted support to develop their reading comprehension skills.

Table 11

Selection of participants for intervention: Cases A, B, C

Case	**Comprehension age < chronological age**	**NARA II: Reading accuracy > reading comprehension discrepancy**			**BAS 3: Word reading**
		Reading Age	*Standard score*	*Percentile*	*Standard score*
A *(p19)*	1: 01	1:07	16	34	104
B *(p13)*	1:01	2:06	14	40	109
C *(p22)*	1:00	2:03	14	32	113

Once the three suitable participants were identified, the head teacher and Special Educational Needs Co-ordinator (SENCo) of each child's school was contacted by telephone and email. This enabled the content of the weekly sessions and the duration of the intervention to be communicated, and a discussion with regard to practical arrangements (e.g. providing a suitable room for one-to-one sessions). Upon agreement, parents were sent a letter to provide information about the intervention and to gain informed consent (See Appendix M). Although children were familiar with the researcher from study one, each child was visited in school before the intervention began, to explain what the intervention would involve and to gain their consent.

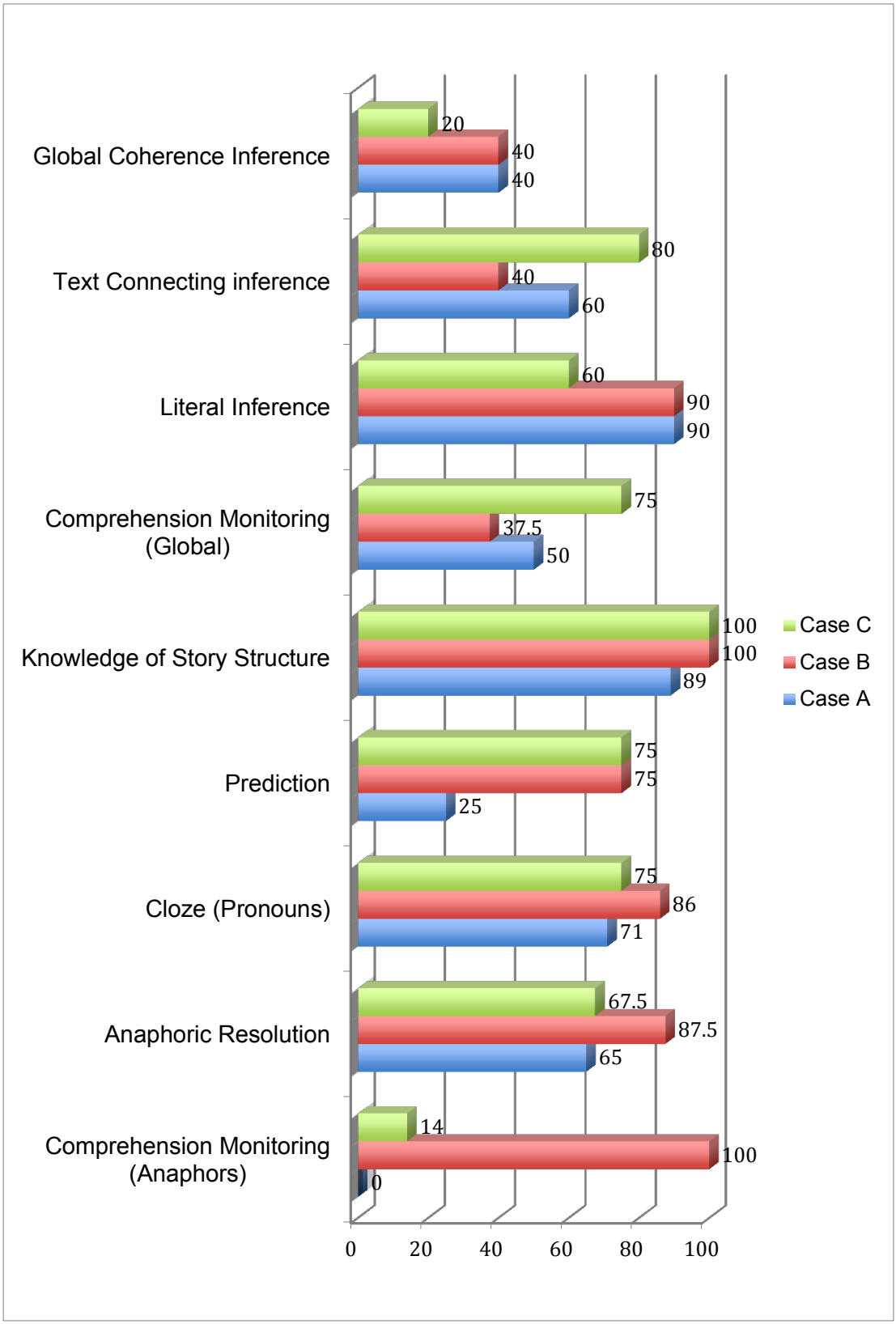
5.4 Planning and development of reading comprehension intervention

5.4.1 Analysis of component comprehension skills: Case A, B, C

The first stage in developing the intervention involved an analysis of the performance of each child on the component comprehension skill tasks in Study One. Figure 10 shows the score for each child on each component comprehension skill task as a percentage. This allowed the researcher to gain a sense of each child's areas of competence, where they experienced difficulties, as well as to highlight common areas of competence and weakness.

Figure 10

Case A, B and C Individual Comprehension skill profiles (percentage of questions answered correctly for each component comprehension task)



As shown in Figure 10, all three children demonstrated competence in the Knowledge of Story Structure, Anaphoric Resolution and Pronoun (cloze) tasks. In contrast, they all experienced particular difficulty when they were required to resolve Global Coherence Inferences. However, their performance on the other tasks differed individually.

Case A:

Child A performed well on questions requiring literal understanding (90%) and was also able to answer questions where he was required to resolve a text-connecting inference (60%). He experienced particular difficulty in the Comprehension Monitoring (Anaphors) task (not scoring at all) but did achieve a score of 50% on the Comprehension Monitoring (Global) task. He also experienced difficulty when asked to make predictions about future story events (not scoring) but was able to link some clues found earlier in the text to known future story events (Prediction Part B).

Case B:

Child B achieved full marks in the Comprehension Monitoring (Anaphors) task but experienced greater challenge in the Comprehension Monitoring (Global) task (scoring 37.5%). This suggests that whilst he is able to monitor his comprehension at the sentence level (e.g. applying his knowledge and understanding of pronouns), he has more difficulty monitoring his comprehension at the whole text/global level. He was able to make some predictions about unknown future events (50%) and showed a secure understanding when he need to link previous clues to known story events. This child also experienced difficulty when resolving text-connecting inferences (scoring only 40%).

Case C:

Child C was able to answer questions where he needed to resolve text-connecting inferences (scoring 80%) but was less competent than the other participants when answering literal questions (60%). He experienced difficulty in the Comprehension Monitoring (Anaphors) task but demonstrated

competence in the Comprehension Monitoring (Global) task (a score of 14% compared to 75%). Thus, he appears to show a degree of competence when monitoring comprehension at the whole text/global level, but has more difficulty at the sentence level (the opposite pattern to case B). Similarly to case B, he was able to make some predictions about future events (50%) and showed a secure understanding when he needed to link previous clues to known story events.

5.4.2 Selection and development of approaches and strategies

The further analysis of each child's component comprehension skill profile informed the researcher of both the common and individual areas that required targeting through the intervention. The author drew upon knowledge of reading comprehension interventions (see Chapter 2) as well as engaging in further reading, to select the most appropriate strategies and approaches to address these areas.

Following analysis and further reading, it was decided that the think-aloud (Brown & Lytle, 1988) and reciprocal teaching approaches (Palincsar & Brown, 1984) were particularly suitable to address the comprehension difficulties experienced by the individual children. There is currently very limited research on effective interventions and strategies for children with ASC's, however the think-aloud process has been used in a couple of studies that included individuals with autism (Whalon & Hanline, 2008; Williamson et al., 2012). Although no study has investigated the reciprocal teaching approach for children with ASC, there is evidence showing its effectiveness when used to support typically developing children and those with language impairments, of a similar age to the children in the current sample (Rosenshine & Meister, 1994; Greenway, 2002; Takala, 2006). Acknowledging that question generation has been identified as a particularly effective strategy by the NRP (NICHD, 2000) this strategy was considered an important aspect of the intervention.

The think-aloud process (which also underpins reciprocal teaching) has been recommended for children experiencing difficulty with aspects of the reading process involving metacognition, which forms an integral part of the complex process of reading comprehension (Meltzer, 2007; Cohen & Cowen, 2008). Analysis of stage one data revealed that the metacognitive skills (e.g. comprehension monitoring) of many children required development. Amongst others, publications by two key authors of the think-aloud (Wilhelm, 2001) and reciprocal teaching approaches (Oczkus 2010) were referred to in order to develop the structure, content and teaching methods for the intervention. Careful consideration was given to the strategies and resources selected and were adapted accordingly to facilitate the learning styles of the children with an ASC.

5.4.3 *"Types of question" strategy*

Raphael (1982, cited in Wilhelm, 2001) identified four basic categories of question that good readers pose when reading:

1. ***"Right There"*** (Literal questions)
2. ***"Think & Search"*** (Integrating information from different parts of the text and involving inference)
3. ***"Author & Me"*** (Thinking about the language an author uses and what they want the reader to think/feel)
4. ***"On my Own"*** (Questions that require the reader to integrate their existing world knowledge with the text. The answer therefore cannot be found by interpreting the information in the text alone).

Wilhelm (2001) highlights the importance of guiding students to internalise and begin to pose these questions automatically whilst reading. It was decided that the different 'types' of question would be taught explicitly to the children. It was evident through stage one analysis that many participants had difficulty resolving global coherence inferences, where they needed to draw

upon and integrate their own prior knowledge with the text (e.g. “On my own” questions). A visual resource was developed by the researcher, which together with question sorting activities supported the children’s understanding of the four types of question (see Appendix N).

5.4.4 *The “Fab Four” strategies*

The reciprocal teaching approach (Palincsar & Brown, 1984) focuses on four strategies that are consciously and actively utilized to support reading comprehension. These strategies are commonly referred to as the “*Fab Four*”:

1. ***Predicting*** – encourages the reader to make predictions before reading (e.g. using information from titles, sub-titles and illustrations) as well as during reading.
2. ***Questioning*** – encourages the reader to have an active engagement with the text by asking, “Who?, What?, Where?, When?, How?).
3. ***Clarifying*** – encourages the reader to monitor their understanding as they read.
4. ***Summarizing*** - encourages the reader to summarize as they are reading (e.g. recapping the main points after reading a chapter) as well as providing a summary after reading a whole text or story.

(Adapted from Oczkus, 2010)

It was felt that this approach provided a structured framework in order to introduce, model and give pupils the opportunity to learn and apply reading comprehension strategies. As highlighted through Study One data analysis (see Chapter 4) making predictions when reading was an area for development, along with clarifying understanding (comprehension monitoring). Further, pre intervention assessments indicated that all three pupils experienced difficulties in summarising a text. Techniques to teach and model the different strategies were adapted from Oczkus (2010) in order to be appropriate for the pupils in the intervention. For example, the author explains

the strategy of 'clarifying' *as "…like pushing a pause button for a moment to think" (p 55).* The researcher developed a visual 'pause button' resource to make this explanation more concrete and thus, more accessible for participants with an ASC (i.e. they could physically 'push' the pause button).

5.4.5 *Teacher modelled and shared 'free-response' and 'cued' think-alouds*

The think-aloud process was used within every session to engage the pupil with the text. In session one, the researcher planned and modelled a 'free-response' think-aloud, referring to the guidance and examples provided by Wilhelm (2001). This involved the researcher 'reporting out' their thinking process whilst reading the text aloud (see Appendix O). As pupils gained familiarity with the approach, the think-aloud became a shared, collaborative process (either pupils spontaneously commenting on the text or the researcher inviting them to respond through targeted questioning). The researcher used a 'cued' think-aloud to either facilitate the teaching of a particular strategy or to enable more direct focus on an area of difficulty for an individual pupil. For example, when teaching the 'clarify' strategy, the think-aloud was targeted at identifying when comprehension had not occurred e.g. a word or phrase that did not make sense (using the 'pause button' resource). The researcher and pupil then worked together to apply a 'fix-up' strategy (adapted from Wilhelm, 2001; Appendix P) to establish understanding.

5.4.6 Selection of reading material

Considerable attention was given to the choice of the main text. Existing literature, together with observations made by the researcher and the participants' own reflections (gained through the semi-structured interviews), indicate that the goal of understanding narrative poses a significant challenge for individuals with an ASC. In particular, the social communication difficulties characteristic of children with autism, present additional challenges to reading and understanding fictional narratives (Gately, 2008). Therefore, the intervention focused mainly on a fictional narrative text (rather than non-

fiction) in order to target the higher order, discourse level comprehension skills required to build a coherent understanding of the story.

Through conducting and analysing the semi-structured interviews, many participants indicated preferences for particular types of reading material and several children expressed that their motivation increased when reading texts of interest to them. Further, an important selection criterion was whether the text facilitated the application of the 'Fab Four' strategies. Oczkus (2009) advocated selection of 'mentor texts' that call for a particular strategy (e.g. a mystery story may encourage predictions). Although one main text was chosen, the researcher ensured all four strategies could be applied (e.g. particular chapters lent themselves to a particular strategy). It was considered that using one narrative text would allow the researcher to support pupils to build their understanding, and to make connections within the text. The researcher referred to several book lists compiled by teachers in the Upper Primary years to identify texts that could potentially be used within the intervention. These texts provided an appropriate level of challenge for the children in the intervention, both in terms of the words and language used by the author and the themes explored through the narrative.

The researcher selected *"The London Eye Mystery*" (Dowd, 2007) as this text fulfilled all the aforementioned criteria. Additionally, as the protagonist has an ASC himself, it was felt that this could further facilitate the children in making connections from their own life experiences and enhance their engagement with the text. As the author narrates the story through the protagonist's inner voice, it naturally lends itself to recognizing when misunderstanding occurs. The researcher informed parents and SENCO's of the nature of the story (giving an insight into ASC's through the main character) and they all considered this to be appropriate reading material. In order to introduce the participants to the think-aloud process, a short story, *"The Pudding Like a Night on the Sea"* (Cameron, 2002) was also selected. A short summary of each text is provided in Appendix Q.

5.4.7 Content and structure of individual intervention sessions

An outline of the seven individual sessions, which were approximately 50 minutes in duration, is provided in Appendix R. It is pertinent to note that the researcher tailored the sessions in order to be responsive to the individual needs of the children (as illustrated through the case synopses which are presented in Chapter 6). Therefore, although a general structure was followed, the researcher adopted a reflexive plan-teach-review cycle. Notes were made both during and after each session of the participants' behaviours, approach to learning and areas of difficulty and competence, which subsequently informed planning of future sessions, as well as providing a valuable, informal method of ongoing assessment and evaluation.

The seven intervention sessions were originally planned to take place on a weekly basis (over a period of seven weeks). This was the case for child A and B. However, this was not possible for child C due to the need to accommodate school and personal events. Therefore, child C received seven individual sessions over a duration of four weeks; two intervention sessions were carried out in weeks 2 - 4 (e.g. Monday and Friday).

5.5 Pre and post intervention measures

5.5.1 Pre intervention measures

Participants were assessed in the first intervention session using the YARC: Secondary (Stothard et al., 2010). This was an appropriate assessment as all participants were of secondary school age and the assessment has parallel forms (A and B) to provide pre and post measures. The YARC (A) generated pre intervention scores for each participant on measures of reading fluency, reading rate, reading comprehension and summarisation. A measure of pre intervention single word reading was gained using the Wide Range Achievement Test (WRAT4: Word Reading subtest, Wilkinson & Robertson, 2006). This is a well-used, standardised assessment that can provide an

accurate screen measuring the skills of learning (Makray & Hope, 2009). Although a measure of word reading was gained during stage one (BAS3) a period of over 4 months had passed before the intervention commenced. Therefore, the parallel forms of the WRAT4 (green and blue) were used to provide a pre and post intervention word reading measure. In addition to standardised tests, participants were asked to rate themselves on a scale of 1 – 10 (1: I am not very confident, I find this challenging, to 10: I am confident, I can do this well) on four key aspects of reading: reading/decoding accurately, understanding individual words, understanding the whole text and knowledge of comprehension strategies.

5.5.2 Post intervention measures

Participants were re-assessed during the seventh session using the YARC: Secondary (Form B) to obtain post intervention measures of reading rate, reading comprehension and summarisation (N.B. only a single measure of reading fluency can be obtained using the assessment). The WRAT4 (Blue Form) was used to gain a post intervention score for word reading. Participants were also asked to complete the reading scaling activity again, and were given a new response sheet to do this. The researcher made the decision not to show or remind participants of their ratings from session one, so their present scores would not be influenced by their previous ratings.

Chapter 6
Study Two: Results and Discussion

This chapter focuses upon an analysis of the individual children involved in the reading comprehension intervention. Firstly, the performance of each child on the pre intervention standardised measure of comprehension (YARC: Secondary) is discussed, with reference to their performance on the NARA II in Study One. In the second part of the chapter, three case synopses (child A, B, C) are presented. Each synopsis includes excerpts of dialogue from the individual intervention sessions, observations from the researcher and the children's own reflections. This is followed by an analysis of pre and post intervention measures.

6.1 Pre Intervention measures

The performance of children A, B and C on the YARC: Secondary (Form A) and the WRAT-4 word reading subtest (Green Form) is presented in Tables 12 and 13. These show baseline measures of word reading, reading accuracy, reading rate, reading comprehension and summarisation (calculated separately from the reading comprehension score).

Word Reading and Reading Fluency

As expected (based upon previous NARA-II and BAS3 word reading scores) all three participants scored within the average/above average range for word reading and within the average range for reading fluency. Thus, the children's skills in word reading (decoding) and fluency are developing age appropriately or above (as with child C).

Reading Comprehension and Summarisation

Participants performed within the average/low average range on reading comprehension and notably, all three failed to achieve a score on the summarisation component. Participants A and C achieved comprehension scores below those expected for their chronological age (as found in the

NARA-II), however child C achieved a comparatively lower comprehension score on the YARC than the NARA-II (a standard score of 88 compared to 96 or an age equivalent of 8:09 compared to 10:04). Conversely, child B achieved a score slightly above his chronological age (a comprehension age of 12:00 at the age of 11:09). Although this was not expected (as he achieved a lower score on the NARA-II) it was noted that he answered a high percentage (75%) of the questions requiring literal understanding correctly (46% of all questions in the YARC: Form A required retrieving literal information) which may have contributed to a higher overall comprehension score.

Reading Rate

Referring to reading rate scores, participants A and B scored in the average/low average range, whilst participant C scored in the above average range (an equivalent of > 16:00 years). The procedure to calculate reading rate is that the child reads the passage silently rather than aloud (most students read silently during the YARC test development, although if a student indicated that they wanted to read aloud, this was permitted). As all three participants read the passage silently, the reading rate score was dependent upon the individuals themselves indicating when they had finished reading. The researcher was therefore unable to establish whether the child had become distracted or lost concentration whilst reading, whether they had read the full text in its entirety or whether they had re-read parts of the text. Thus, this may impact upon the reliability of the measure.

Table 12

Pre intervention measures: Word reading (WRAT-4), Reading Fluency, Rate & Comprehension (YARC: Secondary)

Case	Chronological Age	Pre intervention reading measure										
		Word Reading (WRAT-4[11]: Green)		Reading Fluency (YARC[12])			Reading Rate (YARC: Form A)			Reading Comprehension (YARC: Form A[13])		
		Standard score	*Percentile*	*Standard score*	*Percentile*	*Age*	*Standard score*	*Percentile*	*Age*	*Standard score*	*Percentile*	*Age*
A	11:03	116	86	101	53	11:03	92	30	09:11	97	42	10:05
B	11:09	108	70	100	50	11:09	90	25	09:07	101	53	12:00
C	11:09	107	68	107	68	13:03	121	92	16:00+	88	21	08:09

Table 13
Pre intervention measure: Summarisation (YARC: Secondary)

Case	Chronological Age	Pre intervention measure: Summarisation		
		Raw Score	***Ability Score***	***Performance Band***
A	11:03	0	38	Below Average
B	11:09	0	38	Below Average
C	11:09	0	38	Below Average

[11] WRAT-4: Wide Range Achievement Test, 4th Edition
[12] YARC: York Assessment of Reading for Comprehension, Secondary Complete Set
[13] YARC Comprehension Form A: 26 Questions classified as: Literal information (12); Vocabulary (4); Predictive inference (2); Knowledge-based inference (2); Elaborative (2); Evaluative inference (4).

6.2 Reading comprehension intervention case synopses

A summary of each child's involvement in the reading comprehension intervention is provided, including key observations of their learning behaviour within the sessions (e.g. level of engagement) and individual responses to the approaches and strategies used. Examples of dialogue between the child and researcher are included in order to illustrate particular areas of difficulty and also, where progress would appear to have been made over the sessions. The children's ratings of their own level of competence on four key areas of reading (ascertained in sessions 1 and 7) are presented and discussed.

6.2.1 CASE A

Learning behaviour and approach: key observations

Child A was happy to be involved in the reading project and seemed particularly engaged by the genre of the chosen text, 'The London Eye Mystery'. However, the researcher noted that his concentration and focus differed considerably across the seven sessions. In some sessions he was fully engaged and in others, he needed frequent prompting to stay on-task. This appeared to be linked to difficulties he was experiencing in lessons, as reported by a Teaching Assistant. During the third session, he appeared to be particularly distracted. When asked why he was finding it difficult to concentrate, he explained, *"Like see that printer over there, well the light is flashing on it and now I can't concentrate on anything else apart from that"*. Therefore, efforts were made to ensure that there were no such distractions in the room during future sessions.

Areas of competence, difficulty and progress:

Child A was able to recall specific details from the text, particularly about the main character, Ted. For example, when re-capping the story at the beginning of each session, he recalled that Ted was a, 'neek' (a mixture of a nerd/geek). He was able to demonstrate insight after reading that Ted's brain, "…runs on a different operating system to other people", commenting

that, *"It's because Ted has an Autism"*. However, through the process of the think-aloud, it became evident that he was having particular difficulties forming links between information in different parts of the text, which was in turn greatly affecting his understanding. He seemed to have a fragmented approach to reading, focusing on individual details that interested him and interpreting the chapters in isolation rather than integrating information to build a coherent sense of the developing story. The example below clearly illustrates this:

Researcher: *"When Kat said that the Barracks (the very tall building) would be 'flattened any day now by our dad', what did she mean?"*

Child A: *"Mmm…cos he's fat?"*

Researcher: *"Ok. Do you think even a fat person could flatten a building?"*

Child A: *"Maybe if they were really fat! (laughs)"*

Researcher: *"What did we find out about dad in the previous chapter that might help us understand why he is going to 'flatten' the Barracks?"*

Child A: *"I don't know"*

Researcher: *"What about when we found out what Dad does as a job – we talked about it together last session, if you can remember?"*

Child A: *"I don't know"*

Researcher: *"Ok. Let's read that part again."*

Child A: *"Oh yeah, he blows up buildings…he's going to blow up the Barracks"*

Researcher: *"That's right, he is a demolition expert. So we need this information to help us to understand why Kat said the Barracks would be 'flattened' by their dad."*

Throughout the sessions, questions were posed by the researcher (through the think-aloud process) that encouraged child A to continually make connections between information given in different parts of the text, particularly those connections that help to understand and predict events in the story. By session six, child A appeared to have made considerable progress in making inferences by linking different parts of the text (integrating information from within the same chapter or different chapters). In formulating his response below, child A drew upon information in a previous chapter where the main character, Ted, had suggested to Aunt

Gloria that it would be better for her health to give up cigarettes, quoting statistics from the NHS:

Researcher: *"Why do you think nobody objected to Aunt Gloria smoking a cigarette in the house?"*

Child A: *"It's because everyone is worrying about Salim – they don't care about smoking a cigarette … it's a little bad thing".*

Researcher: *"Do you think any of the characters would have objected to Aunt Gloria smoking before Salim disappeared? If yes, who and why do you think this?"*

Child A: *"Yes – everyone … Actually, maybe Ted, he's all out on health and everything".*

Overall, it was noted that child A began to ask more questions whilst he was reading, which it was felt reflected a deeper level of engagement with the text. When asked why he was asking more questions as he was reading, he replied*, "I think more when I read now".* Although child A could often give an accurate explanation of individual words, through the process of the think-aloud, this increased child A's awareness that sometimes words have more than one meaning. For example, he confidently explained that the word *minor* meant *"a small thing",* however in the context of the sentence, it referred to one of the characters as a *minor:* a child (under the age of 18 years).

