The Reading Comprehension Skills of Children Learning English as an Additional Language

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Abstract

This thesis examines the language and literacy skills of children learning English as an Additional or only Language (EAL/EL1). Children, recruited from Year 2 and Year 4, participated in three phases of data collection. The results from time 1 (t1) demonstrated that the children learning EAL had weaker language and reading comprehension skills overall when compared to their EL1 peers, though their word reading skills were comparable.

The second phase of data collection examined children's morphological awareness as well as their knowledge of multi-word phrases (MWPs). Awareness of both inflectional and derivational morphemes was weaker for the EAL children, and all children had a weaker awareness of derived morphemes relative to inflected morphemes. Notably, regression analyses revealed that morphological awareness predicted unique variance in reading comprehension outcomes, above and beyond word reading and oral language skills, for the EAL children but not the EL1 children. Further, differences between the two language groups emerged on the task of MWP knowledge, as well as additional measures of vocabulary depth, including polysemous word knowledge and word associations, which were carried out at t3.

The longitudinal analyses revealed that the EAL children made greater gains than the EL1 children in their oral language skills from t1 to t3. However, despite the observed gains, the EAL children continued to lag behind their EL1 peers on measures of oral language and reading comprehension. Moreover, language group status (EAL/EL1) did not significantly add to the prediction of t3 reading comprehension, once word reading and oral language was accounted for. Thus, suggesting that the key predictors of reading comprehension are similar for both groups of learners. The findings are discussed with a focus on EAL children's language and literacy profiles, and the implications for educational practice are considered.

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Author's Declaration

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References. Selected aspects of the work have been presented elsewhere:

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Introduction

Learning to read transforms lives.

(Castles, Rastle, & Nation, 2018, p. 5).

In literate societies, the ability to read is fundamental for meaningful communication. An individual's ability to understand written text is not only critical for achievement within school, with a rapid shift from 'learning to read' to 'reading to learn' (Chall, 1983), it is paramount for later life when individuals seek and maintain employment. Perfetti, Landi and Oakhill (2005) suggest that the acquisition of reading comprehension is, ultimately, the ability to understand written text as well as one understands spoken language. While extensive research into the individual differences in children's reading ability has explored the potential cognitive and linguistic skills that may underpin and contribute to successful reading comprehension in first language (L1) reading (Cutting & Scarborough, 2006; Daneman & Carpenter, 1980; Jenkins, Fuchs, Van Den Broek, Espin, & Deno, 2003; Wagner, Schatschneider, & Phythian-Sence, 2009), far fewer studies have explored this with children learning to read in an additional language.

Globally, migration flows are profoundly changing typically monolingual classrooms through the rise of linguistically diverse pupils; the number of children for whom the language of school instruction is different to their home language has gradually been increasing for many years (Organisation for Economic Co-operation and Development [OECD], 2010). Despite the growing prevalence of multilingual classrooms and the potential benefits of bilingualism (see Barac, Bialystok, Castro, & Sanchez, 2014 for a review), data suggests that children who are exposed to more than one language often underperform in their academic achievement relative to their monolingual peers (OECD, 2016). This global trend is evident in the UK context where 21.2% of pupils in state funded primary schools are identified as learning EAL (Department for

Education [DfE], 2018), an increase of 6% from 2009 where the percentage was 15.2% (Department for Children, Schools and families [DCSF], 2009). In a cross-sectional report, Strand, Malmberg, and Hall (2015) demonstrate that the overall achievement gap between children learning English as an Additional Language (EAL) and monolingual English-speaking (EL1) children declines with age, however, at age 11, when children are in their final year of primary school education, the achievement gap between EAL and EL1 children on assessments of reading is still of notable difference. Additionally, a number of reports have identified particular risk factors that increase the likeliness of lower academic outcomes; for EAL children, socio-economic status and age of arrival in the UK are noted as two of the key risk factors (Hutchinson, 2018; Strand & Hessel, 2018; Strand et al., 2015). Employing a sequential design, this thesis examines the cognitive and linguistic skills underpinning reading comprehension and explores how these skills compare for EAL and EL1 children attending primary schools in the UK.