Pupil's own reflections:

As shown in Figure 11, child A rated himself as '1' in relation to his knowledge and use of strategies to facilitate understanding in session one, explaining, *"I don't really know any… my tactic was that I used to miss out words".* In the final session, he rated himself as a '9' and explained, *"When there's questions I think about the questions – like think and search".* This referred to the activities that focused upon identifying different types of question, e.g. "Think and search" involves making inferences. Whilst in the first session, child A rated himself as a '9' with relation to his understanding of word meaning, he rated himself as a '6' in the final session. From the

researcher's perspective, this was a more realistic rating of his ability and reflected his developing awareness of words with different meanings, dependent upon the context.

Reading scaling activity: Case A

Rating: session 1
Rating: session 7

Reading a story or text accurately (being able to read/decode the words)

Understanding what each word means when I read it

Understanding the meaning of the whole text or story as I read it.

There are strategies I know and I can use to help me if I don't understand what I am reading.

Figure 11

6.2.2 CASE B

General learning behaviour and approach within sessions:

During the individual assessments, child B appeared slightly anxious, particularly if he thought he had made a mistake whilst reading or he wasn't sure of an answer. Therefore, the opportunity to fully explore the meaning of the text through the 'think-aloud' process was very appropriate for him. This was reflected both in his reduced anxiety and enjoyment in the reading sessions but also, he developed the confidence to acknowledge when he did not fully understand.

After being introduced to the different strategies to support reading comprehension (including identifying the 'type of question' and the 'pause button' to indicate when the text was causing confusion or the meaning unclear), he immediately started to use these independently. Child B preferred to indicate that he needed to stop and clarify by 'pressing' the pause button and making a buzzer noise. In the final intervention session, when administering Form B of the YARC (having been informed that he wouldn't be able to discuss the text with the researcher) child B stopped when reading and asked, *"Do I press the pause button?"* The researcher responded by saying, *"This time, just use the 'pause button' in your head".* After pausing for a few moments he said, *"Ok I get it now"* and continued reading.

Areas of competence, difficulty and progress:

As previously highlighted, Child B showed a high degree of competence in the comprehension monitoring (Anaphors) activity. This demonstrated that he was able to monitor his comprehension at a sentence level (identifying misuse of pronouns) independently. Therefore, as would be expected, he was consistently able to identify words and phrases where he was unsure of the meaning. However, he experienced greater challenge when monitoring comprehension at a whole text level (often not being aware that

he had not understood) or when a full understanding was dependent upon making inferences. The example below (session 1) illustrates that child B needed the researcher to scaffold his thinking in order to begin to develop his understanding from a literal to an inferential level:

Researcher: *"I wonder why the boys didn't want a piece of the pudding when mum asked them?"*

Child B: *"Because they were full up – they had already eaten some pudding".*

Researcher: *"You are right, they did eat some of the pudding when dad asked them not to. But do you think there might be another reason why they said they didn't want any?"*

Researcher: *"I don't know, I don't think so"*

Child B: *"Do you think the boys felt guilty about eating the pudding dad had made?"*

Researcher: *"Yeah cos dad said it was for mum and to leave it alone".*

Child B: *"So maybe the boys feel bad about eating the pudding, and they were also very frightened when dad told them off…. so perhaps they really don't want any pudding now!"*

Child B: *"Yeah".*

Although child B showed progression in terms of thinking about characters' feelings and emotions, he still needed support to make connections between characters' feelings and their actions. He also developed a secure understanding of the different types of question, and used this strategy without prompt to facilitate his thinking when answering questions.

Researcher: *"How many sandwiches did Aunt Gloria manage to eat?"*

Child B: *"None. That's a 'right there' (question)"*

Researcher: *"Ok. Why do you think she didn't eat any sandwiches?"*

Child B: *"Not sure"*

Researcher: *"How was Aunt Gloria feeling?"*

Child B: *"Sad"*

Researcher: *"So if she is sad, do you think she would want to eat?"*

Child B: *" No, when you're sad you don't feel hungry".*

Throughout the sessions, child B became more confident when asking questions, and was beginning to make additional comments about the text from his own thoughts and perspective. This demonstrated that through the think-aloud strategy, child B was able to engage with the text at a higher level:

Researcher: *"Why do you think the author called this chapter, "The Eye of the Hurricane?"*

Child B: *"Aunt Gloria is the hurricane"*

Researcher: *"That's right, Ted's mum called her 'Hurricane Gloria'. But why was Aunt Gloria like the 'eye' of the hurricane?"*

Child B: *Erm, I'm not sure.*

(Researcher and Child B re-read relevant text and discussed)

Child B: *"Aunt Gloria was calm"*

Researcher: *"Like the eye or the middle of the hurricane"*

Child B: *"I thought it would be worse in the centre (of the hurricane)?"*

Researcher: *"That is something that you might think, and it's why we need information from our own world knowledge or we need to do some research so that we really understand what the author means.*

Child B: *"So it's an 'author and me' but a bit 'on your own'"*

Pupil's own reflections:

It was apparent from the initial session that of the three children, Child B showed the most awareness of experiencing difficulties with understanding when reading. As shown in Figure 12, he rated himself as a 3.5 in relation to understanding what each word means. In comparison, he rated himself higher (7.5) in terms of understanding the whole text. In the final session, he moved himself up on the scale to a 5 for understanding words, but remained the same for his understanding of the whole text. The researcher questioned why he had given himself a lower rating for being able to read accurately, and it transpired that this was due to him being presented with more challenging, unfamiliar words in the word reading subtest (WRAT4). In the final session, child B placed himself higher on the scale for knowledge

and use of comprehension strategies. When asked why he was now at 7.5 he explained, *"I like clarify and summarise and I think about what question it is, like a 'think and search' or 'on my own'".*

Reading scaling activity: Case B

Rating: session 1
Rating: session 7

Reading a story or text accurately (being able to read/decode the words)

Understanding what each word means when I read it

Understanding the meaning of the whole text or story as I read it.

There are strategies I know and I can use to help me if I don't understand what I am reading.

Figure 12

6.2.3 CASE C

Learning behaviour and approach: key observations

It was agreed with school and parents that Child C would participate in the intervention during enrichment time (at the end of the formal school day). He was focused and engaged throughout every session.

Child C approached reading enthusiastically, reading aloud loudly and fluently, with very accurate pronunciation and with expression. Often, his expression was over-exaggerated, so that whilst reading aloud to the researcher, it was similar to the level of expression and intonation that one might expect when speaking aloud on stage, or reading aloud to an audience. Overall, he appeared to be rather preoccupied with what his reading 'sounded like'.

Areas of competence, difficulty and progress:

As the researcher modelled the think-aloud strategy, pausing to verbalise her thoughts during reading, or asking him a question relating to the text as he was reading, child C appeared to be rather irritated at times that either the researcher had stopped reading, or that she had interrupted him whilst he was reading. Although he attempted to respond to the questions posed, he showed signs of anxiety (repeatedly tying and untying his tie) and was very eager to continue reading. Over the course of the intervention, it was noted that child C became less anxious when stopping to discuss the text and during the fourth session, child C independently used the 'pause button' resource, indicating that he needed to pause to clarify his understanding. In session six, when he was informed that he would be completing a comprehension activity about the chapter, 'The Eye of the Hurricane', he chose to read in his head rather than read aloud for the first time. When answering the questions, he accurately identified the type of

question (without prompt) according to the four types that had taught during the intervention.

Child C was often able to give an accurate explanation of the meaning of individual words, or offer a plausible suggestion, but he had particular difficulty understanding idioms or figurative language. Although it was likely that some phrases were unfamiliar to him, he consistently had difficulties interpreting the social dialogue between the characters in the story. He would often offer an interpretation of an idiomatic expression at a literal level, even though this was not consistent with the context. For example, a character in the story used the phrase, "He's the spit of his grandfather" when she saw him for the first time in years, which was discussed together:

Researcher: *"What does 'the spit of' mean here?"*

Child C: *"Its like when you spit (touches mouth)"*

Researcher: *"That is what the word means sometimes, you're right, but here, it has a different meaning. Aunt Gloria is saying he is 'the spit of' his grandfather. What might this mean do you think?*

Child C: *"I don't know"*

Researcher: *"When you say, 'the spit of' someone, it means they look very similar. So Aunt Gloria is saying that Ted looks just like his grandfather."*

The term 'idiom' was introduced using examples from the text, and he acknowledged that he often found it difficult to understand what these phrases actually meant. At the beginning of the third session, child C showed that he had been thinking about what idioms are, and how they are used, beyond the reading intervention sessions:

Child C: *"Oh I've got another idiom".*

Researcher: *"Oh great, let's hear it".*

Child C: *"Getting away with murder".*

Researcher: *"Great. So why is that an idiom?"*

Child C: *"Cos when you say you're getting away with murder, it doesn't actually mean you have murdered someone, it means you are just getting away with something".*

Researcher: *"Have you been thinking about idioms this week?*

Child C: *"Yeah".*

Whilst child C demonstrated that he was able to integrate information from different parts of the text (for example, he linked the fact that Ted's dad was a demolition expert to him 'flattening' a building), it became clear that he was often unable to resolve inferences in order to understand characters' actions:

Researcher: *"Why do you think Kat interrupted Ted when he was about to speak?"*
Child C: *"I don't know".*
Researcher: *"What did Kat say when Aunt Gloria asked her if she smoked?"*
Child C: *"She said she didn't (smoke)".*
Researcher: *"Do you think she was telling the truth?"*
Child C: *"I don't know, probably not"*
Researcher: *"I agree – it says in the text that Ted has seen Kat with a cigarette in her mouth at school, doesn't it?"*
Child C: *"Yeah"*
Researcher: *"So what do you think Ted was about to say?"*
Child C: *"That he saw her smoking"*
Researcher: *"So why do you think Kat interrupted him when he started to speak?"*
Child C: *(Pauses, no response)*
Researcher: *Do you think she wanted Ted to tell her parents and Aunt Gloria that she had smoked?*
Child C: *"No".*

Pupil's own reflections:

In the first session, Child C rated his understanding of both individual words and the whole text as a '9', and rated his ability to read accurately a '10'. During the fist few intervention sessions, it was not clear to the researcher whether child C was either unable to identify when he had not understood something in the text, he was reluctant to acknowledge that he didn't understand, or whether he was just solely focused on the task of reading aloud accurately, with expression and intonation. As shown in Figure 13, when asked to place himself on the scale in the final intervention session, it was interesting that he rated himself lower for reading accurately (8),

understanding word meaning (7) and understanding the whole text (6). Thus, it would appear that through the intervention, child C was able to reflect upon his reading abilities and evaluate his performance more realistically, acknowledging some of the difficulties he experiences with comprehension.

Reading scaling activity: Case C

Rating: session 1
Rating: session 7

Reading a story or text accurately (being able to read/decode the words)

Understanding what each word means when I read it

Understanding the meaning of the whole text or story as I read it.

There are strategies I know and I can use to help me if I don't understand what I am reading.

Figure 13

6.3 Comparison of Pre and Post Intervention measures

Pre and post intervention measures of word reading, reading rate, reading comprehension and summarisation are presented in Tables 14 and 15. Differences between the pre and post measures (standard scores, percentiles and age equivalents) for each child were then calculated and are shown in Table 16 below.

Table 16

Difference between pre and post intervention measures: Word Reading, Reading Rate & Reading Comprehension

	Difference: Pre/Post intervention measures							
	Word Reading (WRAT-4: Green/Blue)		**Reading Rate (YARC A/B)**			**Reading Comprehension (YARC A/B)**		
Case	*Standard score*	*Percentile*	*Standard score*	*Percentile*	*Age*	*Standard score*	*Percentile*	*Age*
A	-2	-4	0	0	0	+2	+5	+0:06
B	-2	-4	+5	+12	+1:02	+4	+10	+0:10
C	-3	-7	-9	-13	0	+11	+26	+2:08

Table 14
Comparison of pre and post intervention measures: Word Reading and Reading Rate

	Word Reading (WRAT 4: Green/Blue)						Reading Rate (YARC Form A/B)					
	Chronological age		*Pre*		*Post*		*Pre*			*Post*		
Case	*Pre*	*Post*	*Standard score*	*Percentile*	*Standard score*	*Percentile*	*Standard score*	*Percentile*	*Age*	*Standard score*	*Percentile*	*Age*
A	11:03	11:04	116	86	114	82	92	30	09:11	92	30	09:11
B	11:09	11:11	108	70	106	66	90	25	09:07	95	37	10:09
C	11:09	11:09	107	68	104	61	121	92	16:00	112	79	16:00

Table 15
Comparison of pre and post intervention measures: Reading Comprehension and Summarisation

			Reading Comprehension (YARC Form A/B[14])						Summarisation (YARC Form A/B)			
Case	Chronological age		*Pre*			*Post*			*Pre*		*Post*	
	Pre	*Post*	*Standard score*	*Percentile*	*Age*	*Standard score*	*Percentile*	*Age*	*Ability score*	*Performance Band*	*Ability score*	*Performance Band*
A	11:03	11:04	97	42	10:05	99	47	10:11	38	Below Average	37	Below Average
B	11:09	11:11	101	53	12:00	105	63	12:10	38	Below Average	65	Above Average
C	11:09	11:09	88	21	08:09	99	47	11:05	38	Below Average	43	Average

[14] YARC Comprehension Form B: 26 questions classified as: Literal Information (10); Vocabulary (4); Predictive inference (2); Knowledge-based inference (6); Elaborative inference (3); Figurative Language (1).

Word Reading

As shown in Table 14, all participants scored up to 3 standard score points lower than on the post intervention measure (a difference of 2 or 3 points as shown in Table 16). As the discrepancy is consistent for all three participants, this suggests that this could be due to slight differences inherent within the test itself (Green/Blue Forms). Overall, all scores (pre and post measures) are within the average to high average range and reflect age appropriate performance.

Reading Rate

No difference was calculated between the pre and post intervention reading rate score for participant A. Although the post intervention score for participant C remained within the above average range, it was 9 standard score points lower than the pre intervention score, thus indicating a decrease in reading rate. Following the intervention, if a participant was engaging in self-monitoring behaviours (pausing to clarify understanding as they were reading) a decrease in reading rate might be expected. However, participant B obtained a higher post intervention reading rate score (+5 standard points) indicating an increase in reading rate. As previously discussed, the procedure by which the reading rate scores were obtained may affect the reliability of the measure. To illustrate, one of the participants asked the researcher two questions whilst reading, affecting the accuracy of the time taken to read the passage from start to finish.

Comprehension

All participants obtained a higher score on the post intervention measure of reading comprehension, as shown in Table 15. However, the degree of difference between the pre and post intervention score varied individually, as highlighted in Table 16.

Participant C's performance on the post intervention measure (YARC Secondary: Form B) was 11 standard score points higher than the pre intervention measure (from 88 to 99), a difference in age equivalent terms of approximately 2 years, 8 months over a period of 4 weeks. Participant B obtained a post intervention comprehension score of 105, 4 standard score points higher than the pre intervention score (an equivalent of approx. 10

months). Participant A's post intervention score increased by 2 standard score points (an equivalent of approx. 6 months).

Summarisation

All participants scored in the below average range in the pre intervention summarisation task. As shown in Table 15, participants B and C demonstrated an improvement in their performance post intervention. For example, Child C's post intervention score places him in the average range, and child B gained an ability score of 65 in the post summarisation task (from 38 pre intervention), within the above average range. Child A's score remained in the below average range.

6.4 Further analysis of Pre and Post intervention reading comprehension scores

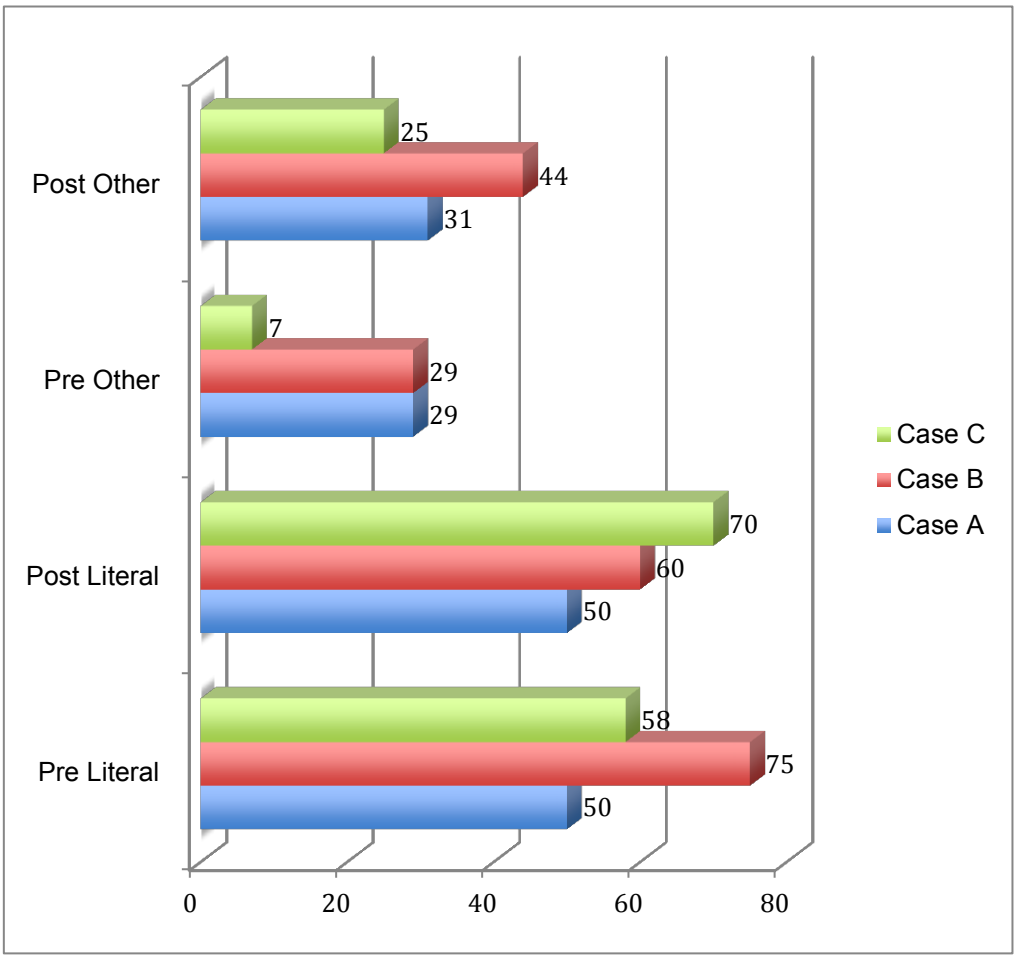
The standard scores for reading comprehension from the YARC Secondary assessment are gained by calculating the total number of correct responses to the comprehension questions following each passage. This includes several different types of question, including: literal information, knowledge-based inference, evaluative inference, predictive inference, vocabulary and figurative language (an explanation of each question type is provided in Appendix W). The number of each question type is not consistent across the passages (i.e. the number of literal information and knowledge-based inference questions differs for each individual passage). The breakdown of questions for each reading passage for the pre and post measures (Level 1 A and Level 1 B) are shown in Appendix X.

The analysis of the component comprehension skill tasks highlighted that overall, the children in study one (n=22) demonstrated competence when answering questions requiring literal information (see Figure 5 and Figure 10). To identify whether this area of competence was apparent through scores achieved on the YARC, the percentage of literal questions answered by cases A, B and C pre and post intervention was calculated separately (see Figure 14). Furthermore, as a significant proportion of questions following the passages are

literal (46% and 39% for parallel tests A and B respectively), the participants' performance *excluding the* literal information questions was also established (referred to in Figure 15 as 'Other'[15]). The individually tailored reading comprehension intervention was designed to facilitate the participants' meta-cognitive skills (e.g. comprehension monitoring) and improve their higher-level reading comprehension skills in particular, such as resolving inferences and integrating prior knowledge with the text. Thus, by excluding the literal questions, this enabled participants' performance on questions involving higher-level comprehension skills to be established.

Figure 14

Percentage of literal and 'other' questions answered correctly pre and post intervention



[15] Other: Knowledge-based inference, evaluative inference, elaborative inference, predictive inference, vocabulary, figurative language.

Figure 14 shows that as expected, participants answered a higher percentage of literal information than 'Other' questions correctly (50% or over both pre and post intervention). Whilst case A's performance remained the same pre and post intervention, case B answered fewer literal questions correctly post intervention and case C answered a higher percentage of questions (12%) post intervention.

All participants answered less than 50% of 'Other' questions correctly, both pre and post intervention. However, it is noteworthy that all three children answered a higher percentage of 'Other' questions correctly post intervention. This varied from a small increase for case A (2%), to a larger increase for case B and C (15% and 18%, respectively).

6.5 Interim discussion: Summary of Study Two

The beginning of Chapter 5 outlined the criteria used to select the three children to participate in the reading comprehension intervention, alongside a focused analysis of the performance of each child on the component comprehension tasks. Thus, this enabled the researcher to carefully select approaches, materials (e.g. the main text) and develop strategies that would enable areas common to all three children (and indeed, the sample) to be targeted within the intervention. Analysis of each case on an individual basis, together with the adoption of a plan-teach-review approach when delivering the intervention, facilitated the researcher in further 'fine tuning' the sessions to meet the needs of each individual child.

Chapter 6 presented an analysis of the different approaches used in order to measure and evaluate the effectiveness of the intervention. A number of measures were incorporated into the multiple-case study design, both quantitative (pre and post intervention measures) and qualitative data gained through observations and excerpts of dialogue from the intervention sessions. The case synopses clearly illustrated the 'individual' nature of the intervention, together with the participants' level of active engagement with the different strategies and approaches. The responses from the participants during the

sessions, alongside their own pre and post ratings on their reading skills and abilities, highlighted a progression in terms of their understanding and awareness of the cognitive processes ('thinking skills') involved in deriving meaning from written text, and the accuracy of their self- evaluations of their skills. The standardised (YARC Secondary) pre and post intervention measures highlighted considerable individual differences in the gains made in reading comprehension over the duration of the intervention (varying from an increase of 2 to 11 standard score points, or a reading age equivalence of 6 months to 2 years, 8 months). Due to limitations identified in the development of standardised reading comprehension assessments (discussed in Chapter 7), further analysis was carried out to distinguish the gains made in the participants' performance on questions requiring literal information and those involving higher order and metacognitive skills (including inference and integration of prior knowledge). This highlighted that each child was able to answer a higher percentage (ranging from 2 – 18%) of non-literal questions following the intervention. This provides evidence that (for cases B and C) the intervention was effective in both targeting and developing key skill areas involved in reading comprehension.

The value and limitations of both carrying out and evaluating the reading comprehension intervention within a multiple-case study design, (particularly with regard to the generalisability of the findings) will be addressed further in the following chapter.

Chapter 7
General Discussion

This research project aimed to contribute to the small body of existing research literature investigating the reading abilities of children with ASC's, focusing in particular on reading comprehension. Previous research in this area has been limited in scope and despite consistently reported difficulties for individuals with an ASC, minimal progress has been made to date in gaining a deeper and more thorough understanding of the process of reading comprehension; namely, identifying specifically where problems occur for children with ASC's and exploring possibilities for remediation in this process. In response to the numerous references by authors and educators alike, highlighting the necessity for further research in this field (e.g. Nation et al., 2006; Randi et al., 2010; Iland, 2011) this study intended to explore reading comprehension with increased rigour, through an analysis of the higher-order component comprehension skills identified as integral to the complex process of reading to achieve meaning.

The following chapter presents the main findings of both studies, in relation to the overarching research questions and specific aims outlined at the end of Chapter 2. The findings are discussed with reference to the existing literature, and with consideration of the implications of the findings for parents, professionals and practitioners working with this population. Both the strengths and limitations of the studies are acknowledged, and opportunities and requirements for further research recognised.

7.1 *Patterns of reading (and cognitive abilities) in the sample*

Overall, measures of reading and cognitive abilities in the sample reflect the heterogeneous nature of this group, consistent with previous findings (e.g. Nation et al., 2006; Huemer & Mann, 2010; Jones et al., 2009). Standardised scores on measures of reading accuracy, reading comprehension (NARA-II), word reading (BAS3), and cognitive abilities (WASI), ranged considerably. Although varied performance between individuals was expected, the marked

degree of variation in the sample was surprising, considering that all children attended primary or secondary mainstream schools and a criteria for selection was that pupils could access National Curriculum Level 3 reading material (based on teacher assessment).

7.1.1 Reading abilities

As expected based on previous findings (Nation et al., 2006, Huemer & Mann, 2010) the majority of the sample scored within the average range on measures of reading accuracy and single word reading, reflecting age appropriate or above performance. However, the majority of children also scored within the average range on the standardised measure of reading comprehension. As previous research (Nation et al., 2006) identified a large proportion of children (65%) with impaired reading comprehension (scores at least 1SD below population norms), lower reading comprehension scores on the NARA-II were expected. Indeed, in the present study, only 17% of the sample scored 1 or 2SD's below population norms.

There are several factors that could contribute to the higher overall performance on reading comprehension in the current sample. As previously acknowledged, other authors have reported reading comprehension scores of individuals with ASC's in the average range, particularly those considered to be 'cognitively able' (Holman, 2004; Newman et al., 2007). However, acknowledging the limitations of standardised assessments of reading comprehension (Klingner, 2004; Iland, 2011), to interpret these scores superficially - suggesting that impairments in comprehension are not evident within this group, would be hasty and could lead to inaccurate conclusions. Such limitations concern the design of the standardised test and what it purports to measure, based upon the authors' definition of the construct (Salvia & Ysseldyke, 2004, cited in Iland, 2011). For example, the inclusion of questions requiring retrieval of literal information may mask difficulties with higher-order discourse level skills (e.g. making inferences). As will be commented upon later, analysis of component comprehension skills in Study One highlighted that all participants demonstrated competency when answering questions requiring literal

information. Further, in Study Two, the children involved in the reading comprehension intervention answered between 50 - 75% of the YARC comprehension questions requiring literal information correctly. This was in comparison to a considerably lower percentage of correct responses to non-literal questions, including those involving inference.

Additionally, the level of performance on the standardised measure of reading comprehension may have also been influenced by the sample itself; comprising children in the final term of primary or first two terms of secondary education (aged 10-12). Thus, as attending mainstream schools, all participants were familiar with reading comprehension assessments in the format of a reading passage followed by a series of questions (this format is used to gain National Curriculum attainment levels in the Year 6 SATs). Drawing on previous teaching experience with this age group, the researcher was aware that specific teaching (focusing on test technique and practising past papers) is undertaken widely in schools in preparation for these assessments. Therefore, research samples including children of a wider age range (i.e. younger) or attending more varied educational settings (mainstream *and* specialist) may be less familiar with the structure of comprehension assessments. Children in the lower primary years will inevitably have less experience of formal comprehension tests, as might those children attending specialist provision, due to the differences in the type and nature of assessment used in such settings. Of relevance, the sample in the research carried out by Nation et al., (2006) included children aged between 6 to 15 years, and they did not specify whether the children attended mainstream or specialist settings. It is possible therefore, that the differences in the make-up of the sample could have contributed to the lower comprehension scores obtained than in the present study.

7.1.2 Cognitive abilities

Consistent with existing research, measures of cognitive abilities also highlighted the broad range of abilities within this group (ranging from the extremely low to superior range) and the prevalence of uneven cognitive profiles in relation to discrepancies between verbal (VIQ) and non-verbal (PIQ)

measures, typically (although not exclusively) a verbal < non-verbal profile (Jones et al., 2009; Joseph et al., 2002; Siegel et al., 1996). Echoing the perspective of Jones et al., (2009), comparing relative performance within individuals rather than focusing on group means alone, both illustrates the heterogeneity of cognitive skills and identifies areas of strength and weakness for individual students. This information is of particular relevance to professionals involved in educating this population, in ensuring educational programs are designed to ensure children can learn effectively.

7.2 Do discrepancies exist between reading accuracy, word recognition skills and reading comprehension in the sample?

The majority of participants scored within the average range for both standardised scores of reading accuracy and reading comprehension. However, a significant discrepancy between the two component skills was observed in over 80% of the sample, who attained a higher reading accuracy score. Only 8% reflected the opposite pattern (higher reading comprehension score) and for the remaining children, no discrepancy between scores was evident. The finding of a significant discrepancy in the majority of the sample provides further support for existing research; children with ASC's tend to have typically developing decoding skills but experience more difficulties comprehending text (e.g. O'Connor & Klein, 2004; Nation et al., 2006, Huemer & Mann, 2010; Norbury & Nation, 2010).

With reference to the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) a significant proportion of the sample (with a discrepancy between the component skills) could be placed within the bottom right quadrant of the diagram; poorer comprehension relative to more developed word recognition skills (see Figure 2). It is also pertinent to note that in the absence of a comparison between the two component skills (and as standard scores for most participants fall within the average range) this could lead to the mistaken assumption that both processes are developing typically, with no impairments evident. Although the 'poor comprehender' reading profile characterised the sample, other profiles were also apparent. In particular, several children

experienced difficulties with both word recognition skills and comprehension ('generally poor readers') and one child in particular obtained scores comfortably in the average range for both components (achieving a slightly higher score for reading comprehension). As expected, a profile of reading ability associated with Dyslexia (well developed reading comprehension relative to poor word recognition and decoding skills) was not observed in the sample.

Although the present study does not permit exploration of the developmental nature of the dissociation in children with ASC's (whether remaining stable, increasing or decreasing with age), it is pertinent to illustrate that during the period of primary to secondary transition (Year 6 to Year 7), discrepancies of up to and over three years (in terms of equivalent reading accuracy and reading comprehension ages) were evident. This transition can be a challenging time in a child's educational career, with many contextual and academic changes apparent. Of relevance to reading comprehension, this includes curriculum discontinuities (reading is no longer taught as a distinct subject) and expectations of autonomy (a shift to 'reading to learn') coupled with the expectations of pupils to engage with more demanding literature (Galton, 2003; Ricketts, 2011). Therefore, this highlights the need for children at risk of specific comprehension difficulties (of which children with ASC form a significant group) to be identified and subsequently supported, in order to develop their reading comprehension skills. It is plausible to suggest that primarily, schools may focus their support for children with ASC's on addressing social and organisational factors relating to making the transition to Secondary school. Whilst not underestimating the importance of support in these areas (particularly during the initial transition phase), it is important that equally, the academic needs of individuals with ASC's (such as specific difficulties with reading comprehension) are addressed.

Overall, the researcher maintains that acceptance, without caution, that a standard score within the broad average range indicates adequate development in reading comprehension (especially where a discrepancy between the two components exists) is fundamentally unsound. In accordance with the position advocated by Iland (2011), this study supports the premise that a discrepancy

between reading accuracy and reading comprehension (despite performance in the average range on both measures) should not be ignored. Acknowledging the importance of reading comprehension in achieving academic success (e.g. Cain & Oakhill, 2006a), a relative weakness in this area is likely to prevent individuals with ASC (and indeed, other children with a similar reading profile) from reaching their potential. Thus, efforts should be made to target reading comprehension for such individuals, in order that the two components of reading develop along a more even trajectory.

Of relevance to exploring the relationship between the component reading skills in the sample, results from Study One indicate that reading accuracy and word reading skills are strongly and significantly associated with reading comprehension. Therefore, those children with lower levels of reading accuracy and decoding abilities also have impaired comprehension skills, and those with well-developed decoding, together with a higher degree of reading accuracy, tend to have more well-developed comprehension skills. Nation et al., (2006) also reported a significant correlation between reading accuracy and comprehension in children with ASC's (NARA-II), together with a significant correlation between word reading (BAS-II) and comprehension. The correlations reported by the previous authors were considerably lower than this study for both reading accuracy and reading comprehension ($r = .57$ compared to $r = .81$) and word reading and reading comprehension ($r = .48$ compared to $r = .88$).

The influence of reading accuracy on reading comprehension was particularly evident for three participants in the study (participants 14, 20 and 24), scoring 1 or 2 SDs below population norms for both reading components. Through observations during the assessments, it appeared that the high level of effort and attention given to reading the individual words (leading to a slow reading rate and lack of fluency), in turn, impacted upon their ability to understand the meaning of the text. However, although for such children, comprehension difficulties may be attributed to impaired reading accuracy and word recognition skills, the significant discrepancy found between reading accuracy and reading comprehension scores in the majority of the sample, suggests that although

highly correlated, the two component skills appear to develop independently; reading accuracy and word recognition skills do not *ensure* success in reading comprehension.

7.3 Are verbal abilities and oral comprehension skills correlated with reading comprehension?

The findings from Study One indicate that verbal abilities are strongly and significantly associated with reading comprehension. This is demonstrated by the significant strong positive relationship between verbal IQ, receptive language abilities and reading comprehension in the sample. Thus, those children with higher verbal cognitive and receptive language ability also have higher comprehension scores and conversely, children with lower levels of verbal abilities attain lower reading comprehension scores. This provides further support for research highlighting that impairments in both using and understanding language accompany impairments in reading comprehension (Nation et al., 2002; Nation et al., 2004; Nation et al., 2006, Norbury & Nation, 2011). It also adds support to the rationale for interventions to address problems in reading comprehension via oral language training, or whereby verbal language forms a central component within the intervention (Clarke et al., 2010). Indeed, this was a key consideration in the decision to incorporate the think-aloud procedure within the reading comprehension intervention. Through the researcher initially modelling aloud the thinking processes of an 'expert' reader, with familiarity and experience, the think-aloud became a collaborative process. Exploring ambiguous language within the text, reasoning and posing questions, formed the content of discussions between the student and researcher.

Results also found a significant positive correlation between verbal abilities, reading accuracy and word reading, which seems to suggest that poor verbal language abilities are also associated with difficulties in acquiring and developing word recognition and decoding skills. This appears to be of particular relevance for a proportion of children with ASC's who are either completely unable to read or whose decoding and word recognition skills,

together with reading comprehension, are considerably impaired (Nation et al., 2006).

7.4 Developing understanding of reading comprehension difficulties in children with Autism Spectrum Conditions

The underlying objective for the research project was to develop and further current understandings of the comprehension difficulties experienced by individuals with an ASC. Several aspects of the present research project were purposefully incorporated in order to contribute to this understanding, namely the investigation of component comprehension skills, semi-structured interviews and the development and implementation of an individually tailored reading comprehension intervention. Therefore, each aspect is discussed in turn, with particular reference to how and in what ways the findings may be linked to the different theories of autism, which provide a framework for understanding difficulties with the complex processes and skills involved in reading comprehension.

7.4.1 Exploring discourse level component comprehension skills in the sample

This study aimed to address a gap in existing research by investigating a number of discourse level and metacognitive skills considered as integral to reading comprehension (Nation et al., 2006; Cain & Oakhill, 2007). Accounting for the limitations associated with obtaining standardised measures of reading comprehension, the research intended that a more comprehensive profile of component reading comprehension skills be established.

The findings clearly show differing individual 'profiles' with regard to areas of competence and weakness in a number of discourse level skills. Performance ranged from those failing to score, to those children gaining maximum scores on five of the component skills assessed: Comprehension monitoring - Anaphors & Global, Pronoun identification and agreement, Prediction and Global coherence inference. However, analysis of the patterns of performance across the entire sample highlighted particular component skills where the

children experienced difficulty but also, those areas where they demonstrated competency. A clear area of strength was the participants' ability to identify and recall literal information from the text, with all children able to answer over half and two-thirds answering 90% or more questions correctly. Indeed, performance on literal questions was neither significantly associated with overall performance on reading comprehension nor performance on any other component comprehension task. As discussed previously, widely used standardised assessments (e.g. NARA-II, YARC) include a proportion of literal information questions and thus, interpreting standardised scores on their own may mask difficulties within the reading comprehension process, in particular, discourse level and metacognitive skills.

A second area where participants demonstrated strengths was their ability to answer questions involving text-connecting inferences (integration of information within the actual text). This is in contrast to the greatest weakness identified within the sample, when participants were required to resolve global coherence inferences; integrating or drawing upon their real world knowledge, in order to gain an understanding of implicit information or ideas not explicitly stated. This finding concurs with research by Williamson et al., (2012) who identified a 'Text-based' comprehender profile within their ASC sample. These children were able to answer explicit questions and to make text-based (sentence level) inferences but had difficulty answering implicit questions or making inferences at other levels (e.g. paragraph, whole passage). Further, although previous studies have identified inference-making deficits in individuals with ASC (Myles et al., 2002; Wahlberg & Magliano, 2004; Norbury & Nation, 2011) adequate inference skills in individuals with ASC have also been reported (Saldaña & Frith, 2007). Upon examining the level and type of inferences the participants were able to make successfully, it is clear that the task the authors designed required integrating information between two sentences (vignettes). Thus, the authors' findings do not contradict research highlighting difficulties for autistic individuals in making inferences per se; their findings are consistent with the present study and Williamson et al., (2012) that notwithstanding individual differences, individuals with ASC's do appear to demonstrate competency when

resolving sentence-level, text based inferences but experience particular difficulty with global coherence inferences.

Referring to the theories of autism, the difficulties participants experienced with global coherence inferences, together with strengths answering explicit questions and making text-based inferences, could be attributed to a bias for local processing (WCC); a propensity to focus on details rather than gaining a coherent sense of the whole text (Happé and Frith, 2006). Findings in the study are consistent with Wahlberg & Magliano (2004) who found individuals with ASC'S had difficulties drawing upon and integrating background knowledge (required to resolve global coherence inferences). It is also plausible (as considered by Norbury & Nation, 2011) that such difficulties could also be explained by a difficulty in activating and integrating relevant background knowledge, whilst simultaneously suppressing irrelevant prior knowledge - a task involving executive functioning.

Participants performed competently on tasks whereby their focus and attention was directed to knowledge and awareness of anaphors (the anaphoric resolution and pronoun identification/agreement tasks). However, when they were not explicitly instructed to focus on anaphors as part of the comprehension monitoring task (identifying incorrect anaphor use within the narrative text) they encountered greater difficulty. This could be associated with the theory of 'monotropism' (Murray 1992, cited in Murray, Lesser & Lawson, 2005), whereby the participants' attention was purposefully directed to the goal of the task (thus supporting the children with ASC's). However, weaknesses evident in the whole sample on the second comprehension monitoring task, where participants were explicitly instructed to identify parts of the text that 'did not make sense together', suggests that despite awareness of the goal of the task, deficits in this particular skill area remain. Cutting et al., (2009) draw distinct parallels between higher-order reading skills and executive functioning, i.e. comprehension monitoring is in essence, the task of initiating and monitoring action. Therefore, difficulties with higher-order reading skills, including comprehension monitoring, indicate impairments in executive functioning and as thus, support the 'executive dysfunction' theory of autism.

An additional area of competence identified within the sample was that participants generally demonstrated awareness and knowledge of conventional narrative structure. Due to children's repeated exposure to traditional stories throughout primary education, together with the practice of sharing such stories within home environments (for many, but not all) one would expect children to have internalised the language, phrases and conventions of 'story'. However, it is important to acknowledge the individual differences in performance on this task, with over a third of the sample gaining a maximum score, but several experiencing difficulties. It is rational to assume that these children will inevitably experience challenge when faced with more complex curriculum texts as they progress through the education system, for example, the interwoven narratives and complexity of plot development associated with Shakespeare plays.

Of interest, participants' level of performance on the task involving prediction differed according to the aspect assessed: a) predicting when story events were unknown - identifying salient 'clues' to make credible predictions and b) the ability to identify clues and signs within the text that link to the occurrence of subsequent (known) story events. Whilst participants generally demonstrated competence in Part B, many children had difficulty formulating predictions of future events based upon the clues and links inherent within the text. Whilst some predictions were very general, showing no association to clues from the text, others did not give any response. Williamson et al., (2012) found that even those individuals with an ASC who were categorized as 'Strategic comprehenders' (able to make inferences at all levels, ask questions and make connections between their prior knowledge and the text) had difficulty making predictions. This suggests that the process of formulating predictions may be impaired in individuals with ASC's and thus, requires targeted support. Indeed, developing children's prediction skills was an area identified and subsequently addressed through the reading comprehension intervention in this study, through the reciprocal teaching approach (Palinscar & Brown, 1984; Oczkus, 2010).

7.4.2 Exploration of the experiences of children with Autism Spectrum Conditions identified as 'poor comprehenders' and their approach to different strategies to develop reading comprehension skills

The development of an intervention tailored to target key skills involved in the process of reading comprehension (areas where children with ASC's appear to show impairments) but also, to meet the individual learning needs of each child, supports the rationale for the development of individualised educational programmes for this group (Koegel et al., 2009, cited in Randi et al., 2010). Whilst common strengths and difficulties were identified, the analysis of component comprehension skills emphasized many individual differences. The individual case synopses further illustrated areas of competency and weakness, together with differences in learning behaviour, highlighting the need for reflexivity and on-going assessment in order to develop reading comprehension in children with an ASC. Both pre and post intervention measures, children's self-assessments and informal observations and assessments made during the intervention, indicated that all children made gains in the skills and processes involved in reading comprehension, albeit to differing degrees. For instance, whilst Child C made considerable gains in pre and post standardised measures of reading comprehension (notably, those questions requiring higher level inferential skills), Child A made far fewer gains. It was noted that in the case synopses, Child A needed a high level of support in order to maintain his attention during the sessions, and the researcher was made aware that he was experiencing such difficulties when learning in the mainstream classroom environment.

Overall, the strategies and approaches incorporated within the intervention appeared to facilitate learning for all three children. The impact of using the think-aloud approach was indicated by the children's increased level of engagement with the text, for example asking more questions as they were reading and making spontaneous personal reflections. The 'type of question' strategy (with accompanying visual resource) was understood and applied independently by all children throughout the intervention sessions. The explicit teaching of the different 'types' of question increased children's awareness of

drawing upon their own world knowledge when reading *("On my own")* and the need to integrate information from different parts of the text *("Think and search'*). Children responded well to direct teaching and modelling of the "Fab Four" reciprocal teaching strategies (Oczkus, 2010), however it was acknowledged by the researcher that summarisation skills required additional teaching and support (one child made no improvement according to pre and post intervention measures). A particularly effective strategy in terms of encouraging and developing children's skills to monitor comprehension as they read, was teaching the 'clarify' strategy using the 'pause button' visual resource. The pause button provided a tangible means through which the metacognitive skills could then develop.

The detailed comprehension skill profiles of each child, together with observations made throughout the intervention, did not lead to the identification of specific 'types' of comprehender, with reference to Williamson et al., (2012). However, characteristics of the 'Text-based' comprehender were apparent for all three children, notably difficulties identifying and interpreting implicit information, drawing on background knowledge, as well as difficulties inferring characters' emotions (a characteristic of a 'Strategic' comprehender). The level of scaffolding (through prompting and targeted questioning) the children required in order to make inferences to understand characters' thoughts, feelings, actions and intentions, supports those authors who anticipate challenges for individuals with ASC's in comprehending narrative (e.g. Gately, 2008, Iland, 2011). For two children, inference-making difficulties appeared to be associated with problems involving the attribution of mental states to characters (particularly in social exchanges between two or more characters), linked to impairments in theory of mind. However, for one child (A), difficulties when inferring appeared to be related to his fragmented approach to reading; a tendency to focus on details and information presented in isolation, rather than forming links both within and between chapters, to build understanding of the narrative. This could be attributed to a bias for local processing (aligned with the WCC theory): a preoccupation with specific details (e.g. words and phrases) alongside the tendency to avoid combining parts of the text to form a coherent whole. Additionally, this child also communicated difficulties in maintaining focus

and concentration when reading in the presence of sensory distractions in the environment. This was also highlighted through several children's responses in the semi-structured interviews, which can be linked to hypersensitivities to sensory stimuli (as recognised in the proposed DSM 5 diagnostic criteria).

The individual intervention sessions illustrated examples when abilities in language skills (as both the current and previous research has identified) are associated with children's ability to comprehend written narrative (Nation et al., 2006; Norbury & Nation, 2011). All three children experienced difficulties understanding idioms and lacked awareness of the differing meanings of words, dependent on context. In accordance with suggestions based upon previous research (Norbury, 2004) the children appeared to benefit from direct teaching of idioms they encountered in the text, as well as support to identify contextual clues to help establish meaning of unfamiliar language. Once children understood the concept of idioms (phrases that have both a literal and figurative meaning) this enabled them to identify idioms within the text more readily, although explicit teaching of the meaning of idiomatic phrases was still necessary.

Over the course of the intervention, considerable shifts were evident in terms of the children's level of self-awareness in relation to their reading abilities, particularly being able to accurately identify strengths as well as those areas posing greater challenge. Thus, this reflects a metacognitive level of engagement with the reading process. For example, at the beginning of the intervention, Child C presented with well-developed reading accuracy, fluency and expression but could be described as having a, 'low standard for text coherence'; he was not reading to establish meaning and was therefore largely unable to monitor and remediate his understanding. Lower standards for text coherence have been attributed to a bias for local processing (WCC theory) and difficulties in monitoring comprehension for individuals with ASC's associated with impairments in executive functioning. Considerable attention through the intervention was given to increasing Child C's standard for text coherence: to read with the goal of deriving meaning and as thus, develop comprehension monitoring skills. Researcher observations indicated progress in establishing

understanding as he was reading and substantial improvements in reading comprehension (measured via pre and post standardised assessments) were found. However, the researcher considered that the child's own ratings provided compelling evidence of progress; demonstrating self-awareness of the difficulties he experiences when comprehending text alongside increased knowledge of strategies to support him.

7.4.3 Wider issues in reading development: insights into attitudes, perspectives and experiences of children with Autism Spectrum Conditions as 'readers'

The comments and reflections made by the participants in the study offer useful insights into understanding autistic children as 'readers'; highlighting issues that may be addressed or taken into consideration through reading interventions. Thematic analysis identified four main themes from the responses within the sample as a whole, whilst identification and discussion of sub-themes allowed differences between individuals within this population to be explored and acknowledged. As a detailed narrative account of each theme was presented in Chapter 4, attention to findings of particular relevance, with respect to theory and development of interventions, are discussed.

A salient sub-theme highlighted throughout the analysis was that for many children with an ASC, level of interest impacts reading; increasing motivation to engage in reading (i.e. to pursue specific interests) and also, affecting level of performance (interest promotes memory and understanding). This would appear to be associated with the restricted range of interests outlined in the diagnostic criteria for ASD (ICD-10, 1993 World Health Organisation; DSM-IV, 2000, American psychiatric Association) and the 'monotropic' cognitive style, with individuals with an ASC having few, highly aroused interests (Murray et al., 2005). Whilst some children expressed preferences for non-fiction, others liked to read different genres of fiction. As suggested by Iland (2011) it is often useful to begin to teach comprehension strategies by starting with a topic of interest to engage children with an ASC and to encourage them to draw upon their own prior knowledge. Indeed, the researcher carefully selected the main narrative text to ensure that it would tap into areas of interest for the children and it

encouraged them to integrate their own personal experiences (e.g. London is a familiar setting, the main character was of a similar age with an ASC).