Outline of the Thesis

Chapter 1 provides an overview and critique of the relevant research literature and is divided into three distinct sections: the first section explores what is meant by bilingualism, who EAL learners are, and what the literature suggests regarding EAL and language-minority learners' reading comprehension both in the UK and internationally; the second section discusses the theoretical framework that was involved in the conceptualisation of this study; and the final section reviews existing research that has examined the cognitive and linguistic predictors of reading comprehension within various monolingual and bilingual contexts. Chapter 2 provides a statement of the research questions and reports the methodology and methods used in this study to answer those questions. The ethical and practical considerations are also considered in this chapter. Chapters 3 to 6 detail the results of the relevant research questions and each chapter provides a brief discussion of the findings. Chapter 7 collates the research findings in a critical discussion, considering and drawing on relevant theoretical perspectives and previous research evidence. The limitations of the research are considered and the chapter concludes with a summary of the main findings, a presentation of the practical implications, and a proposal of possible avenues for future research.

Chapter 1 – Review of the Literature

1.1 Bilingualism

The last few decades have seen an exponential growth in research pertaining to bilingualism and bilingual language development in childhood. Research has engaged with a range of questions including but not limited to: theoretical questions, for example, whether children store knowledge of their languages in a single or dual mental system (Meisel, 1989; Volterra & Taeschner, 1978), whether cognitive and linguistic knowledge acquired in one language helps knowledge in another language (Cummins, 1981); empirical questions, such as, do bilingual babies reach the same linguistic milestones (e.g., canonical babbling) at the same chronological age as monolingual babies (Oller, Eilers, Urbano, & Cobo-Lewis, 1997); and questions that address both empirical and theoretical standpoints, such as, whether bilingual children have certain advanced cognitive skills relative to monolingual children (Bialystok, 1999). While many questions remain unresolved, unanswered or contested, it is clear from the research literature that there are a great variety of contexts in which children become bilingual, and with that there is great variability in the extent to which proficiency is achieved in children's given languages. The acquisition of two or more languages is well within the human endowment, however, research has shown that not every child exposed to more than one language becomes bilingual (De Houwer, 2007; Kondo-Brown, 2010), which perhaps raises more questions about bilingualism and bilingual language acquisition than it answers. Importantly though, it necessitates the question of what is meant by bilingualism.

Definitions of bilingualism range from, being able to communicate effectively enough in each language to fulfil individuals' own needs (Grosjean, 1989), to acquiring native-like proficiency in both languages (Bloomfield, 1933). Often, research differentiates between dominant and balanced bilinguals, i.e., the extent to which mastery of each language is equivalent (Wei, 2000) and research examining the language development of bilingual children differentiates between simultaneous and sequential bilingualism, i.e., whether both languages are present from birth or whether exposure to an additional language is encountered later in childhood. As Bhatia and

Ritchie (2006) pointed out, there is no single unanimously employed definition of bilingualism, or indeed, any one accepted way of how it should be measured, however, the stance adopted within this thesis is that when researchers examine bilingual language and literacy development, there is a vast array of research questions that are being addressed and as such a single definition of bilingualism may be unnecessary or, in fact, counterproductive. For example, certain theoretical questions regarding bilingual babies may only be addressed by identifying and examining simultaneous bilingual babies, or questions of a cognitive advantage may be better addressed with the examination of 'balanced' bilingual learners. This is not to say that certain conceptualisations are not problematic or perhaps misleading, but it is important to recognise that bilingualism is not a static concept and as such definitions may vary depending on the context and the research questions being asked. With that said, it is of utmost importance that researchers explicitly state the way in which bilingualism is being operationally defined within the parameters of their research, as Grosjean (1998) highlighted, the conflicting results in the study of bilingualism "could have been lessened, if not avoided, had close attention been paid to methodological and conceptual issues" (p.132). This statement maintains its relevance in the research field twenty years later.

This thesis takes the viewpoint that bilingual language development is context-bound, and thus when carrying out empirical research it is important to identify the context in which second language learning (L2) is taking place. In doing so, researchers can identify trends across contexts allowing for a more nuanced understanding of bilingual language development. As explained in the introduction, this research study examines the cognitive, language and literacy skills of children learning English as an Additional Language (EAL) and monolingual English-speaking children (EL1) in England; their definitions and acronyms will be detailed in the following section. It is important to note that this thesis assesses EAL and EL1 children in English only. While it is unquestionable that the L1 is an essential component of EAL children's language development, the L1 of EAL children in this study has not been assessed. In line with the multi-competence approach, it is recognised that bilingual language development 'involves the whole mind of the speaker, not simply their first language (L1) or their second'

(Cook 2012, p.3768). However, due to the large number of L1s spoken by the sample (see section 2.9), the relatively short time frame of the project, the limited number of valid and reliable measures in each of the L1s and limited funds to access speakers of the L1s to administer assessments, the EAL children's L1 abilities were not assessed. In addition, it is important to note that EL1 children's abilities are not being held as the goal or aim for EAL children. Rather, the two groups have been compared to examine how and where they differ/are similar in their English language and literacy skills, with the intention of better understanding EAL children's language and literacy trajectories in the educational context in which the children must function.