The majority of the sample expressed that reading was undertaken as a solitary activity, reporting infrequent opportunities to read with others. Whilst the importance of developing autonomous reading skills (together with the opportunity for 'alone time') is acknowledged, reading with others (particularly more skilled readers) allows modelling of the cognitive processes and effective strategies to facilitate comprehension. This is the core premise of the 'think-aloud' strategy (Brown & Lytle, 1988; Wilhelm, 2001) and as thus, this procedure was adopted within the current intervention.

Differing perspectives were evident from children's responses with relation to the purpose of reading and their concept of the reading process. Whilst responses did not form distinct polar categories, some children held a more 'holistic' view of reading (e.g. a 'life skill' and means to gain knowledge and understanding) whilst for others, a more pragmatic view was adopted (reading is a task undertaken to achieve a specific outcome). Those children who explicitly acknowledged the relationship between the reading process and gaining understanding could be considered as having a higher 'standard for text coherence', which has been associated with metacognitive skills, including the propensity to monitor comprehension when reading (Perfetti et al., 2005). Further, responses with relation to the reading process (particularly extracting meaning) reveal both holistic and reductionist approaches. Several participants communicated an awareness of building an understanding of narrative, together with facilitative strategies such as reading on for meaning and linking different parts of the text. However, other responses reflected a more fragmented approach (as was evident for Child B) that could be associated with a cognitive bias for local processing (Happé & Frith, 2006) together with a focus on mechanistic strategies to facilitate word recognition processes (decoding) or understanding at the word level. Of particular note, several children showed neither an awareness of comprehension strategies nor an appreciation of the necessity to establish meaning (ignoring confusing parts).

It is not possible to ascertain whether the themes identified through the thematic analysis are solely unique to children with ASC's (a comparison with typically developing children was not an aim of the present study). However, it is reasonable to propose that the insights gained reflect the atypical cognitive styles, behaviours and interests associated with this group and as thus, are important to consider with relation to understanding difficulties experienced and ways to improve reading comprehension for such individuals. Responses from the majority of individuals indicated a weakness with spontaneous comprehension, which stresses the importance of developing children's abilities to effectively monitor comprehension (identify when comprehension fails) and to apply strategies to remediate confusion and enable understanding to resume.

7.5 Strengths and shortcomings of the research studies and opportunities for future research

Through adopting a mixed methodological approach and combining standardised and non-standardised (dynamic) measures, the present research allowed a comprehensive profile of reading skills to be established for individual participants, as well as patterns identified within the entire sample. Issues regarding the generalisability of findings from this study to the wider ASC population are evident, given the size and specific age group of the sample. However, it is recognised that the sample in the present study (N=24) is an adequate size, given that all children had a diagnosis of an ASC, and the gender imbalance reflects the overall predominance of males diagnosed with an ASC (Giarelli et al., 2010). Indeed, a number of research studies within the autism literature have often included only 1 or 2 participants with ASC's (e.g. Chaing & Ling, 2007).

Whilst the findings may be informative for other children with ASC's attending mainstream schools and of primary to secondary transition age, a clear shortcoming of the research was that comparisons to a control group (typically developing or other developmental disorders) was not permitted. For aspects of Study One, some comparison with the typically developing population can be made, through the analysis of reading, cognitive profiles and receptive language

abilities gained through standardised assessments. However, the analysis of component comprehension skills in the study was exploratory in its nature. The individual tasks adapted and developed to ascertain performance on a number of component comprehension skills, were used to assess the autistic children in the sample only. In the absence of a control group of typically developing children (of similar age and ability) it is not possible to draw strong conclusions from the dynamic assessments of component comprehension skills. For instance, it cannot be established whether the general patterns of strength or difficulty observed in the ASC sample are characteristic to this group in particular. Therefore, further research is required in order to explore the component comprehension skills of children with ASC and typically developing children, so a comparison of the performance of each group on the component comprehension tasks can be made.

Overall, although not an aim of the current research project, longitudinal research is warranted to investigate the developmental trajectories of component reading skills. Specifically, to address the question of when, or at what stage in development, discrepancies between word recognition and comprehension become apparent for individuals with an ASC, and furthermore, whether such discrepancies remain stable over the course of development?

Intentionally seeking the views of children with an ASC formed a unique aspect of the research project. Conducting semi-structured interviews gave the researcher flexibility and scope to explore interesting responses and thus, provides greater sensitivity to capturing individuals' perspectives than when using other methods, such as questionnaires. The insights gained through the interviews enabled further illumination of factors that appear to have a degree of impact upon the processes involved in reading comprehension for individuals with an ASC. Some authors have used questionnaires to gain information about a child's reading from parents and teachers (Williamson et al., 2012), although as highlighted above, the nature of the information provided was mainly factual, rather than allowing reading processes to be explored.

Study One involved gaining responses from parents and teachers in order to obtain a measure of autistic symptomatology for the participants. A child's parent (mother or father) and a teacher who knew the child well, were requested to complete ratings on the SRS, a 65-item questionnaire (Constanino & Gruber, 2005). A marked discrepancy between the two scores was apparent, with parents rating their child's autistic symptoms as considerably more 'severe' than their teachers. Although some differences between parent and teacher ratings on the SRS have been reported, generally, a high level of inter-rater reliability between informers from different settings has been found. Constantino et al., (2007) reported a strong correlation (r = .72) between parent and teacher SRS reports. Possible explanations for the low-level of inter-rater reliability in the present study may indeed be linked to factors associated with the period of transition itself. Firstly, teachers in secondary schools who completed the SRS might not see a child as frequently as a primary school teacher, who sees the child all day for a variety of lessons and therefore, the secondary teacher may be less aware of difficulties the child experiences in different situations. It is also plausible to suggest that as the period of transition can be a particularly challenging time for children with ASC's (Gumaste, 2011) this may be reflected by an increased prevalence of autistic symptoms during this time, more likely to be presented within the familiar context of the home environment (observed and reported by parents). Therefore, although no significant associations were found between autistic symptoms, reading and cognitive abilities, considering the low levels of reliability of SRS scores obtained in the study, this finding is not conclusive.

With respect to the individually tailored reading comprehension (Study Two), adopting a multiple-case design has both advantages and limitations. The advantages of incorporating mixed methods in a single study (Burke et al., 2004; Onwuegbuzie & Leech, 2005; Yin, 2009) were realised through the richness of the data obtained through the multiple-case design. This was illustrated through the individual case synopses, capturing each child's approach to the different strategies incorporated in the individually tailored reading comprehension intervention, highlighting areas of difficulty and importantly, progress made through the sessions. However, whilst the children's

own reflections, researcher observations and pre and post quantitative measures (highlighting considerable improvement for one child in particular) are very encouraging in terms of outcomes following the intervention, strong conclusions about the effectiveness of this intervention for children with ASC's cannot be drawn. Therefore, further research is required to establish the effectiveness of the intervention. This would include randomisation of participants to intervention and comparison control groups, which would then allow improvements identified through pre and post measures to be attributed (with a greater degree of confidence) to the particular strategies and approaches used within the intervention.

It was the intention of Study Two to pilot an individually tailored reading comprehension intervention, following a thorough exploration of the individual children's areas of competence and areas of difficulty within the reading comprehension process. The value of delivering the intervention on a one-to-one basis so that the researcher could tailor the sessions to meet the children's individual needs, and make very detailed observations, is evident through the case synopses. However, if the intervention was to be delivered within an individual school setting (for example, by trained members of teaching support staff) the researcher considers that it may be possible to deliver the intervention to a pair or small group of children with an ASC, or indeed, alongside a typically developing peer with specific comprehension difficulties. This would enable more children to be able to access this intervention, who may benefit from focused support in order to develop higher level reading comprehension and metacognitive skills.

Finally, the author outlined a clear rationale to focus on a fictional narrative text within the intervention, with particular consideration of the social communication difficulties characteristic of children with autism, which may present additional challenges to reading such texts. Additionally, the opportunity for the children to engage with an extended narrative over the duration of the intervention facilitated the researcher in supporting the students to build a coherent understanding of the story (e.g. recalling and linking information in different chapters). However, it is acknowledged that supporting children to comprehend

expository texts (non-fiction) as well as narratives, is also important. Therefore, there are possibilities to further develop the intervention, so that children also gain experience in applying strategies to facilitate their ability to comprehend a range of different texts.

7.6 Implications of research

The findings from this study highlight important implications for parents and professionals (including teachers, teaching assistants and Educational Psychologists) who are involved in supporting the development and progress of children with ASC's. Firstly, the heterogeneous nature of reading and cognitive profiles within this group highlights the importance of establishing each individual child's strengths and weaknesses. This is important in order to meet individual learning needs, in addition to implementing more general strategies to support this group. Secondly, the tendency for the development of reading comprehension to fall behind reading accuracy and word reading (decoding) in children with ASC's, together with the association between comprehension difficulties and problems understanding and using language, are important findings to communicate to parents and professionals alike. This study raises the importance of thorough assessment in order to identify problems within the reading comprehension process for children with ASC's and providing targeted support for both reading comprehension and language development for this group of children. Educational Psychologists (EPs) can be considered as well placed to both directly and indirectly implement such recommendations, throughout their involvement with individual children with ASC's but equally, through systemic work (for instance, at the group, classroom or whole school level).

Educational Psychologists have an instrumental role in guiding schools to devote increased focus and resources to meet the learning needs of individuals with ASC, in order that they are able to achieve their academic potential. Children and young people with ASC's form a significant group, the majority of whom are educated in mainstream schools, and as for all children, education is central to the development of skills to enable them to progress toward further

education, training and employment and prepare them to function as adults within society. As might be expected, teachers and schools tend to focus more readily on supporting and addressing directly observable social and behavioural issues, which could lead to academic problems being overlooked or at least, receiving less attention. Although this is a possibility in both primary and secondary educational settings, considering the nature of the organisation of secondary schools (i.e. pupils being taught discrete subjects by many teachers) together with coping with the demands of a more socially complex environment, it is plausible to suggest that this is more likely to occur in secondary schools. Indeed, this perspective was expressed by a parent who approached the researcher to discuss concerns in relation to her child's academic progress in secondary school (having attained above average academic levels in primary) despite acknowledging the support in place for her child to develop social skills and manage his anxiety. EP's have a key role in supporting the planning and implementation of transition packages to support children with ASC's (Gumaste, 2011) and also, to identify appropriate targets for Individual Education Plans (IEP's) as they progress through the education system. As highlighted by the present study, such packages and IEP's need to target, support and emphasise all aspects of development for individuals in this vulnerable group: social, emotional, behavioural *and* academic learning needs.

With particular reference to reading comprehension, there is a consensus that this is undoubtedly the neglected component of reading, with a larger body of research, training and emphasis placed upon word recognition skills (notably, synthetic phonics programmes). Thus, a starting point for EPs may be to raise the status of reading comprehension at a whole school level for all children, both in primary but most importantly, in secondary schools, when the teaching of reading skills diminishes yet pupils engage with increasingly challenging reading material. Through the framework of the Simple View of Reading Gough & Tunmer, 1986; Hoover & Gough, 1990) the EP could subsequently support schools to identify children with specific comprehension difficulties and in doing so, raise the profile of children with ASC's in relation to this superficially 'invisible' difficulty that has the potential to greatly impact upon learning, academic achievement and thus, future outcomes for such individuals.

The paucity of research literature focusing on reading abilities of children with ASC's, particularly developing and evaluating suitable interventions, presents an opportunity for collaborative working between EPs and professionals in schools. As highlighted by Greenway (2002) sufficient time for planning, implementing training and reflection on the process needs to be available to ensure effective delivery of interventions. With reference to the current study, the intervention required skilled teacher modelling, an awareness of the learning styles of children with ASC, together with a sound knowledge of the processes and skills involved in reading comprehension. The EP therefore has a vital role in the interface between research and practice; imparting theoretical underpinnings and specialist knowledge whilst simultaneously, supporting practitioners to apply strategies and approaches in real world contexts.

7.7 Conclusions

Research has consistently identified that children with ASC's are at increased risk of reading comprehension difficulties. The development of age appropriate word reading and decoding skills, together with the use of standardised measures of reading comprehension, may lead to such difficulties being left undetected. Due to impairments typically associated with individuals with ASC (e.g. poor verbal and language abilities), together with characteristic differences in cognitive processing, reading comprehension skills may not develop as typically expected or be acquired through repeated exposure alone. This study has demonstrated the benefits of the development of reading comprehension interventions to address discourse level and metacognitive skills and processes, tailored to meet the individual learning needs of children with ASC's. Reading is an essential life skill; the 'gateway' to learning and thus, taking steps to address reading comprehension difficulties for this population (and indeed, for all children) should be considered a high priority.

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APPENDICES

APPENDIX A

Parent consent Letter

Dear Parents/Carers,

Re: Consent for your child to take part in a reading research project

(INSERT SCHOOL) is committed to supporting the learning and educational achievement of all our pupils. As part of our aim to support children with individual needs in school, we have agreed for Libby Roberts, a Trainee Educational Psychologist from the Institute of Education, University of London, to carry out some individual work with pupils in our school. As an experienced primary school teacher, Libby is very familiar with supporting the learning of children and has a particular interest in developing children's enthusiasm and skills for reading.

What are the aims of the research project?

The ability to read and understand is one of the most important skills to teach our children and is essential for successful functioning in society. Learning to read is a complex process, requiring children to develop strategies to read individual words and ultimately, to ***understand*** what they have read.

Recent research has focused upon those children who may need additional support to develop the skills involved in the process of reading for meaning. In particular, a new strand of research has focused on the reading development of groups of children with Autism Spectrum Disorder. It has been suggested that some children in this group often are able to read print accurately but experience difficulties with reading comprehension. As research shows well-developed reading comprehension skills are associated with higher levels of educational attainment, this is an important aspect of learning to develop both in school and at home, particularly as they make the transition from primary to secondary school.

Therefore, this research project aims to explore both the reading and cognitive skills of pupils in this group as they make the transition from primary to secondary school. This will provide information for schools and parents about ways to further support each pupil's reading development as they progress through school.

How will pupils be involved?

Pupils will be invited to take part in reading activities and other short tasks where they will be using their thinking and problem solving skills. There will also be a short interview where the pupils will be asked several questions about reading. If the pupils are happy to take part, the activities will take place over two to three sessions (no longer than an hour each) and an appropriate time to work with Libby during the school day will be agreed in advance.

To ensure the pupils' responses are recorded accurately, the short interviews will be audio recorded. All information and assessments collected from the pupils will be kept confidential and if included in the research, used anonymously. All aspects of

the research being carried out at (Insert School) have been given ethical approval by the Institute of Education, University of London.

If you have any questions or would like further information please contact the school or alternatively you may contact Libby Roberts directly at eroberts@ioe.ac.uk.

If you are happy for your child to take part in the reading and secondary transition research project in school, please sign and return the slip below. If you do not wish your child to participate please indicate and return.

Thank you for your support and co-operation.

Yours sincerely,

Head Teacher/SENCo

Elizabeth (Libby) Roberts
Trainee Educational Psychologist
Institute of Education
University of London

☐ I am happy for my child to take part in the reading project

☐ I do not wish for my child to take part in the reading project

Child's name .....

Parent/carer name .....

Signed ..... Date .....

Thank you.

APPENDIX A

Participant consent letter

Reading and learning research project

My name is Libby Roberts.

I used to be a teacher in a primary school and now I work in Bexley as a Trainee Educational Psychologist. This means that I work with lots of children and young people and part of my job is to make sure that they can learn in school. I am also a student at the Institute of Education in London and I am really interested in finding out how children learn to read. As reading can be a difficult thing to do, I want to find out how to help children become even better readers.

I will be going into schools to carry out different activities and tasks with different children. I would like you to be involved in the reading project too.

Any questions …?

I am happy to take part in some puzzles, tasks and activities where I use my thinking, reading and problem solving skills with Libby Roberts. This will help to find out things about my learning – the things I am really good at and other things that I might need more help or practise with.

I know that I can ask for a break or ask to stop if I want to during the activities.

Signed ……..

APPENDIX B

BPS Ethical Approval Form – DEdPsy Y2-Y3

STUDENT RESEARCH ETHICS APPROVAL FORM
Psychology & Human Development

This form should be completed with reference to the BPS Code of Ethics and Conduct – available online from www.bps.org.uk

On which course are you registered? Doctorate in Professional Educational Child & Adolescent Psychology

Title of project: The impact of reading and oral comprehension skills on the transition from primary to secondary school in children with Autism Spectrum Disorders: *Deriving meaning and understanding in an academic and social learning environment.*

Name of researcher(s): Elizabeth (Libby) Roberts
Name of supervisor/s (for student research): Tony Charman & Vivian Hill

Date: 04.11.11 Intended start date of data collection (month and year only): 11/11

1. **Summary of planned research** (please provide the following details: project title, purpose of project, its academic rationale and research questions, a brief description of methods and measurements; participants: recruitment methods, number, age, gender, exclusion/inclusion criteria; estimated start date and duration of project). It's expected that this will take approx. 200–300 words, though you may write more if you feel it is necessary. Please also give further details here if this project been considered by another (external) Research Ethics Committee.

Project timescale: 11/11 – 11/12

Comprising 1% of the child population, children with Autism Spectrum Disorder (ASD) form a significant group (the majority entering mainstream provision), requiring varying and specific support to meet their educational needs and to prepare them to be able to function within society. The ability to read and understand is one of the most important skills to teach children. There is currently a growing body of research exploring reading skills in children with ASD, suggesting that this group have particular difficulties with reading comprehension.

Making the transition to secondary school can present challenges for all students, but in particular, children with SEN, as they are required to adjust to the social and curriculum differences inherent in the secondary environment. Children with ASD have been highlighted as being particularly vulnerable in the transition period, due to their specific

needs, including social communication difficulties and academic/learning difficulties.

The present study aims to further examine the reading profiles of children with ASD, specifically their discourse level reading comprehension skills and oral comprehension skills, within the transition year. That is, to examine the impact of such discourse level comprehension skills on their transition from primary to secondary. It is intended that an exploration of reading skills and specific difficulties with comprehension in the sample of ASD children will inform the development of an intervention to support the development of reading comprehension in a sample of year 6 children with ASD.

Research questions/aims:

This research project is to be carried out in 2 stages and thus, different questions will be addressed in each stage. Primarily, the data collected from the research carried out in stage one will be analysed and will then inform stage two.

Stage One:

1. To establish patterns of reading (and cognitive abilities) in a sample of pupils with ASD
2. To identify whether discrepancies exist between reading accuracy and reading comprehension in the sample.
3. To identify whether verbal abilities and oral comprehension skills are correlated with reading comprehension.
4. To explore patterns in discourse level reading comprehension skills and wider issues related to reading development (attitudes, behaviours and knowledge and awareness of strategies) in the sample of pupils with ASD.

Stage Two:

5. To evaluate the impact of a reading comprehension intervention with a sample of children with ASD on their discourse level skills
6. To explore the influence of discourse level comprehension skills on children's transition from primary to secondary: i) socially and ii) academically

Method

Sample and recruitment

It is intended that the research will use 2 sets of participants. In stage one, approximately 10-15 participants, male or female, aged between 11-12 years with a diagnosis of ASD (Year 7) and approximately 6 parents and SENCO's/teachers will take part in the research. The participants will be recruited by contacting several schools within the London borough of Bexley. The SENCo will be contacted to identify suitable participants for the research project:

1) diagnosis of ASD
2) able to access level 3 texts (minimum)
3) attended a Primary school in the London Borough of XXXX

Letters will then be sent to the children's parents to obtain consent for the children to participate in the research and a separate letter will be sent to the young people before they are due to meet the researcher. On the letter, it will be stated that the researcher would like to involve parents themselves in the research, to capture their voice/perspective and experience. The parents will be contacted separately by the researcher to try to arrange a convenient time/place to be interviewed.

In stage two, approximately 10-15 participants, male or female, aged 10-11 years (Year 6) and approximately 6 parents and SENCO's/teachers will take part in the research. They will be involved in an intervention programme in their primary school focusing on developing discourse level comprehension skills as part of their preparation for secondary transition. The children will be re-visited in year 7 when they have started their secondary school.

Methods and Measurements:

The tasks and activities have been organised to take place over four individual sessions. This ensures that each individual session is no longer than a typical lesson (approximately 50 minutes). This will ensure that the children do not become fatigued and it gives the opportunity to build a rapport with each child at the beginning of the session and to answer any questions they may have at the end of the session.

Stage One

In the first session, the participants will complete the YARC (York Assessment of Reading Comprehension). This will provide a measure of the child's reading accuracy (decoding skills) and reading comprehension. In order to gain a measure of verbal and non-verbal cognitive skills, the researcher will administer the Wechsler Abbreviated Scale of Intelligence (WASI). This includes 4 subtests: Vocabulary, Block Design, Similarities and Matrix Reasoning. This test was designed to be easy and quick to administer and provides an accurate estimate of an individual's intellectual functioning. Participants will be given breaks as required during the assessments. It is estimated that both the NARA and WASI will take no more than an hour in total.

In the second session, once the researcher has built a rapport with the participant, the participant will be asked to think about both their transition to secondary school in the form of a semi-structured interview. This will be followed by tasks measuring oral comprehension using two subtests from the Clinical Evaluation of Language Fundamentals 4. Both the teachers and parents will be asked to complete the Social Responsiveness Scale (SRS).

In the third session, the children will be asked to complete a selection of reading tasks measuring component comprehension skills. This will comprise: An inference task (children and two short stories and answer questions verbally); a knowledge of story structure task (children are given cut up sentences of a story and organise them from beginning to end) and a comprehension monitoring task (children read two short stories and try to identify parts of the story that do not make sense).

In the fourth session, children will complete an anaphoric resolution task, which will involve them reading one short story and answering questions where they have to identify

incorrect pronouns and complete a cloze task. Finally the children will be given a short interview to gain an insight into the attitude to reading, reading behaviors and

Stage 2

Once participants have been selected to take part in the comprehension skills intervention, their skills will be assessed pre and post intervention. The children will be interviewed in the last term of their primary school (Y6) and in their first term of their secondary school (Y7). The child's teacher in the primary and secondary school will also be interviewed, as well as parents.

2. **Specific ethical issues** (Please outline the main ethical issues which may arise in the course of this research, and how they will be addressed. It's expected that this will require approx. 200–300 words, though you may write more if you feel it is necessary. You will find information in the notes about answering this question).

This research study will be using 24-30 school age participants in total (under 16 years old) with a diagnosis of ASD and thus will seek both their consent to participate as well as that of their parents/carers. The researcher holds a current Criminal Records Bureau check and participants' safety will be ensured. The assessments and interview with the children will be carried out in a familiar room on school premises, with the consent of the school. The research will be carried out individually over 3 sessions (possibly 3 in some circumstances e.g. the pupil becomes fatigued or states a preference to complete later). This is to ensure participants do not feel overwhelmed and can retain concentration during the assessments. In order that the participants feel comfortable during the assessments, they will be asked if they would like a familiar adult in school, for example, a Learning support assistant, to accompany them while they complete the activities.

Information held by school in relation to statements of educational need, national curriculum levels, ethnicity and whether the participants are learning English as an Additional Language will be collected and treated as confidential.

Children with a diagnosis of ASD present a group in schools who often receive additional support to cope with the school environment and communication with parents to inform them of events or changes to their routine in school is often very important. Therefore, the researcher will ensure parents are provided with relevant information about the research project and the dates the data will be collected shared with the school, participant and their parents. As reading is a familiar, everyday activity for the participants and the activities to assess cognitive development are designed to be appropriate for this age range and used with children with various special educational needs, there should be little ethical concern regarding their involvement in the study. Furthermore, as the researcher is a qualified primary school teacher who has worked with several children with a diagnosis of ASD, they are familiar with this group and are skilled in supporting such children.

The interviews will be semi-structured, using several open-ended questions, where answers may be followed up with a probing question, as necessary, depending on the quality and depth of the participants' answers. The interviews will be recorded using electronic

Dictaphones and participants will be required to sign consent to them being recorded for the purpose of the study for analysis of their responses. The researcher will hold the data securely and individuals' interview data will not be transported between schools. Pupil's names on the assessment information will be anonymised and any responses in the interview that are included in the report will not be traceable to individual participants. This information will be communicated with both the participants, parents and SENCOs/teachers.

Whilst the focus of the research is on learning and curriculum related topics (notably reading and comprehension) it is not anticipated that any worrying or sensitive information will emerge. However, the researcher is aware that if the pupil or parents' experience of transition has been particularly difficult this topic may be emotive. In this case, the researcher will respond sensitively. For the pupils, the interview will be followed by a practical task, to prepare them for their return to class. In the event that any information regarding a child protection or safety issue is shared, the participant will be informed that this will need to be passed onto the child protection officer in school to ensure their safety and wellbeing. No other risks to participants or the researcher in engaging with this study have been identified.

Participants will be thanked for taking part and given a debrief at the end of the interview/assessments (appropriate to their age and level of understanding) and will be thanked for their participation. In addition to making the pupils feel at ease through encouragement and praise for their effort/attempts during the assessment, an appropriate reward will be offered at the end of each session (e.g. a sticker) to provide a tangible means of acknowledging their effort.

At the end of the study, information regarding participant's reading skills and strategies will be given to schools and parents. This will help to identify strengths and areas for development and in turn, to identify ways to further support the participant's reading development both in school and at home.

3. Further details

Please answer the following questions.

		YES	NO	N/A
1	Will you describe the exactly what is involved in the research to participants in advance, so that they are informed about what to expect?	✓	☐	☐
2	Will you tell participants that their participation is voluntary?	✓	☐	☐
3	Will you obtain written consent for participation?	✓	☐	☐
4	If the research is observational, will you ask participants for their consent to being observed?	☐	☐	✓
5	Will you tell participants that they may withdraw from the research at any time and for any reason?	✓	☐	☐
6	With questionnaires, will you give participants the option of omitting questions they do not want to answer?	✓	☐	
7	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	✓	☐	☐
8	Will you debrief participants at the end of their participation (i.e. give them a brief explanation of the study)?	✓	☐	☐

If you have ticked **No** to any of Q1-8, please ensure further details are given in section 2 above.

		YES	NO	N/A
9	Will your project involve deliberately misleading participants in any way?	☐	✓	☐
10	Is there any realistic risk of any participants experiencing either physical or psychological distress or discomfort? If **Yes**, give details on a separate sheet and state what you will tell them to do if they should experience any problems (e.g. who they can contact for help).	☐	✓	☐
11	Will your project involve human participants as a secondary source of data (e.g. using existing data sets)	☐	✓	☐

If you have ticked **Yes** to any of 9 - 11, please provide a full explanation in section 2 above.

12	Does your project involve working with any of the following special groups?	YES	NO	N/A
	• Animals	☐	✓	☐
	• School age children (under 16 years of age)	✓	☐	☐
	• Young people of 17-18 years of age	☐	✓	☐
	• People with learning or communication difficulties	✓	☐	☐
	• Patients	☐	✓	☐
	• People in custody	☐	✓	☐
	• People engaged in illegal activities (e.g. drug-taking)	☐	✓	☐

If you have ticked Yes to 12, please refer to BPS guidelines, and provide full details in sections 1 and 2 above.

APPENDIX C

Reading Research Project – Feedback letter

Dear Ms XXXX,

Thank you for giving permission for XXXX to be involved in the Reading Research Project carried out by myself, Libby Roberts, Institute of Education, University of London.

Please find below a summary of findings about XXXX learning and reading skills, together with strategies and recommendations to further support his reading comprehension skills.

It is important to note that the activities and tasks carried out do not form an Educational Psychology assessment of your child. The purpose of the individual sessions was to specifically investigate the cognitive processes involved in developing reading and thinking skills.

Attitude, motivation and attention during tasks

XXXX was very happy to work with me each session and he was able to maintain his concentration when completing the activities. XXXX was always willing to have a go at the different tasks and demonstrated persistence and patience when attempting those he found more challenging. It was a pleasure to work with XXXX and he seemed to enjoy the learning experience.

Strengths and areas for development
(See attached sheet to see individual subtests and scores)

XXXX was very focused and adopted a methodical approach to all the tasks. He demonstrated a particular strength when completing activities drawing upon non-verbal skills, scoring in the above average range for both the Block Design and Matrix Reasoning subtests.

When asked to explain the meaning of different words, XXXX was able to give accurate definitions for many different words. For example, for 'famous', he said, "Very popular, well-known, usually a celebrity". In the 'Similarities' activity, XXXX understood the concept of 'alike' or 'similar'. When he was presented with two words (e.g. plane, bus) he was able to say how these were alike (vehicles). For both subtests, drawing upon verbal skills, XXXX scored within the average range. It was noted that XXXX' performance on the Similarities subtest was slightly higher than the Vocabulary subtest, which indicates his expressive language skills are developing slightly below his receptive language skills.

Reading Assessment

XXXX was very happy to complete all the reading activities and appeared confident when asked to read passages of text aloud. He read very accurately with a good pace. XXXX' reading accuracy and word recognition skills are above those expected for his chronological age. He was able to read (decode) some difficult words including: 'endurance', 'tedious', 'flourish' and 'unconquered'. I noted that in comparison to his word recognition and reading accuracy skills, his reading comprehension skills were less developed, and slightly lower than those typically expected for his chronological age.

On the activities designed to explore specific reading comprehension skills, XXXX performed well on many of the activities. When XXXX was given a focused task where he needed to identify and to resolve anaphors (for example, the pronouns, 'he, she, his, her' to replace a name of a character) XXXX did this well. However, he only identified one or two deliberate mistakes in a story that resulted in several sentences not making grammatical sense (e.g. Rosie remembered that she had left *his* purse on the table at home). This suggests that XXXX' self-monitoring skills (monitoring his understanding of a text as he is reading) could be an area for him to develop further. XXXX made relevant and accurate suggestions (using clues within the text) when asked to predict what happens next in a story.

XXXX was able to answer inference questions consistently, when the answer required a more literal level of understanding or when he had to read and interpret information between two sentences. However, XXXX had difficulty answering global inference questions, whereby he had to think beyond the text to provide an answer. For example, integrating his prior knowledge (world knowledge) with information in the text, to gain a full understanding. XXXX experienced some difficulties when he was asked to sequence the events in a short story (from beginning to end). Finally, when XXXX was asked to identify information in a text that did not make sense together (e.g. information that was not consistent or contradicted each other), he was able to identify several parts that did not make sense and clearly explain *why* this was the case.

Suggestions for future learning opportunities and support:

- Continue to praise and foster XXXX' positive attitude to reading and learning.
- Regular opportunities for XXXX to read both at home and school to ensure his reading skills continue to develop (particularly with regards to his reading comprehension skills).
- To support XXXX to develop his reading comprehension skills, he may benefit from the opportunity to discuss a text with an adult or peer, particularly to develop his understanding of the development of plot and the structure of narratives, characters and to make links and connections between different parts of the text.

- It may help XXXX to think about the different types of questions in comprehension activities, and thus, how to answer these. There are broadly four types of question (see attached visual resource):

    1. ***"Right There"*** (Literal questions)
    2. ***"Think & Search"*** (Integrating information from different parts of the text and involving inference)
    3. ***"Author & Me"*** (Thinking about the language an author uses and what they want the reader to think/feel)
    4. ***"On my Own"*** (Questions that require the reader to integrate their existing world knowledge with the text. The answer therefore cannot be found by interpreting the information in the text alone).

    Adapted from: Wilhelm, J. D (2001). *Improving Comprehension With Think-Aloud Strategies: modelling What Good Readers Do.* New York: Scholastic

- To support XXXX' self-monitoring as he reads, it would be useful to encourage him to 'pause, think and check' as he reads parts of a text, particularly if he finds it confusing. He can then use strategies such as re-reading a part of the text, reading on to see if more information is provided to resolve the confusion, or acknowledging when he needs to seek clarification (e.g. by discussing with an adult or peer, finding out the meaning of a word of phrase or perhaps undertaking research on a particular topic).

- XXXX may benefit from activities where he has to read information and then summarise it (either verbally or in writing). This is a higher level skill that requires firstly, a secure understanding of the text and then being able to select relevant information and details to include in the summary. This may help him to think about the overarching themes as well as the specific information and details in the text.

- The "Reciprocal Teaching" approach to developing strategies for reading comprehension focuses on the **"*Fab Four*"** and provides a clear, structured framework to enable students, teachers and parents to focus on some of the key strategies and skills involved in reading comprehension (see attached resource).

    5. ***Predicting*** – encourages the reader to make prediction before reading (e.g. using information from titles, sub-titles and illustrations) as well as during reading.
    6. ***Questioning*** – encourages the reader to have an active engagement with the text by asking, "Who?, What?, Where?, When?, How?).
    7. ***Clarifying*** – encourages the reader to monitor their understanding as they read.
    8. ***Summarizing*** - encourages the reader to summarize as they

are reading (e.g. recapping the main points after reading a chapter) as well as providing a summary after reading a whole text or story.

(See reference: Oczkus, L.D, (2010). *Reciprocal teaching at work: Powerful strategies and lessons for improving reading comprehension (2nd edition).* Newark, D. E: International Reading Association.

If you wish to discuss any of the above further please contact the school or email eroberts@ioe.ac.uk.

Thank you.

Yours Sincerely,

Elizabeth (Libby) Roberts
Trainee Educational Psychologist

XXXX
Senior Educational Psychologist

XXXX's cognitive skills and abilities were assessed at the chronological age of 11 years, 3 months using the four different activities from the Wechsler Abbreviated Scale of Intelligence (WASI). The scores outlined below highlight areas of strengths and difficulties for XXXX. These cognitive scales are designed to measure clearly identifiable skills that are important for learning and educational performance.

A summary of the findings are given below:

	Year	**Month**	**Day**
Date Tested:	2011	12	12
Date of Birth:	-	-	-
Age:	11	03	12

Areas assessed	**WASI Subscale**	**Description of subscale**	**T Score (average = 50)**	**Category**
Verbal	**Vocabulary**	Explanation of word meaning	48	Average
	Similarities	Identifying relationships between key words	54	Average
Performance	**Matrix Reasoning**	Identifying the correct item to complete a pattern	61	Above Average
	Block Design	Assembling designs with coloured blocks	61	Above Average

Glossary of terms

Raw score and T-Score	Raw scores are converted to give transformed scores or T–Scores that have a mean of 50.

Category	Very High	High	Above Average	Average	Below Average	Low	Very Low
T - Score	70 and above	63 - 69	57 - 62	43 - 56	37 - 42	30 - 36	29 and below

APPENDIX D

Wechsler Abbreviated Scale of Intelligence (WASI)

Areas assessed	WASI Subscale	Description of subscale	Cognitive abilities measured/tapped
Verbal IQ	**Vocabulary**	Participant verbally defines orally and visually presented words	Expressive vocabulary Verbal knowledge
	Similarities	Participant explains the similarity between the common objects or concepts that two words represent	Verbal concept formation Abstract verbal reasoning ability General intellectual ability
Performance IQ	**Matrix Reasoning**	Participant identifies the correct item to complete a pattern	Non-verbal fluid reasoning General intellectual ability
	Block Design	Participant replicates a geometric pattern within a specified time limit using two-colour cubes	Spatial visualization Visual-motor coordination Abstract conceptualization Perceptual organisation General intelligence

(Wechsler, 1999)

Clinical Evaluation of Language Fundamentals, 4th UK Edition (CELF-4): Concepts & Following Directions and Word Classes

Subtest	Purpose	Format
Concepts & Following Directions	To measure the child's ability to: a) Interpret spoken directions of increasing length and complexity that contain concepts requiring logical operations. b) Remember the names, characteristics and order of mention of objects c) Identify the pictured objects that were mentioned from among several choices.	The student points to pictured objects (e.g. shoe, ball, car, house, apple, fish) in response to oral directions presented by the examiner.
Word Classes 2 (Age 8-16)	To measure the ability to perceive, understand and explain relationships between associated words.	The student selects two words that go together best from three or four verbally presented words (receptive component) and explains the relationship between the selected words (expressive component).

Adapted from CELF-4 Examiners Manual (Semel, Wiig & Secord, 2006)

APPENDIX E

Development of Task D: Comprehension monitoring (Anaphors)

Short story

Part 1

Rosie felt the fresh summer breeze on her face as she pedalled her shiny new purple bicycle. It was the best birthday present ever and **she** (Practice example IR'; Rosie) couldn't wait for Tom to see it!

Rosie and Tom were best friends. They were really enjoying hanging out and riding their bikes together during the long summer holiday. The **teenagers** (IR'; Rosie and Tom) had lived on the same street since they were babies and did pretty much everything together. When Rosie rode down the drive, she could see that Tom was already outside. He was crouched down inspecting his **chain** (RL; of his bike). "Hey!" she shouted excitedly. Tom lifted his head and smiled, "I'm not too convinced about the colour!" he shouted. Rosie laughed, "Whatever! You're just jealous!" Rosie had wanted a new bike for such a long time and she knew Tom **had** too (IS; wanted a new bike).

"Are you two heading out on the bikes?" shouted Tom's mum from an upstairs window. Rosie looked up and waved. She really liked her because **she** (MR'; Tom's mum) would make Rosie's favourite meal, Spaghetti Bolognese, every time she stayed for dinner.
"Yes, we **are** mum" (ME; going out on the bikes) he replied.
"Who bought you the new bike, Rosie?"
"Mum **did**!" (IS; bought her the new bike) she shouted back.
"Well you are a lucky girl, aren't you?"
"Yes, I **am**!" (IE; a lucky girl) Rosie replied.
"Are you both coming back here for dinner tonight?"
"**Yes**!" (IE; we are coming back for dinner tonight).

Tom filled up his water bottle from the tap outside. They would definitely need plenty to drink today. When he had checked the weather forecast that morning it said that it could even be hotter in the UK than in Southern Spain! He screwed the **lid** (ML; of the water bottle) on tight and placed it in his rucksack. "I hope you have remembered **yours**" (MR'; water bottle). Rosie cast an irritated look towards Tom. "Of course I **have**!" (ME; remembered my water bottle) she snapped. "Well, you *always* forget something Rosie, so you can't blame me for asking!"

The **pair** (R'R; Rosie and Tom) decided to ride into town and call at Maggie's sweet shop. It was every child's dream and every dentist's nightmare! Sitting on the **shelves** (ML; of the sweet shop) were large glass jars filled with every different type of sweet you could think of. Rosie's favourite sweets were strawberry laces and she had been saving up to buy a packet for three weeks!

Part 2

When they got to the shop, Rosie opened her rucksack to take out her money. After only a few seconds, she realised she had left her purse in the kitchen at her house. She had forgotten to pick it up from the **table** (IL; in the kitchen) on her way out. Rosie felt inside her tracksuit pockets hopefully, but found only one 2p coin and an old tissue! Tom rolled his eyes, "I told you **so!**" (RS; that Rosie always forgets something). Tom could see how disappointed Rosie was and so he decided to share his sweets with her. "Thanks, Tom" said Rosie, smiling and thinking how kind he was.
"So do you want to try out my new wheels for the ride home?" she asked. Rosie knew that Tom had been desperate to have a go on her new bicycle all day.
"You bet!" Tom replied. "I guess it could be worse, you could have chosen a pink **one**!" (IS; bicycle)

When Rosie and Tom turned into the driveway, Tom's mum was busy watering the flowerbeds in the front garden. The **sunflowers** (IL; in the flowerbeds in the front garden) were almost as tall as she was. "Let me guess, you called at **Maggie's** (RR' the sweet shop)?" said mum.
"**Yep**!" (IE; called at Maggie's sweet shop). We have eaten too many sweets and we don't have room for dinner now!" Tom replied cheekily. Tom's mum knew his sense of humour very well.
"I certainly hope **not!**" (MS; you haven't eaten too many sweets)
"What *are* we having for dinner, mum?" Tom asked. Tom's mum and Rosie exchanged a knowing look.
"My favourite of course!"

Code:

I = Immediate (antecedent in the sentence immediately preceding the anaphor)
M = Mediated (more than one sentence distant with intervening mention of the item)
R = Remote (more than 2 sentences distant with no mediating reference to the item)

R' = Reference
E = Ellipsis
S = Substitution
L = Lexical

APPENDIX F

TASK A: Inference and integration

Practice story

It was Julie's birthday and she was having a party. She finished icing the cake and then went to get ready. Julie lay down in the water and splashed around. There were bubbles everywhere. But she didn't have long to relax before the party.

She put on her new dress that she had bought last week. The silver necklace that her parents had given her for her birthday would look very nice with it. She went to get her jewellery case, but it wasn't on her dressing table, where she usually kept it. Eventually she found the case in her parents' room.

When her friends arrived they played some games and danced for a while before they sat down to eat. Everyone enjoyed the food and had a marvellous time.

Story one

Jenny was late getting home from school on Friday and she was soaking wet when she walked through the door. She was angry because the bus had broken down.

Mum was just in the middle of a job when Jenny walked in. "Take off those wet clothes" mum said. "I was just sorting out the blue items to do first, I can put your jumper in with them now. It will be ready to wear again by Monday". Jenny went upstairs to dry and change out of her wet clothes. But she left a puddle of water in the kitchen by the fridge where she had been standing. Mum looked for the cleaning equipment. She found the bucket in the cupboard under the stairs.

When Jenny came downstairs, mum wasn't in the kitchen any longer. Perhaps she was sitting in the living room relaxing. Jenny knew that mum was still working hard. There was a strange sound coming from the living room: click, click, click, over and over again. Jenny's mum was making a Christmas present for her grandfather. The present would keep him warm in the winter months.

Story two

Jake decided to spend the day fishing. He got up bright and early and set off for his favourite spot. He caught a bus which stopped just outside the gates. That was handy, because he still had a five minute walk to the lake and he had all his equipment to carry. He walked through the gate and took the left hand path towards the lake. The path went round behind the swings and slides and then on past the tennis courts.

When he got to the water's edge he spotted some wild birds near the bull rushes. The swans were beautiful. Jake decided to set up his equipment further along the bank. He found a good spot, spread out his blanket and sat down on the edge of the bank under a nice shady tree. He set up his rod and unpacked his rucksack. He got out some tackle from his fishing box to put on his hook. But he saw that the maggots had died.

Jake realised that he wouldn't catch many fish that day, but he decided to stay and enjoy his lunch. He watched some ducks that were swimming close by, then he noticed a small creature sitting by the water's edge. Jake threw over some crumbs, but that was not what the little creature wanted. It hopped into the water and swam away. Jake wasn't having a good day with animals!

Inference Questions

(L = Literal; TC = text-connecting inference; GC = Global coherence inference)

Practice Questions:

What was Julie doing just before she got dressed for the party? *GC*

_____

Where did Julie find her necklace? *TC*

_____

What did everyone do before they sat down to eat? *L*

_____

Story one

Why was Jenny late home from school? *TC*

_____

What job was mum doing when Jenny got home? *GC*

_____

Where was the puddle of water? *L*

_____

Where did mum look for the cleaning equipment? *TC*

_____

What was Jenny's mum making? *GC*

_____

Who was the present for? *L*

_____

Story two

Where was the lake? *GC*

_____

Where were the swans? *TC*

_____

What did Jake put on the ground to sit on? *L*

_____

Where did Jake get the maggots from? *TC*

_____

What did Jake feed the animal? *L*

_____

What sort of animal did Jake feed? *GC*

_____

Task A: Inference and integration

Scoring criteria

Story One – Correct/Acceptable responses

1
Because the bus broke down,
Because the bus had broken down,
The bus had broken down

2
Laundry,
Washing her clothes,
Washing clothes,
The washing – washing the blue clothes,
Doing the washing in the washing machine,
Doing the washing – the clothes washing,
She was doing the washing – washing the clothes,
Sorting out the blue clothing,
Sorting out clothes,
She was sorting out the washing,
Sorting the clothes out for the washing,
Sorting out the blue washing,
Sorting out the clothes putting the blue ones in the wash first,
She was sorting out the blue to put in the washing machine,
She was about to wash the clothes,
She was putting stuff in the washing machine,
She was doing the blue washing,
The blue washing, Washing – the clothes,
Doing the washing – sorting out the blue items – the clothes,
Doing the blue items to wash – all the blue clothes,
Sorting out the blue clothes to put in the washing machine,
The washing – sorting out the blue clothes from the rest of it,
Putting on a wash load,
Putting the washing in,
She was just about to put all the washing in,
She was putting the dirty clothes in the wash,
Cleaning – the clothes,

3
In the kitchen,
In the kitchen where she'd been standing,
In the kitchen by the fridge,
In the kitchen next to the fridge,
By the kitchen fridge,
By the fridge,
In front of the fridge,

By the fridge on the floor,
Near the fridge,
Outside the fridge,
By the fridge where she was standing,
By the fridge where J had been standing

4
In the cupboard under the stairs,
Cupboard under the stairs,
Under the stairs – in the cupboard,

Half mark :– In the cupboard – she was looking for them,
Under the stairs,
She got the bucket from under the stairs,
Under the cupboard,

5
A scarf or jumper,
Possibly a jumper,
A blanket,
A blanket for her Grandfather,
Something out of wool for Grandad that would keep him warm in the winter months,
Something to keep J's G warm in winter – it was a jumper,
Something to keep Grandfather warm – a jumper probably,
Something for her Grandfather – I think it was a jumper,
A jumper to keep Grandfather warm in winter,
A xmas present – a jumper or jacket for Grandfather,
Something warm for Grandfather – I think she was knitting a jumper or something,
A present for her Grandfather that would keep him warm in the winter months – it was made out of wool and she was knitting it,
A xmas present for her Grandfather – was she knitting something,
She was knitting something for Grandfather to keep him warm,
Something for her Grandfather to keep him warm which was most probably a coat,
A clothes for Grandpa in the winter months – woolly,

6
Grandad,
Grandfather,
Her Grandfather,
Grandpa,
J's Grandfather,

Story One – Incorrect/Unacceptable responses

1
Because the bus didn't come – it was late,
Because it was raining, Because she got her jumper wet,
Because she was playing in the park

2
Wrapping up a present,
Making a xmas present for her Grandad,
Making something in the kitchen - something for her Grandfather,
Wrapping up her G's present,
Putting the blue items into a box,
Sorting out the stuff,
Cleaning the house – sorting out the blue items,
Something to do with blue – blueing,
She was sorting out all the blue items,
Washing the clothes no that's wrong she was cooking,
Cooking,
Cleaning the kitchen and making the dinner,
Cleaning the kitchen,
She was cleaning the kitchen,
In the middle of a job cleaning the floor,
Washing up,

3
In front of the front door,
By J's feet – on the doorstep,
In the kitchen by the washing,
In the kitchen by the washing machine,
Just in the kitchen – by the door,

4
In the kitchen,
In the kitchen cupboard,
In the cupboard under the sink,
In the cupboard – in the kitchen,
In the hall under the stairs,
In the bucket,

5
She was making coffee,
The dinner or coffee,
A cake,
A birthday cake for her Grandad,
Her Grandfather to keep him warm in winter,
A xmas present for J's Grandpa – to keep him warm for the winter time,
Making a xmas present to keep Grandfather warm in winter – maybe a radiator or a heater,
A present for Grandfather,
A xmas present,
A clock,
A present for her Grandfather to keep him warm in the winter months – it sounded like a clock,
Present for Grandfather – I think it was a clock,
A clock for her Grandfather – no something to keep warm,
A present for her Grandfather – it kept on clicking,
A present for Grandfather – the wrapping made a clicking sound,
A present for J's Grandfather – making clicking noises – the present,
A present for Grandfather – it would keep him warm in winter – and she was making a clicking sound while she made it,
A present for her Grandfather – it was going tick tick tick,

6 N/A

Story Two – Correct/Acceptable responses

1
Three minutes from his house – in a park,
In the park,
By the park,
In a park somewhere,
Past the swings and tennis courts - in a big park,

2
Near the bullrushes,
By the bullrushes,
In the lake near the bullrushes,
In the pond near the bullrushes
Behind the bullrushes,
In the water - in the something rushes,
On the other side of the lake by the bull rushes,
In the water by the rushes,
In the lake – by the reeds,

3
His blanket,
Blanket,
A rug,
A mat

4
His equipment box,
Inside his fishing box,
His fishing box,
From his fishing box,
His tackle box,

Half mark – His box,
From a box – but the maggots had died,
Was it in a box?,
His box from his rucksack

5
Bread,
Some bread from his sandwiches,
Breadcrumbs,
Crumbs,
Some crumbs,
A crumb,

6
A frog,
A frog or something like that

Story Two – Incorrect/Unacceptable responses

1
On the banks,
By the bull something,
By the swings – was it near a river bank?,
Inside the gates,
In the lake at the beginning of it,
By the river's edge,
By the tennis courts – and the swings and the slides,
Inside the gates,
Water's edge,
In the lake – in the middle of the lake I think,
Down the bank,
On the bank,
On the bank or in the lake,
Over the hill and down the bottoms,
Behind the swings and the slides – he took the left hand path to get there,
Past the tennis courts,
It was a five minute walk,
By the tennis courts to the left of the slides,
Round the corner from his house,
On the left hand path,
Inside some gates – near a bus stop,
Near gatewood or something like that,
In the countryside,
Down opposite a forest,
Down in a forest,

2
In the lake swimming around,
In the lake,
In the lake – near the edge
By the water's edge,
Along the bank,
In the lake - on the left hand side,
In the lake swimming about near Jake,
In the pond,
Swimming in the water,
On the river edge,
Under the shady tree,
In the weeds by the lake,
On the bank where his usual spot is,
By the lake,
In the lake – by where he was going to sit,
At J's usual spot,

3
A sheet,
A stool,
A cloth,

4
Did he buy them in a shop and did they die on the way?,
A shop,
His bag,
Under the ground,
It didn't say,
His rucksack – from his rucksack probably in a container,
His garden,
A little tub thing,
A jar,
His rucksack in his tackle,
His fishing equipment,
His buckets,
A box – an ice-cream box,
A container,

5
Maggots,

6
The swans,
Swan,
A duck,
Swans or ducks,
Birds,
Fish,
A little creature,
A strange creature,
The creature,
Some animals,
A lizard sort of one,
A crab,
A little small insect sort of thing,
He didn't know,
One that hopped – a duck,
It didn't say

APPENDIX G

TASK B Knowledge of Story Structure

(Presented to children on cut up strips of card)

Scoring: 1 mark for each sentence in the correct order

Practice story

1. One day Alice was playing in the sand.
2. She built a beautiful sandcastle.
3. The tide came up very fast.
4. The water drenched Alice and her clothes.
5. The water ruined her sandcastle as well.
6. Alice was very upset.
7. So she gathered her things up and went home.

Max: 7/7

Story one

From Stein and Policastro

1. There once was a King who had three lovely daughters.
2. One day, the three daughters went walking in the woods.
3. The daughters were enjoying their walk.
4. But they forgot the time and stayed too long.
5. A dragon came and kidnapped the three daughters.
6. As they were dragged away, the three daughters screamed for help.
7. Three heroes heard the cries.
8. The heroes set off to rescue the girls.
9. They found and fought the dragon.
10. So the heroes rescued the maidens.
11. The heroes then returned the daughters to their palace.
12. The King rewarded the heroes for saving his daughters.

Max: 12/12

Total maximum score: 19

APPENDIX H

TASK C Comprehension monitoring (Global)

(Presented verbally and visually to participants – underlining was completed by individual child, supported by researcher).

Scoring criteria:

1 mark for each correctly identified part of text (key words underlined and verbal explanation given)

Max score: 8

Story 1: 4 marks; Story 2: 4 marks

Practice (do not score)

David was making a birthday cake for his friend, Peter. Peter was going to be eleven years old, so David counted out the candles carefully on his fingers as he was putting them on the cake. David put on the same number of candles as he had fingers. The perfect number.

Read each of the following stories. If you find any bits that don't make sense together, underline both bits of the story that do not make sense together, just like I have done in the example above.

Comprehension Monitoring: Global

(Parts that do not make sense together are underlined – these were not underlined on the participant's copy)

Story One

Wolf hunting

In the middle ages, wolf hunting was a popular activity that people looked forward to, with almost as much anticipation as the village dances. During these times, the lords organised the hunt in order to protect the peasants from the danger of the wolves, but the wolf chase was also an occasion for celebration.

The chases took place before the invention of guns and the wolves were pursued by men on horseback, with a pack of hounds who were specially trained for hunting. The hunt often lasted for many hours because the wolves did not want to be captured, so there was usually a long tiring chase, across fields and through woods.

The capture of the animal was seen as a great achievement. On their return, the hunters showed off the body of the beast in the village square for all to see and the lord rewarded the huntsman who had shot the wolf, for his brave and courageous performance.

Because the hunt itself was quite brief, there was always plenty of time for fun and games afterwards. The victorious huntsman used his reward money to hold a great feast for all the villagers, where there was much dancing and merriment.

Comprehension Monitoring Global

Story Two

Firefighting

Every night, boys and girls throughout the world dream about firefighters in their smart uniforms driving their splendid red fire engines.

These days, there are almost as many female firefighters as there are male ones. In large towns and cities, they are called out to rescue cats stuck up trees almost as often as they are called out to fight fires. For such trivial incidents, they do not sound their siren as they drive to the scene and they take a small fire engine that does not have any hoses fitted.

In more serious situations, it is a race against the clock. When car drivers hear the sound of a fire engine's sirens, they pull over to let it pass. Fire engines sound their siren whatever the situation. It is important to get to the scene as quickly as possible, whether they are rescuing a trapped animal or putting out a dangerous fire.

The fire crew has to rescue people from inside burning buildings as well as putting out the fire. They have to wear protective clothing and breathing apparatus to perform such duties. Thus, fire fighting can be a dangerous profession. Some people believe that this is why so few women join the fire service.

APPENDIX I

TASK D Instructions part (i) to (iv)

(i) Comprehension monitoring (Anaphors) and (ii) Pronoun identification and agreement

1. I'm going to ask you to read aloud the first part of this story. I will be asking you some questions about the story afterwards.

2. If child pauses/hesitates/corrects errors: When you read the story, you noticed that there were some words and parts that did not make sense. Have a look at some of these sentences from the story. Read each one and choose the correct word to complete the sentences so they make sense.

   If child has not noticed any errors:
   When you read this part of the story did you notice anything that did not make sense? There were some errors in the story.
   Have a look at some of these sentences from the story (present cloze task). Read each one and choose the correct word to complete the sentences so they make sense.

(iii) Prediction (Part A)

3. Re-read part 1 of the story to the children (with correct anaphors). Ask children prediction questions:

   Think about the story you have read so far.

   What do you think might happen next in the story?
   Prompts: What do you think might happen to Rosie and Tom/ What might they do?
   What do you think will happen at the end of the story?

(iv) Anaphoric Resolution (task pre-training followed by part 1 questions)

4. Task Pre-training (as used by Yuill & Oakhill, 1988) – presented verbally and visually to participant

When you say things or read things, sometimes there are short ways of saying them. For example, sometimes a person called David is called 'Dave' for short. 'Dave' stands for David. Sometimes in a story there are short ways of saying things. These short cuts always stand for something else in the story that has been said before. I am going to ask you about some of these short cuts. I will ask you to tell me what they stand for. I will ask what could you put instead of the short cut, to say it the long way.

Here are some examples:

a) Mary Jane Wilson went for a walk. **She** found 10p on the ground.

She stands for **Mary Jane Wilson**. You could put 'Mary Jane Wilson' instead of she, and the sentence would still mean exactly the same as it did before.

b) Mary went to the pictures. John **did** too.

You could say "**John went to the pictures too'**. That is what **'did'** is short for in the sentence. Both sentences mean the same thing.

c) 'Is it raining?' asked Mary. '**Yes**', said John.

'**Yes'** stands for '**Yes, it is raining'**. Both mean the same thing. 'Yes' is short for '**Yes, it is raining'**.

d) Mary was in her back garden. The **flowers** smelt lovely.

The word '**flowers**' points back to the words '**in her back garden'**. The 'flowers' is short for '**the flowers in her back garden'**. Both mean the same thing.

5. Ask anaphoric resolution/text questions to children using part 1 of the story.

(iii) Prediction (Part B)

6. Now I am going to ask you to read the second part of the story so we can find out what happened.

7. Ask child follow-up prediction questions:

So what happened in this story?
Did you predict that was going to happen?

What information in part one of the story helped you/could have helped you predict that what was going to happen?

N.B If participant does not identify the two main story events (Rosie forgetting her purse and having Spaghetti Bolognese for tea) then prompt. In this case, ½ mark is then awarded for correct identification of prediction cue.

(iv) Anaphoric Resolution (part 2 questions)

8. Ask anaphoric resolution/text questions for part 2 of the story.

TASK D Part (i): Comprehension Monitoring (Anaphors)

(The 7 pronoun errors are underlined – these were not underlined on the participant's copy)

Scoring criteria: 1 mark for each correct identification of a pronoun error *before* prompt
1 mark for each error identified *after* prompt (recorded separately)
Max: 7

Part 1

Rosie felt the fresh summer breeze on her face as she pedalled her shiny new purple bicycle. It was the best birthday present ever and he couldn't wait for Tom to see it!

Rosie and Tom were best friends. They were enjoying hanging out together and riding their bikes during the long summer holiday. The girls had lived on the same street since they were babies and did pretty much everything together. When Rosie rode down the drive, she could see that Tom was already outside. He was crouched down inspecting her chain. "Hey!" she shouted excitedly. Tom lifted her head and smiled, "I'm not too convinced about the colour!" he shouted. Rosie laughed, "Whatever! You're just jealous!" Rosie had wanted a new bike for such a long time and she knew Tom had too.

"Are you two heading out on the bikes?" shouted Tom's mum from an upstairs window. Rosie looked up and waved. She really liked him because she would make Rosie's favourite meal, Spaghetti Bolognese, every time he stayed for dinner.
"Yes, we are mum" he replied.
"Who bought you the new bike, Rosie?"
"Mum did!" she shouted back.
"Well you are a lucky girl, aren't you?"
"Yes, I am!" Rosie replied.
"Are you both coming back here for dinner tonight?"
"Yes!"

Tom filled up his water bottle from the tap outside. They would definitely need plenty to drink today. When he had checked the weather forecast that morning it said that it could even be hotter in the UK than Southern Spain! He screwed the lid on tight and placed it in his rucksack. "I hope you have remembered yours".

“Of course I have!” said Rosie. “Well, you *always* forget something Rosie, so you can’t blame me for asking!”

The boys decided to ride into town and call at Maggie’s Sweet Shop. It was every child’s dream and every dentist’s nightmare! Sitting on the shelves were large glass jars filled with every different type of sweet you could think of. Rosie’s favourite sweets were strawberry laces and he had been saving up to buy a packet for three weeks!

TASK D Part (ii): Pronoun identification and agreement (Cloze activity)

(Maximum score: 7)

Circle the correct words to complete the sentences.

Rosie felt the fresh summer breeze on her face as she pedalled her shiny new purple bicycle. It was the best birthday present ever and _____ couldn't wait for Tom to see it!

he it her she

Rosie and Tom were best friends. They were enjoying hanging out and riding their bikes together during the long summer holiday. The _____ had lived on the same street since they were babies and pretty much did everything together.

girls teenagers boys

When Rosie rode down the drive, she could see that Tom was already outside. He was crouched down inspecting _____ chain.

her him his he

"Are you two heading out on the bikes?" shouted Tom's mum from an upstairs window. Rosie really liked _____ because she would always make Rosie's favourite meal, Spaghetti Bolognese, every time _____ stayed for dinner.

him her he they she

The _____ decided to ride into town and go to Maggie's sweet shop. It was every child's dream and every dentist's nightmare! Sitting on the shelves inside were large glass jars filled with every different type of sweet you could think of. Rosie's favourite sweets were strawberry laces and _____ had been saving up to buy a packet for three weeks!

boys her pair she he

TASD D Part (iii) Predict Part A & B

Scoring criteria:

Part A (after reading story part one)

Max: 2

To gain a mark responses must make reference to:

1) Rosie forgetting something (do not need to specify what she will forget)

2) Rosie and Tom will have Spaghetti Bolognese for tea (at his house)/ Tom's mum is going to make Spaghetti Bolognese.
(½ mark awarded if do not specify Spaghetti Bolognese)

Part B (after reading story part two)

Max: 2

To gain a mark responses must make reference to:

1) It says (Tom says) that Rosie always forgets something.

2) It says that Tom's mum makes Spaghetti Bolognese every time she stays for dinner.

½ mark awarded if participants did not recall both story events and needed prompt.

TASK D Part (iv) Anaphoric resolution

Question response sheet

Part 1

Examples/Teaching items:

A. Who couldn't wait for Tom to see her present?_____ [ ]

B. What does '**she**' stand for here? _____ [ ]

Teaching items. If child answers incorrectly, say:
'She' stands for Rosie. You could put, 'Rosie couldn't wait for Tom to see it!' and it would mean exactly the same thing.

Text/ anaphor questions:

1. Who are the teenagers? _____ [ ]
2. What does '**chain**' stand for? _____ [ ]
3. What had Tom wanted for a long time? _____ [ ]
4. What does '**she**' stand for here? _____ [ ]
5. What is '**are**' short for here? _____ [ ]
6. Who bought Rosie her new bike? _____ [ ]
7. What does '**am**' stand for here? _____ [ ]
8. What is '**Yes!**' short for here? _____ [ ]
9. What does '**lid**' stand for here? _____ [ ]
10. What did Tom hope Rosie had remembered? _____[ ]
11. What is '**have'** short for here? _____ [ ]
12. What does '**pair**' stand for here? _____ [ ]
13. Where are the shelves? _____ [ ]

Part 2

14. Where exactly had Rosie left her purse?_____ [ ]
15. What had Tom told Rosie when he said, "I told you **so**"?

_____ [ ]

16. What does '**one**' stand for here? _____ [ ]

17. Where exactly are the sunflowers growing? _____ [ ]

18. What is '**Maggie's**' short for here? _____ [ ]

19. What is '**Yep**!' short for here? _____ [ ]

20. What did Tom's mum hope they had not done?

Scoring criteria:

1. Tom and Rosie
2. On the bicycle/bicycle chain
3. A new bicycle
4. Tom's mum/mother
5. Going out on the bikes
6. Her (Rosie's) mum
7. (I am) a lucky girl
8. We are coming back for dinner (tonight)
9. Water bottle lid
10. Her water bottle
11. Remembered my water bottle
12. Rosie and Tom
13. In the sweet shop (Maggie's)
14. On the kitchen table (at her house): Do not accept - on the table ½ for in the kitchen at her house
15. You always forget something/you would forget something. Do not accept: You would forget your purse
16. Bicycle
17. In the flower beds in the front garden (at Tom's house) Do not accept: in the garden. ½ for flower bed/front garden
18. Maggie's sweet shop (½ = shop)
19. Called at Maggie's sweet shop
20. Eaten too many sweets (so they have no room for dinner)

Maximum: 20

Anaphoric resolution Task Sheet
(Participants were referred to this when answering questions)

Part 1

Rosie felt the fresh summer breeze on her face as she pedalled her shiny new purple bicycle. It was the best birthday present ever and **she** couldn't wait for Tom to see it!

Rosie and Tom were best friends. They were really enjoying hanging out and riding their bikes together during the long summer holiday. The **teenagers** had lived on the same street since they were babies and did pretty much everything together. When Rosie rode down the drive, she could see that Tom was already outside. He was crouched down inspecting his **chain**. "Hey!" she shouted excitedly. Tom lifted his head and smiled, "I'm not too convinced about the colour!" he shouted. Rosie laughed, "Whatever! You're just jealous!" Rosie had wanted a new bike for such a long time and she knew Tom **had** too.

"Are you two heading out on the bikes?" shouted Tom's mum from an upstairs window. Rosie looked up and waved. She really liked her because **she** would always make Rosie's favourite meal, Spaghetti Bolognese, every time she stayed for dinner.
"Yes, we **are** mum" he replied.
"Who bought you the new bike, Rosie?"
"Mum **did**!" she shouted back.
"Well you are a lucky girl, aren't you?"
"Yes, I **am**!" Rosie replied.
"Are you both coming back here for dinner tonight?"
"**Yes**!"

Tom filled up his water bottle from the tap outside. They would definitely need plenty to drink today. When he had checked the weather forecast that morning it said that it could even be hotter in the UK than Southern Spain! He screwed the **lid** on tight and placed it in his rucksack. "I hope you have remembered **yours**". Rosie cast an irritated look towards Tom. "Of course I **have**!" she snapped. "Well, you *always* forget something Rosie, so you can't blame me for asking!"

The **pair** decided to ride into town and call at Maggie's Sweet Shop. It was every child's dream and every dentist's nightmare!

Sitting on the **shelves** were large glass jars filled with every different type of sweet you could think of. Rosie's favourite sweets were strawberry laces and she had been saving up to buy a packet for three weeks!

Part 2

When they got to the shop, Rosie opened her rucksack to take out her money. After only a few seconds, she realised she had left her purse in the kitchen at her house. She had forgotten to pick it up from the **table** on her way out. Rosie felt inside her tracksuit pockets hopefully, but found only one 2p coin and an old tissue! Tom rolled his eyes, "I told you **so**!" Tom could see how disappointed Rosie was and so he decided to share his sweets with her. "Thanks, Tom" said Rosie, smiling and thinking how kind he was. "So do you want to try out my new wheels for the ride home?" she asked. Rosie knew that Tom had been desperate to have a go on her new bicycle all day.
"You bet!" Tom replied. "I guess it could be worse, you could have chosen a pink **one**!"

When Rosie and Tom turned into the driveway, Tom's mum was busy watering the flowerbeds in the front garden. The **sunflowers** were almost as tall as she was. "Let me guess, you called at **Maggie's**? said mum.
"**Yep**!" We have eaten too many sweets and we don't have room for dinner now!" Tom replied cheekily. Tom's mum knew his sense of humour very well.
"I certainly hope **not**!"
"What *are* we having for dinner, mum?" Tom asked. Tom's mum and Rosie exchanged a knowing look.
"My favourite of course!"

APPENDIX J

Piloting of component comprehension skills

Parental consent was gained for two typically developing (non-ASC) children in Year 7 (aged 11 years) to complete component comprehension tasks A – D.

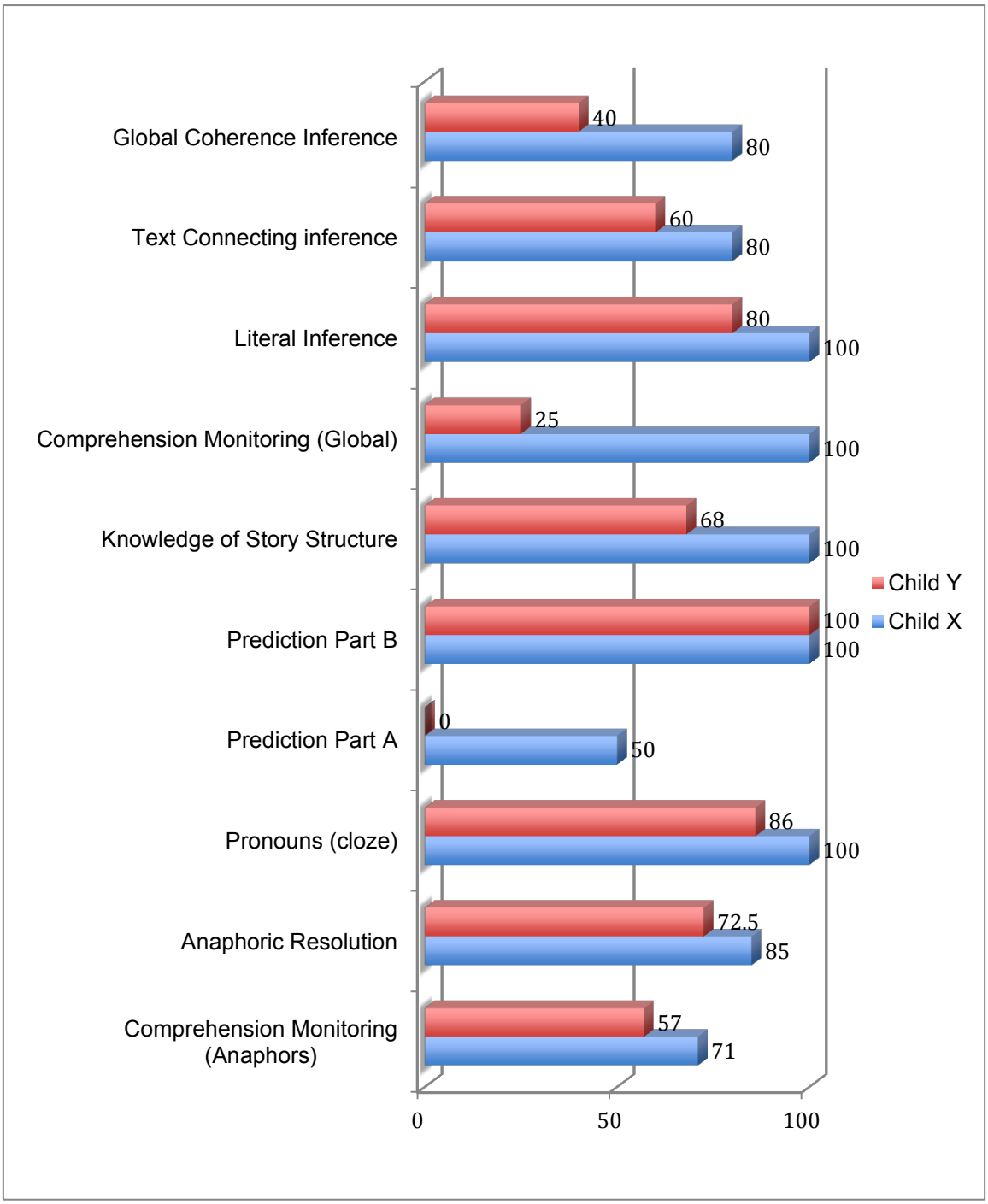
Child X was identified by the school SENCO as a 'good comprehender', whilst child Y had been identified as having difficulties with comprehension ('poor comprehender').

Ps	**Comprehension monitoring: Anaphors (Max 7)**		**Anaphoric resolution (Max 20)**	**Pronouns (cloze) (Max 7)**	**Prediction parts A & B (Max = 2+ 2 = 4)**		**Knowledge of story structure (Max 19)**	**Comprehension monitoring (global) (Max 8)**	**Inference (Max= 5+5+5 =15)**			**Total Score Max: 80**
	Before prompt	*After prompt*			A Ps Predict	B Linking clues in text to events			*Literal*	*Text connecting*	*Global coherence*	
X	5	0	17	7	1	2	19	8	5	4	4	72
Y	2	2	14.5	6	0	2	13	2	4	3	2	50.5

Child X: 'Good comprehender'
Child X gained full marks on 5 comprehension skill tasks: Pronouns (cloze), prediction part B, comprehension monitoring – global, Literal information and Text-connecting inferences. He scored 90% overall on all tasks, scoring 21.5 points higher than child Y.

Child Y: 'Poor comprehender'
Child Y gained full marks on Prediction Part B. He had particular difficulty with comprehension monitoring - anaphors (before prompt) prediction part A, knowledge of story structure, comprehension monitoring - global and global coherence inferences. He scored 63% on all tasks overall, with competence demonstrated in anaphoric resolution, pronouns and literal information.

Comparison of performance on component comprehension skill tasks by a 'good' (child X) and a 'poor' (child Y) comprehender: percentage scored on each task.



APPENDIX K

Semi-structured Reading interview Schedule

1. Do you enjoy reading?

2. What kind of books do you choose to read? (If not sure, prompt by showing a few examples of fiction, non-fiction, newspaper etc.)

3. Do you have a favourite book or story? Can you tell me why it is your favourite?

4. Do you read at home?
   (If yes prompt further) e.g. Do you read alone or with someone else?

5. Do you think learning to read is important? Why?

6. Did you find it hard to learn to read?

7. What do you think makes someone a good reader/ prompt: how would you know they were a good reader? What would they do?

8. What things do you do that help you to read well?

9. What do you do to help you to read words you don't know?

10. When you come to a part of a story or text that is confusing, what do you do?

11. When you have read a story do you find it easy to remember what happened and why?

12. Could you answer questions about the story or text you read?

13. Is there anything else you want to tell me – or that I might find interesting, about reading?

APPENDIX L

Example reading Interview transcript

1. LR The first question I have got for you is do you enjoy reading?
2. I Well, I have to say reading is very important is very much a part of my life. I have needed it so importantly so much because it explains everything to me really well.
3. LR OK, What type of books do you choose to read?
4. I Like its mostly non-fiction because I'm like a sporting fella actually but with fiction it does come in handy sometimes cos if it was a series and you would like to know what happens next.
5. LR OK so do you have a preference of fiction or non-fiction?
6. I I mostly read non-fiction books. It just fills up my head with facts and stuff.
7. LR OK, do you have a favourite book or story?
8. I That's a very hard question there because I don't have a favourite book but I like reading all different types of books but I just fill my head up with fiction and non-fiction.
9. LR OK, do you read at home?
10. I Well yes I do whenever I'm asked to read for an hour for homework or either for half an hour a day and stuff. All I just need is like if I wanted to like (space) do (space) to read at home I try and finish off what I was reading off last.
11. LR Do you read on your own or do you read to someone else?
12. I On my own. Always on my own because I like it to be quiet and stuff.
13. LR OK. Is there a certain time of day that you might do reading?
14. I Well its not really (space) I don't really do it like all day whenever I'm like (space) is a book I really really enjoy reading I would just like and try and finish that straightaway.
15. LR OK you have kind of answered this already but I will just ask you again. Do you think learning to read is important, why?
16. I I think learning to read is important because when you like read it helps you so much with your education cos with like books and stuff it will explain more to you than asking your Mum and Dad cos they may not be good at everything.
17. LR Did you find it hard to learn to read?
18. I First off, I never had glasses when I was younger but then like when I was 3 or 4 years old I decided to have glasses. First off I couldn't read a thing after that but when it came to my eye appointments when I was 5 and 6 years old after that it was really good because I could see a thing now. I could totally see a thing it makes my eyes a lot whole stronger and stuff.

19. LR OK so when you were younger you were having difficulty with seeing the words that was hard?
20. I Yes, seeing things.
21. Once you got the glasses how did you find learning to read then?
22. I I think its been very simple to me, really because without my glasses when I am in bed when I look at something one of my eyes go into my head and like my eyeballs, not my eyeballs, my pupils go to the side, like point over that way, like it makes two of them.
23. LR OK, so that's been a very important thing having glasses. What do you think makes someone a good reader?
24. I Its whenever you have the right expression for everything like you really explain so well.
25. LR Anything else that makes anyone a good reader? How would you know someone was a good reader?
26. I It was by the way they were reading like how they (space) a very good reader it means you have to really good common sense with your like expressions, like abbreviations in the book and stuff.
27. LR What things do you do that help you to read well?
28. I What things do I do? Well I just try like (space) by if there's a book advertising like or either like something else like that or either I spot something in the library or either like W H Smiths or something I would just like look at it straightaway or read it straightaway then I realise that would be a good un I think I will fill up my head with that a bit more.
29. LR OK do you do anything particular to help you read well though when you are reading?
30. I When I am reading (space) when I am doing my reading sometimes when I was like with all the reading like with reading and stuff like now at school like all the books like I have now at home now I have mostly read and I just get bored each time I read them.
31. LR OK what do you do to help you read words you don't know?
32. I I just look in the dictionary and see what they mean.
33. LR OK, so that's the meaning of words so you look at a dictionary. What about if you saw a word and wasn't sure how to read it and say it?
34. I My Mum and Dad would say it out loud. My Mum would like tell me how to say it and stuff.
35. LR OK, when you come to a part of a story or text that's confusing what do you do?
36. I I like if its very confusing I ask someone really like just to say this looks really confusing and its very weird.
37. LR Is there anything you can do to help you if that happens?

38. I I would just like look at a sentence again and again and again and the same thing the sentence again, again and again. I would see what it tells me and then I would take it from there.
39. LR OK, do you ever find parts of stories and texts confusing?
40. I It doesn't happen most often but it does happen like its most unlikely to happen.
41. LR OK, when you have read a story do you find it easy to remember what happened and why?
42. I Sometimes I do but whenever I'm like not with someone its kind of like very hard.
43. LR What do you mean when you are not with someone?
44. I Whenever they hear me read it then that gives me confidence then they know what I'm doing and stuff, what it means, what its about and stuff.
45. LR When you're on your own?
46. I Sometimes when I'm not reading enough that's when it gets confusing. I do forget sometimes what the story is about.
47. LR OK, could you answer questions about the story or text you read?
48. I Pardon, sorry.
49. LR Could you answer questions about a story that you read?
50. I Well I could sometimes if it is a book that I really know really well I will be able to answer questions or either if we read the same book together that would be really great.
51. LR OK so you like that experience of reading with someone else.
52. I When I was younger I did really like reading by myself but now I'm older I really like doing it by myself.
53. LR OK, we have come to the end of everything we have to do now and we've done lots of different things, so was there anything particular that's been helpful? we Are there any of the activities you have found helpful or hard?
54. I Things I've found hard I think it was at the beginning of the year really I just felt kind of a struggle but then I realised I could do it.
55. LR Ok, any other reading activities we've done, have they taught you anything new?
56. I It taught me by my reading, my expressions, how I should say it and how its like pronounced and stuff.
57. LR Very good, so nothing else you want to say about reading?
58. I Well reading is just like one of the greatest experiences in your life really. It will be very important to you, one of the most important lessons of your life.
59. LR Well on that note we will stop. Press stop if you can.

Transcribed 02.02.2013

APPENDIX M

Parental consent form for comprehension intervention

Dear Parents/Carers,

Re: Reading Research Project

As you aware, XXXX has been involved in the reading research project with myself (Libby Roberts, Trainee Educational Psychologist) at the end of his final term in Primary School. It was a pleasure to work with XXXX, and the activities and assessments he completed gave a very clear picture of his many strengths and the strategies he uses to help him learn and work through problems.

The tasks XXXX completed were aimed at targeting the cognitive skills, abilities and learning strategies that we draw upon when reading and understanding texts. An important part of the assessment was looking in detail at XXXX's reading profile – in particular, his reading accuracy compared to his reading comprehension skills. I will be sending you a report in the coming weeks outlining XXXX's performance in these various activities.

Overall, the assessments indicated that XXXX has developed good decoding and single word reading skills (age appropriate and in some cases, a performance associated with individuals slightly older than his chronological age). The assessments of reading accuracy were considerably higher than his performance on reading comprehension activities which focused on establishing meaning from a text.

Having identified particular skills involved in reading comprehension that XXXX may need some additional support to develop, I would like to offer him the opportunity to be involved in a Reading Comprehension Intervention in school. This will be planned and delivered by myself over seven weekly sessions (lasting 1 hour) over the next half term. This will give XXXX and myself the opportunity to identify the aspects of reading comprehension he finds more challenging, and to help him develop his awareness of strategies that he can use to help to develop his skills.

If you have any further questions about the Reading Comprehension Intervention, I am happy to discuss this with you. Please indicate whether you are happy for XXXX to receive extra support from myself with his reading comprehension skills on the slip below and return to school.

Thank you.
Kind Regards,

E. R Roberts

Elizabeth (Libby) Roberts

Trainee Educational Psychologist
Bexley Early Intervention Team
Institute of Education, London
eroberts@ioe.ac.uk

XXXX
Senior Educational Psychologist, Trainee EP Supervisor
XXXX Early Intervention Team

☐ I am happy for my child to take part in the reading comprehension Intervention

☐ I do not wish for my child to take part in the reading comprehension intervention

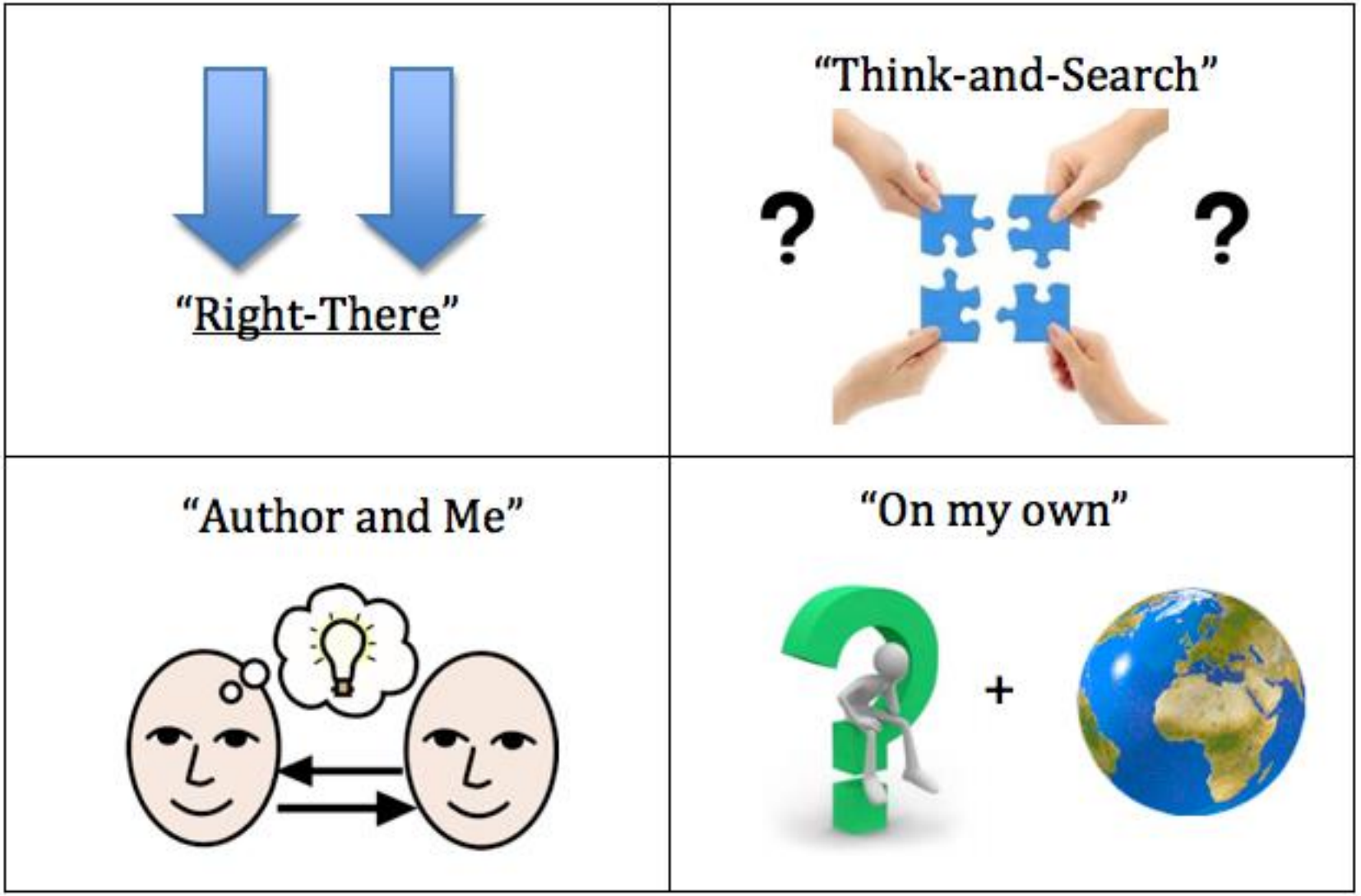
Child's name .....

Parent/carer name .....

Signed ..... Date .....

Thank you.

APPENDIX N **Types of question visual resource**



APPENDIX O

Intervention Session One: Introducing the 'think-aloud' framework

The Pudding Like a Night on the Sea
Ann Cameron

Text	***Researcher's think-aloud comments***
Previewing title and front cover: "The Pudding Like a Night on the sea"	*Hmmm. That's an interesting title the author has used – it is quite an unusual way of describing a pudding. "Like a night on the sea" – the author has used a simile here, comparing the pudding to a night on the sea. What's a night on the sea like? It could be calm… or stormy…* *The illustration shows a boy dipping his finger into the pudding here – I wonder if it is his pudding? I wonder if he made it? I wonder what it tastes like?*
"I'm going to make something special for your mother", my father said.	*Hmmm. I know that the first few lines of a text are important and I should notice them. This is obviously an important piece of information.*
My father is a big man with wild black hair.	*Hmmm. The author is describing him so that I can almost picture him in my head. The word 'wild' is used to describe his hair. I think this might be important. I wonder if he is quite wild like his hair? Or perhaps he is quite flamboyant/he has a 'big' personality?*
When he laughs, the sun laughs in the windowpanes.	*Hmmm. That's an interesting description. I wonder if it means that he is the kind of person who can make other people laugh and feel happy too.*
When he thinks, you can almost see his thoughts sitting on all the tables and chairs.	*Hmmm. Again, this is a really interesting description. It is very visual, as I read this I can see a picture of the tables and chairs. I think this might mean you know when he is happy, sad, thoughtful, angry … he doesn't keep his feelings to himself, maybe he lets them out?*
When he is angry, me and my little brother Huey shiver to the bottom of our shoes.	*Hmmm. 'Shiver to the bottom of our shoes'. I can almost see and feel them both shivering. I wonder if he shouts very loudly when he is angry? Or does he have an angry stare?*
It will taste like a whole raft of lemons. It will taste like a night on the sea.	*Hmmm. I see the author has made a link to the sea here by using the word 'raft'. `I know that lemons have a sharp taste, but they also taste refreshing. There is something about the word 'raft' that makes me think about floating on the sea.*
And – the pudding is for our mother. Leave the pudding alone!	*Hmmm. This links with the first line of the story – the pudding is for their mother. But father is going to sleep – I wonder if they will actually leave the pudding alone?*
With waves on top like the Ocean	*Hmmm. The author is using language to fit with the theme of the sea once more. She uses another simile*

	here, comparing the top of the pudding to waves on an ocean. It's making me want to taste the pudding. I wonder if the boys will be able to resist having a taste …… I predict they won't be able to!
Since you took more, I'll have more.	*This reminds me of a typical brotherly relationship. If you do that … I want to do that too.*
It looked like craters on the moon	*Hmmm. Another simile, comparing the pudding to the surface of the moon. I'm imagining huge holes where the pudding has been eaten!*
We were supposed to leave the pudding alone.	*Hmmm. The boys have realised what they've done now. They have tried to repair the damage but its too late! I don't think their father will be happy!*
His voice went through every crack and corner of the house	*Hmmm. That's answered my earlier question. That's why Huey and Julian' shiver to the bottom of their shoes'! If the author describes how his voice goes through every crack and corner of the house, it must be incredibly loud.*
We felt like two leaves in a storm	*Hmmm. The author is making me picture two small leaves being blown around. I'm starting to feel a bit sorry for the boys!*
We heard my father walking slowly through the rooms. We could see his feet. He was coming into our room.	*Hmmm. The author is creating suspense here using short sentences. I understand now just how scared the boys are.*
His eyes like black lightning.	*Hmmm. Another simile. Father is obviously very very angry.*
There is going to be some beating here now. There is going to be some whipping!	*Hmmm. I know what the boys are thinking… I wonder if their father is going to beat and whip them?! But I'm also thinking about how those words were used to describe how their father made the pudding. I think their father knows what the children are thinking – but I think he might find another way to 'punish' them… we'll see…*
No thank you.	*Hmmm. The boys don't want any more of the wonderful pudding after all that! I think they have learned their lesson.*
It takes like a night on the sea.	*The author has ended with the words of the title. I think the author meant to do this as it creates a good ending for the story.*

APPENDIX P

How do I check I am *understanding* when I am reading?

Checklist:

- ☐ I pause often as I am reading to check it is making sense
- ☐ I ask myself, "Does this make sense to me?"
- ☐ After I have read a section of text (e.g. a paragraph or chapter) I check that I can retell the important points.
- ☐ I know I have understood if I can say it in my own words.

If YES, reading makes sense, **continue** reading.

If **NO**, reading is not making sense ask:

When did I lose track?
When did it start to go wrong?

Identify the ***cause*** of the difficulty: **Did I .....**

1. have difficulty with a word or words (vocabulary)?
2. stop concentrating?
3. read it too fast?
4. lose track of the meaning (struggle to understand how it relates to what was written before)?
5. not know enough about the topic I'm reading about?
6. lose the picture or image in my head? (I can't "see" what it is I'm reading about)
7. not understand how the text is organised and what I should expect?
8. try a strategy that didn't work? Not know which strategy to try?

Find a fix-up strategy – match it to your problem!

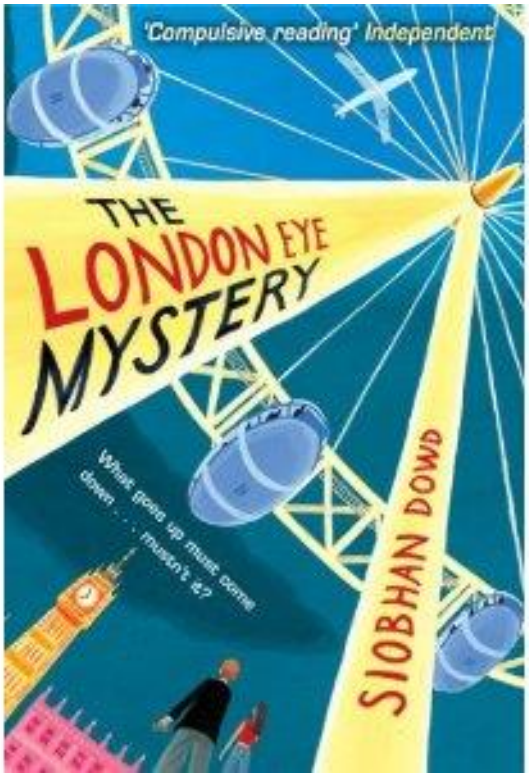
1. Skip the word and read to the end of the sentence or section, trying to work it out from the context.
1. Guess the meaning or substitute a word that seems to fit and see if it makes sense.
1. Ask someone the meaning of the word, or look it up in the dictionary
2. Reread the section of text.
2. Read aloud – it can really help to hear the text. Or ask someone else to read it aloud to you.
3. Slow down and reread, or read it aloud.
4. Chunk the confusing part with what came before or what comes afterward. Try to understand a whole chunk that is short and manageable.
5. Think hard about what you already know about the topic. What do you know about this or a similar topic that might help you?
5. Find out more about the topic – you could read another book, do a search on the internet or ask someone else who knows more.
6. Try to create a picture of what is going on in your head – you could draw if it helps you.
7. Use text features and cues like headings, sub-headings, illustrations, captions and charts.
7. Ask: Am I supposed to make an inference? Fill a gap in the story? Put information together?
8. Read on and see if the confusion clears up.
8. If you are still confused, try another strategy or ask for help. You could ask a friend, a teacher, or another expert reader.

APPENDIX Q

Comprehension Intervention Reading Material

The London Eye Mystery

Siobhan Dowd

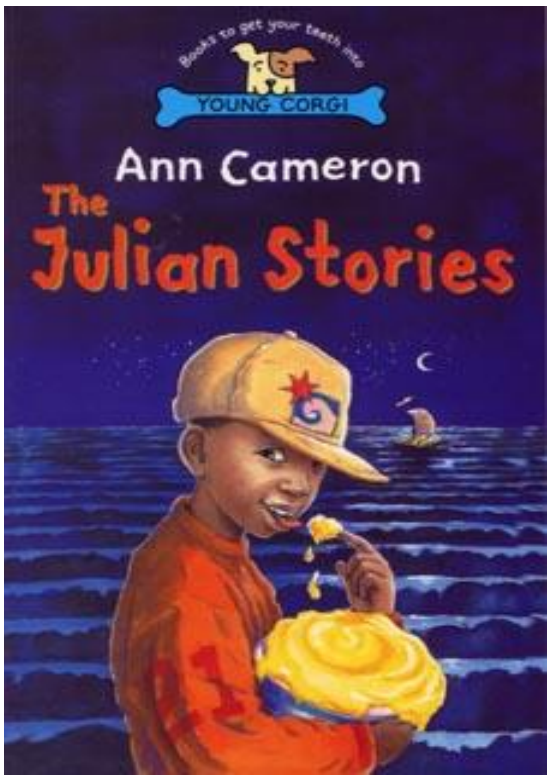


When Ted and Kat watched their cousin Salim get on board the London Eye, he turned and waved before getting on. But after half an hour it landed and everyone trooped off - and no Salim. Where could he have gone? How on earth could he have disappeared into thin air? So Ted and his older sister, Kat, become sleuthing partners, since the police are having no luck. Despite their prickly relationship, they overcome their differences to follow a trail of clues across London in a desperate bid to find their cousin. And ultimately it comes down to Ted, whose brain works in its own very unique way, to find the key to the mystery. This is an unputdownable spine-tingling thriller - a race against time.

The Julian Stories:

The Pudding Like a Night on the Sea

Ann Cameron



Julian just can't resist a taste of the wonderful lemon pudding his father has made. But as he and his bother, Huey, taste just a little bit more, the pudding is suddenly all gone! And Julian is in trouble...

APPENDIX R

Reading Comprehension Intervention:

Outline of individual sessions

N.B. Although the general structure was followed, there were differences in each session in response to each individual child (i.e. areas of strength/difficulty, responding to the child's own comments etc.) Also, the pace of reading for each child differed slightly (owing to differences in concentration, discussions within the think-aloud process) and therefore, there was flexibility to accommodate this.

Session 1

Main focus: Baseline measures and introducing the 'think-aloud'

Introduction:

Meet with participant and re-explain intervention (every week), what it will entail. Each child given a calendar so they can write on dates and times of sessions and a folder containing notebook, "Fab Four" bookmark and coloured pencils.
Any questions…?

Activities:

- Administer single word reading test (WRAT-4) and YARC: Secondary Form A.

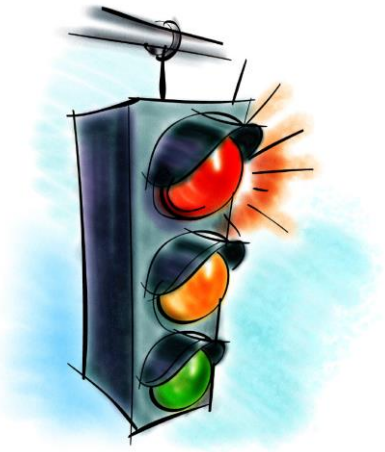
- Model "Think aloud" for the Julian Story, "The Pudding Like a Night on the Sea".

- Thought bubbles (shared activity with child) using illustration from the story to scaffold inference of characters' feelings (Julian and Huey)

Plenary:

Discuss the think-aloud activity. Was it interesting hearing the researcher's thoughts as she was reading? Explain we will be 'thinking aloud' every week.
Explain home activities. (Questions to answer at home, using traffic light system – red = tricky, orange= ok, green = easy)

Home activity: Session One



Traffic Lights

How did I do?

As you answer each question, think about how easy or difficult it was for you.

Make a **red**, **orange** or **green** mark by each question:

Red – I found this really tricky. I'm going to ask for some help with this next session.

Orange – I found this tricky at first, but I thought it through and now I understand.

Green – I understood this straight away.

Session One: Home activity questions

The Pudding Like a Night on the Sea
Ann Cameron

1. Where was the boys' mother?

2. How many lemons did the boys' father use to make the pudding?

3. What do you think would be a good name for the pudding?

4. Why are the boys frightened of their father sometimes?

5. Why was the boys' father angry with them?

6. How do you know that Julian and Huey were sorry for what they had done?

7. The boys chose to run upstairs and hide under the bed. Why might this not have been the best way to deal with the situation?

8. How does the author's use of language help to make the pudding seem so irresistible?

9. Why do you think the boys' father wanted to make the pudding for their mother?

_____

10. If you were 'guarding' the pudding like Huey and Julian, would you have had a taste? Give an explanation for your answer.

☐ Yes ☐ No

Why?

_____

_____

_____

Session 2

Main focus: Introducing "The London Eye Mystery", predicting and questioning

Recap from last session:

Remind children of the think-aloud approach.
Did children manage to complete the questions at home? If yes, discuss how they 'rated' each question – i.e. which were rated as green/orange/red?

Starter activity:

Using visual resources (each 'type' of question visual on a separate piece of A4) children sort the different questions – i.e. do they think each question is a "right there", 'think and search", "author and me" or "on my own"?

Introduction:

Introduce "The London Eye Mystery" book to the children – give them their own copy. Explain this is going to be the main text that we will read every week.

Explain to children that a good reader pays attention to the title of the book and images on the cover before they start to read. Show children 'Predicting' and Questioning' visuals (reciprocal teaching). Check understanding of prediction and model the 'crystal ball' action. Then model the questioning action (hand on chin).

Activities:

Look at the front cover, encourage questioning and prediction. Record children's predictions and questions in their notebooks. Make sure children pick up upon the word 'mystery' and can articulate what this might mean. Establish whether the children have ever seen/been on the London Eye before.

Begin modelled think-aloud, chapter 1, encouraging children to comment and become involved. Begin with researcher reading and child following using their own copy of the text, and then when comfortable, child reads aloud. Then read chapter 2 using the think-aloud.

Plenary:

Recap the strategies focused on today: identifying the type of question to help us know how to answer it, predicting and questioning.
Researcher supports child to summarise what they have learned so far in the story, e.g. about the characters, where the story is set.

Session 3

Main focus: Clarifying (Comprehension monitoring) – Developing understanding of characters

Recap from last session:

-Are you enjoying the story so far?
-Did you read on a bit more at home?
-Were there any bits you really liked or interested you?
-Were there any parts you didn't understand?
-Did you make any notes in their notebook?

Starter activity:

Match the description to the type of question activity – to ensure children have a secure understanding from last session.

What do we know/what has happened in the story so far (summarising)

Introduction to activities (teaching input):

Use the 'Fab Four' spinner and ask, "Last session, it was the first time we looked at 'The London Eye Mystery' and we read chapters 1 (and 2) together. What strategies did we use, that *good* readers use, to help us to really understand and think about the story?"

Predicting and *Questioning*
(Use some examples of predictions and questions the pupil came up with last session). Remind pupils of the gestures for 'predict' (crystal ball) and 'question' (hand on chin).

Today, we are going to focus on how to '***Clarify'*** when we are reading.
This is a very important strategy that good readers use to help them to understand as they are reading. Sometimes we need to clarify words and ideas in a text that we may be unsure about. This is how we *monitor* our comprehension. We make sure we understand as we go along and check out things we don't.

How do we do this?
As you are reading, imagine you have a 'pause' button, like on a TV (introduce visual pause button resource). When we clarify, it is like pushing a pause button for a moment to think and figure out difficult words or parts of the text before we read on (indicate forwards with right hand) or re-read (indicate back with left hand).

Activities:
Read chapter 3 together – Model using 'pause button' and clarifying using the think aloud procedure.

Move onto chapter 4 and 5 explain to pupil that they are going to use the pause button themselves – to indicate when they need to clarify something (i.e. when something doesn't make sense). Record in child's notebook using the pause symbol when they need to clarify (page number/word(s)

Plenary:

Stop at chapter 6. Explain to children that the first few chapters of a book are very important for picking up clues in the story that help us to understand what the different characters are like. Those clues can help us to predict (show with action/visual) how the characters might behave – what they might do/say.

Who are the main characters in the story? What do we know about them so far?

Focus on Ted, the main character. Write him in the middle of the diagram.
Write other characters around him.

Using the text to support, record information from the text to help us to understand what Ted is like. Discuss the phrase, "funny brain that operates on a different operating system from other people's".

Session 4

Main Focus: Clarifying and comprehension monitoring

Recap from last session:

Recap learning from last session: Which strategy did we focus on? Remind children by showing them the "pause" visual resource. When might we need to 'pause' or stop and think as we are reading? Why is it important to do this? (Establish that we *read* in order to ***understand***).

'Clarify'

Ask child to explain what this means. Support if needed. Recap that it is a strategy we use to monitor our understanding as we read. This is very important.

Recap the two other strategies we have focused on, using the "Fab Four" spinner: *Predicting* and *Questioning*.

Explain to children that today, we are going to be using all three strategies as we read (using the think-aloud process), but we are going to also get even better at 'clarifying'.

Introduce children to the 'fix up strategy' visual resource ad use together when child needs to clarify.

Activity:

Before continuing to read "The London Eye Mystery' remind children of the comprehension monitoring - global activity. Explain to children that they are going to have a go at this activity again (different stories) but his time, they are going to use the three strategies to help them we have learned so far, particularly the 'clarify' strategy. Children complete activity – discuss what they did this time that they might not have done last time.

Continue reading The London Eye Mystery (from chapters 7/8) using a collaborative approach to thinking aloud. Emphasis upon clarifying understanding – making sense as they go along, including making links to information in previous chapters to build their understanding.

Plenary:

Recap learning with child. Ask them, "What have you learned today that might help you when you are reading from now on?"

Re-emphasise why it is important to clarify things we are not sure about when we are reading.

Session 4: Comprehension monitoring (global) activity

Does this story make sense? Underline any bits that do not make sense together.

The Seaside

Trips to the seaside have been popular for hundreds of years. In days gone by, doctors would recommend a dip in the sea for its beneficial health effects. In the eighteenth century the rich travelled to Brighton to take advantage of the sea waters. People were very modest and didn't wear the sorts of swimming costume that we wear today. They wore long bathing robes that looked like dresses and went down to their ankles. Because of all this clothing they were not able to swim, but merely paddled near to the shoreline.

These days, there is much more to do besides swimming at the seaside, but these activities often require special equipment, training and therefore they can be rather expensive. For example, in warm countries, people like to dive to look at the multi-coloured fishes, corals and plants that live under water. Divers have to wear special masks and breathing apparatus to be able to stay under water for long periods of time. As it is very affordable, it is one of the most popular activities amongst holidaymakers.

Windsurfing is another exhilarating seaside activity and is very easy to master. Windsurfing is a cross between surfing and sailing. You balance on a board that has a sail attached to it. Using your skill, you have to move the sail to catch the wind to carry you along. Most beginners spend more time in the water after falling in, than on their boards!

Session 4: Comprehension monitoring (global) activity

Does this story make sense? Underline any bits that do not make sense together.

The Stagecoach

Decorated in yellow and green and drawn by four horses, the stagecoach was an impressive and welcome sight on its arrival in villages during the nineteenth century. It carried people journeying from one town to another, and tradesmen with new wares from the town that they brought to sell to the eager villagers. Parcels and mail would often be brought as well. Thus, the weekly arrival of the stagecoach often went unnoticed by the villagers.

The roads were very different from today - in places no more than a dirt track, and full of potholes. The driver was used to these conditions and urged the pair of horses on, regardless. It was not necessarily a comfortable ride.

These days, the journey from Brighton to Scotland takes only a few hours by train but, in the nineteenth century, the same journey by stagecoach would take several long days travelling from first light until dusk. Each night, the coach would stop at a small country tavern or inn where travellers would rest overnight. The driver would pay a local lad to brush down the horses, and wash all the mud and dust off of the stagecoach. The next day they would load up the luggage and set off on the next leg of their journey after a hearty lunch at the tavern.

Session 5

Main focus: Summarising

Recap from last session:

What strategy did we use to help us to understand as we were reading? (Clarify – pause, stop and think when we are reading, use a 'fix-up' strategy)

What other strategies can help us?

Starter activity:

Question sort activity (using questions from Story 1 of the Inference and Integration skill task). Children identify the different 'types' of question and answer them. Discuss which questions they found easier/more difficult and why.

Introduction to activity (teaching input):

Draw children's attention to the last strategy on the "Fab Four" spinner: 'Summarise". Based on the explanation outlined in Oczkus (2010) introduce the strategy:

"Imagine you go on holiday and take lots of photos - about 500 of them. You want to show the photos to your friends – but you can't show them 500 photos, they would be there for hours and would probably get very bored! So instead, your task is to find the 25 photos that show the main parts of the holiday – or the most interesting or important parts… a 'summary' of your holiday (from beginning to end).

When you summarise a text or story, you so something very similar. You have to think about the information in the story and choose the main points. You have to decide what information you need (the main points of the story from beginning to end) and what information and detail you don't *need*.

Activity:

Introduce children to London Eye Mystery summary activity (see below). Children are given cut up sentences so they can move them around to order them to produce a summary. Children start by highlighting those that are important in green and those not in red.

Following activity, continue reading the story (do not read beyond chapter 12) using the think-aloud procedure collaboratively.

Plenary:

Ask child to explain what a 'summary' is and how to produce a summary - supported if needed.

Session 5: Summary activity

You have been asked to write a summary of the story so far.

You need to choose **7** pieces of information to include in the summary. Which would you include and which not – why?

1. Highlight the ones you **would** include in **green** and the ones you **would not** in **red.**

2. Number the pieces of information in the order you would place them in the summary (1 = first, 6 = last)

One of the main characters in the story is Ted, whose brain runs on a different operating system than other people.

Ted is really interested in the weather and wants to be a meteorologist when he is older.

Salim wanted to fly the London Eye whilst he was visiting London.

Ted's dad is a demolition expert and his mother is a nurse.

Ted and his sister Kat watch their cousin, Salim get on the London eye and track his pod as it slowly goes around.

Ted is trying his best to learn how to 'talk small' instead of 'talk big' so that he can make more friends at school.

Life was going pretty normally, until Ted's Auntie 'Hurricane' Gloria and their cousin, Salim, came to stay.

Aunt Gloria had been offered a job as an art curator in New York City.

Whilst Ted, his sister Kat and Salim waited in the queue, a stranger offered them his ticket, and Salim decided to take it.

Ted's garden is the size of a postage stamp.

Salim's pod landed at 12.02 pm but he was nowhere to be seen. Ted and Kat waited around to see he if he turned up but there was no sign of him.

Ted sounds like the BBC but the other members of his family have a South London accent.

Ted likes to count the number of shreddies he eats for breakfast.

Even thought Kat and Ted have a love-hate relationship, they must now work together to help figure out what happened to Salim.

Session 6

Main focus: Applying comprehension strategies independently

Recap from previous sessions:

Using the "Fab Four" spinner, ask children to talk about each strategy and how it can help us when we read. Use the visual types of question resource to remind children of the 'types of question' strategy.

Activity:

Ensure children have visual resources available to support their comprehension as they are reading (e.g. pause button, 'Fab Four', fix-up strategies).

Ask the children to read the chapter on their own (either aloud or in their head as they would prefer). Encourage children to use strategies independently but they are able to discuss with the researcher if they need to.

After children have read the chapter, they then answer the questions (researcher records answers). The questions include all 'types' and the final question requires children to summarise.

Children to work mostly independently but researcher to provide support if needed through targeted questioning, or directing children to re-read parts of the text.

Following activity, continue reading story.

Plenary:

Children to reflect upon their performance on chapter 13 questions – what strategies they used to help them, what they still found difficult and why.

Session 6 - Comprehension questions

Chapter 13:

The Eye of the Hurricane

1. Why was the photo of Salim that Aunt Gloria gave to the police not 'ideal'?

2. What does Salim's father do for a living?

3. On page 96, what do the words, "driving at" mean?

4. (a) Why do you think nobody objected to Aunt Gloria smoking a cigarette in the house?

   (b) Do you think any of the characters would have objected to Aunt Gloria smoking before Salim disappeared. If yes, who, and why do you think this?

5. How many sandwiches did Aunt Gloria manage to eat?

6. How does the author help the reader to understand how distressed Aunt Gloria is?

7. Why do you think the author called this chapter, "The Eye of the Hurricane"?

8. In your own words, summarize what happened in this chapter.

Session 7

Main Focus: Gaining post-intervention reading measures and reflection upon learning during the intervention

Recap from previous sessions:

Over the last six weeks, what have you learned that has helped you with your reading?

What strategies can you use to help you to understand when you are reading?

Activity:

YARC Secondary: Form B and WRAT-4 word reading assessments. Before assessments, ensure children understand this is to be done on their own (i.e. no support from the researcher).

Reading scaling activity followed by discussion of ratings with children.

Continue to read the London Eye Mystery from where the children are up to, children to take the lead with the think aloud.

Plenary:

Thank participants for taking part and congratulate them on progress made in their reading.

Encourage children to finish reading The London Eye Mystery. Children to take home all resources in their reading folder.

APPENDIX S

Individual subtest WASI results (including calculated VIQ vs. PIQ discrepancy for all participants)

Ps	Vocabulary T-score	Similarities T-score	Verbal Sum of T-scores	Block Design T-score	Matrix Reasoning T-score	Performance Sum of T-scores	Verbal IQ (VIQ)	Performance IQ (PIQ)	Difference: VIQ and PIQ	VIQ v PIQ	Full Scale IQ (FSIQ)
1	47	51	98	53	58	111	98	111	13**	PIQ>VIQ	104
2	54	57	111	64	54	118	108	115	7	PIQ>VIQ	113
3	44	41	83	41	45	86	87	89	2	PIQ>VIQ	86
4	32	46	78	42	49	91	84	93	9	PIQ>VIQ	86
5	37	35	72	45	45	90	79	92	13**	PIQ>VIQ	84
6	50	42	93	42	36	78	95	84	11**	VIQ>PIQ	87
7	32	45	77	33	22	55	83	67	16**	VIQ>PIQ	73
8	43	55	98	37	54	91	98	93	5	VIQ>PIQ	95
9	48	54	102	61	61	122	101	119	18**	PIQ>VIQ	110
10	47	57	104	63	64	127	103	124	21**	PIQ>VIQ	114
11	30	37	67	34	42	76	76	82	6	PIQ>VIQ	77
12	34	39	73	41	28	69	80	77	3	VIQ>PIQ	76
13	52	49	101	37	55	92	101	93	8	VIQ>PIQ	97
14	35	44	79	71	43	114	85	110	25**	PIQ>VIQ	97
15	62	44	106	50	58	108	105	106	1	PIQ>VIQ	106
16	45	47	92	57	64	121	94	118	24**	PIQ>VIQ	101
17	49	46	95	44	51	95	96	96	0	PIQ=VIQ	95
18	43	49	92	58	59	117	94	114	20**	PIQ>VIQ	104
19	54	52	106	57	37	94	105	95	10	VIQ>PIQ	100
20	21	41	62	33	24	57	73	68	5	VIQ>PIQ	69
21	47	43	90	68	59	127	92	124	32**	PIQ>VIQ	107
22	47	51	98	43	47	90	98	92	6	VIQ>PIQ	95
23	53	45	99	34	49	83	99	87	12**	VIQ>PIQ	91
24	38	46	84	59	57	116	88	112	24**	PIQ>VIQ	100

Statistical significance: ** $p < .05$

APPENDIX S Social Responsiveness Scale (SRS): Teacher and Parent Raw scores and T-scores

Ps	Respondent	SRS Subscale											
		Social Awareness		Social Cognition		Social Communication		Social Motivation		Autistic Mannerisms		Total	
		Raw Score	T-score	Raw Score	T-score	Raw Score	T-score	Raw Score	T-score	Raw Score	T-score	Raw Score	T-score
1	Teacher	9	55	18	65	38	67	11	54	14	60	90	63*
	Parent												
2	Teacher	6	48	10	53	19	52	8	50	4	46	47	50
	Parent	19	91	22	85	47	95	17	78	17	78	122	92**
3	Teacher	12	69	17	70	27	66	12	60	14	71	82	68*
	Parent	16	88	20	86	21	68	8	58	24	111	89	84**
4	Teacher	8	52	17	64	40	68	21	70	13	59	99	65*
	Parent	13	72	15	70	33	77	22	90	12	67	95	79**
5	Teacher	10	57	19	67	25	56	13	57	10	55	77	59
	Parent	15	78	26	94	41	88	18	80	19	83	119	91**
6	Teacher	7	55	3	44	9	48	8	53	2	47	29	49
	Parent												
7	Teacher	17	74	23	73	49	75	20	69	22	71	131	75*
	Parent												
8	Teacher	12	62	10	53	37	66	19	67	6	49	84	61*
	Parent	11	65	12	63	22	64	13	68	7	55	65	65*
9	Teacher	6	48	7	48	11	46	6	46	2	44	32	46
	Parent	11	65	28	99	38	84	22	90	28	103	127	95**
10	Teacher	14	67	15	61	32	62	19	67	12	58	92	63*
	Parent	13	72	19	79	39	85	26	99	27	101	124	93**
11	Teacher	6	52	13	62	17	56	15	65	7	57	58	59
	Parent	23	113	35	123	50	110	28	106	32	135	168	128**
12	Teacher	7	50	13	58	23	55	1	38	3	45	47	50

	Parent	17	85	26	94	38	84	15	73	19	83	115	89**
13	**Teacher**	4	43	10	53	21	53	9	51	10	55	54	52
	Parent	9	59	14	68	29	72	17	78	23	92	92	78**
14	**Teacher**	16	72	22	72	35	64	15	61	26	77	114	70*
	Parent	15	78	30	103	36	81	23	92	34	117	138	100**
15	**Teacher**	11	60	16	62	28	59	21	70	7	51	83	61*
	Parent	14	75	32	108	45	93	21	87	21	87	133	98**
16	**Teacher**	8	52	3	42	14	48	7	48	3	45	35	46
	Parent	20	94	16	72	40	86	18	80	15	74	109	86**
17	**Teacher**	13	65	15	61	35	64	16	62	21	70	100	66*
	Parent												
18	**Teacher**	11	66	22	79	26	65	13	61	11	65	83	69*
	Parent	9	63	15	74	12	55	12	67	5	55	53	64*
19	**Teacher**	10	57	15	61	27	58	10	53	11	56	73	58
	Parent												
20	**Teacher**	8	57	13	62	14	63	8	53	13	69	56	59
	Parent	6	52	8	57	15	59	8	58	17	91	54	65*
21	**Teacher**	9	55	4	44	16	49	8	50	8	52	45	49
	Parent	11	65	21	83	33	77	19	82	26	99	110	87**
22	**Teacher**	9	55	16	61	13	47	11	54	14	60	62	55
	Parent												

**T-score 76 or higher indicating a result in the severe range - severe interference in everyday social interactions, which provides strong evidence for clinically diagnosable ASC.
*T-score 60 – 75 indicating a result in the mild to moderate range - clinically significant deficiencies in reciprocal social behaviour typical for children with mild or "high-functioning" ASC's.

Ps 1,6,7,16,19,22 SRS not returned by parent/carers.

APPENDIX T

Differences in performance on receptive language subtests (CELF-4)

Ps	Age	Concepts & Following Directions (C&FD)		Word Classes – Receptive (WC-R)		Difference C&FD & WC-R	
		Standard score	*Percentile*	*Standard score*	*Percentile*	*Standard score*	*Percentile*
1	11:08	70	2	100	50	-20	-48
2	11:11	105	63	120	91	-15	-28
3	12:02	65	1	80	9	-15	-8
4	12:04	90	25	80	9	+10	+16
5	12:03	65	1	80	9	-15	-8
6	12:02	70	2	85	16	-15	-14
7	11:10	65	1	80	9	-15	-8
8	11:10	65	1	95	37	-30	-36
9	11:06	100	50	135	99	-35	-49
10	11:06	110	75	110	75	0	0
11	11:10	70	2	75	5	-5	-3
12	11:09	70	2	90	25	-20	-23
13	11:05	110	75	110	75	0	0
14	10:11	80	9	90	25	-10	-16
15	10:11	100	50	105	63	-5	-13
16	11:05	90	25	90	25	0	0
17	11:04	85	16	100	50	-15	-34
18	11:08	90	25	115	84	-25	-59
19	10:11	80	9	100	50	-20	-41
20	10:11	60	0.4	65	1	-5	-0.6
21	11:10	100	50	100	50	0	0
22	11:04	90	25	100	50	-10	-25

APPENDIX U

Comparison of parent and teacher respondent SRS T-scores

Ps	Total T-score *Parent (P)*	*Teacher (T)*	Relationship P/T scores	Difference
2	92	50	P > T	+42
3	84	68	P > T	+16
4	79	65	P > T	+14
5	91	59	P > T	+32
8	65	61	P < T	+4
9	95	46	P > T	+49
10	93	63	P > T	+30
11	128	59	P > T	+69
12	89	50	P > T	+39
13	78	52	P > T	+26
14	100	70	P > T	+30
15	98	61	P > T	+37
16	86	46	P > T	+40
18	64	69	T > P	- 5
20	65	59	P > T	+6
21	87	49	P > T	+38

APPENDIX V

Significant test of normality: component comprehension measures

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CompmonitorA	.239	22	**.002**	.867	22	.007
Anaphoric resolution	.091	22	.200*	.966	22	.629
pronouns	.284	22	**.000**	.766	22	.000
PredictA	.307	22	**.000**	.764	22	.000
PredictB	.264	22	**.000**	.798	22	.000
Storystructure	.257	22	**.001**	.810	22	.001
CompmonitorG	.179	22	.063	.886	22	.016
Literal	.268	22	**.000**	.768	22	.000
Text	.177	22	.073	.929	22	.114
Global	.275	22	**.000**	.824	22	.001
Total Comprehension skills	.167	22	.111	.956	22	.416

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

APPENDIX W

Classification of YARC Secondary reading comprehension questions (Secondary Manual[16] p 130-138):

Literal Information
'This category was used for questions that did not require an inference because the answer was literally written in the text'.

Knowledge-based inference
'Inferences that are necessary for maintaining a coherent representation of the passage. These inference generally involve application of real-world knowledge.'

Evaluative inference
'This type of inference relates to the emotional outcomes of events, the consequences of actions, and so on. They are necessary for understanding a text and, like knowledge-based inferences, rely on the reader's us of real-world knowledge in interpreting textual information'.

Elaborative inference
'Inferences that serve to add to the mental representation of the passage but are not necessary for maintaining textual coherence'.

Predictive inference
'Inferences that involve making predictions about future events'.

Vocabulary
'Items were rated as vocabulary-dependent if it was felt that the most important factor in deriving the correct answer was understanding a key word, that is where low frequency words or difficult words were included in the text or question'.

Figurative language
'Figurative language refers to the non-literal use of words to convey a sense beyond that associated with their usual meaning'.

[16] Stothard, S. E, Hulme, C, Clarke, P, Barmby, P & Snowling, M. J (2010). *York Assessment of Reading for Comprehension, Secondary Set*. London: GL Assessment

APPENDIX X

Breakdown of YARC Secondary comprehension questions:

Level 1 A (pre intervention measure)

Level 1.1A: The Schoolboy

Questions	*Classification*
3, 4, 5, 6, 11,	Literal Information
1, 2, 10	Evaluative inference
9, 12	Knowledge-based inference
13	Predictive inference
7, 8	Vocabulary

Level 1. 2A: Honey for You, Honey for Me

Questions	*Classification*
2, 3, 6, 8, 9, 10, 11	Literal Information
12	Evaluative inference
13	Predictive inference
1, 4	Elaborative inference
5, 7,	Vocabulary

Level 1 B (post intervention measure)

Level 1.1B: River Girl

Questions	*Classification*
1, 2, 7	Literal Information
3, 6,	Evaluative inference
4, 5, 8,	Knowledge-based inference
13	Predictive inference
12	Elaborative inference
10, 11	Vocabulary
9	Figurative language

Level 1.2B Food in Medieval Times

Questions	*Classification*
1, 3, 5, 6, 7, 8, 10	Literal Information
4, 11, 12	Knowledge-based inference
13	Predictive inference
2, 9,	Vocabulary