1.1.1 Children learning EAL in England

The DfE (2018) state that:

> A pupil is recorded to have English as an additional language if she\he is exposed to a language at home that is known or believed to be other than English. This measure is not a measure of English language proficiency or a good proxy for recent immigration (p. 10).

In line with this definition, schools are to identify their EAL learners. That is, any pupil that has exposure to a language other than English in the home (irrespective of the extent to which the language is used/heard by the pupil) will be recognised as an EAL learner. Evidence demonstrates that English language proficiency is a key factor in predicting the performance of EAL learners (Demie, 2017; Strand & Hessel, 2018). However, schools are not required to assess a child's proficiency in English. This is in spite of the DfE's clear acknowledgement that identifying a pupil as having EAL in this way is not a measure of English proficiency, but also in spite of the research that demonstrates that knowledge of EAL learners' English proficiency has the potential to be an important tool for teachers to support effective practice (Flynn & Curdt-Christiansen, 2018). Nonetheless, children with EAL are identified in schools using this very broad classification and accordingly are an enormously heterogenous group of learners comprised of everyone from newcomers to England and to the English language, to proficient speakers of English who have been consistently and simultaneously exposed to English and another language since birth, and everything and everyone in between. Thus, the identification of EAL learners using only the DfE's guidance is not particularly helpful in understanding who those children are in terms of their linguistic background and proficiency.

Beyond understanding children's specific language skills, Bronfenbrenner's bioecological theory (1979, 1993) highlights the importance of identifying and acknowledging the wider social, political and economic factors that play a role in children's learning and development. These considerations are of value and relevance to the current study and as such it is of contextual importance to point out the changes in school requirements in terms of EAL data during this research project. For a short time (2016-2018), the DfE Proficiency Scales (DfEPS) were introduced; this required schools to report EAL learners' proficiency in English, identifying children as either: *New to English, Early Acquisition, Developing Competence, Competent* or *Fluent*. While the importance of the DfEPS is clear from a research and pedagogical perspective, its concurrent arrival with the requirement for schools to acquire pupils' nationalities and countries of birth was perhaps ill-fated and may have contributed to its brief existence and ultimate dismissal. Certainly, Hutchinson (2018) highlights its perceived association with the negative political narrative surrounding migration. Although this thesis does not attempt to examine the political tensions of the post-Brexit uncertainty, it is of note that this research project was carried out against the backdrop of a hostile migration narrative and during the introduction *and* removal of the DfEPS.

For teachers of children learning EAL then, it can be quite a challenge to know how to effectively support EAL learners (Bailey & Marsden, 2017), particularly considering the lack of research evidence in the UK (Murphy & Unthiah, 2015; Oxley & De Cat, 2018) and/or the potentially misleading information concerning the elimination of EAL and EL1 disparities by Key Stage 4 (age 16) (Strand et al., 2015). The heterogeneity of EAL learners masks the nuance and the idiosyncrasies of the individual differences found within this population and there is a clear lack of interventions and examinations of effective practice with EAL learners in the UK. Moreover, at the start of this research project in 2015 there was a lack of UK based research examining the types of language and literacy differences experienced by EAL and EL1 children, particularly into the final years of primary school. Given the centrality of reading in the UK education system and Western culture more broadly, this project set out to examine the linguistic and cognitive skills important for reading comprehension, as identified in previous research with monolingual and bilingual children, of children who are identified as learning EAL in the UK.

1.1.2 Terminology and Acronyms

1.1.2.1 Children with EAL

Throughout this thesis, children with EAL, children learning EAL, EAL children and EAL learners are terms used interchangeably to refer to children who use a language other than English (though this may be in addition to English) in their home environment with members of their family and/or in their local community. While EAL learners can be considered bilingual, the term EAL is adopted in this thesis to acknowledge two things: firstly, that children are learning to speak English, and secondly, that children speak a language outside the school environment that is not the majority language of their education, nor for the most part, is this language acknowledged within schools. The use of this term is reflective of school practice and, as identified above, is not deterministic of linguistic background or proficiency. For clarity, the term language-minority learner is used within the literature review to refer to children who, much like EAL children, speak a minority language in their home environment and the majority language at school, but for whom the majority language is a language other than English, e.g., Dutch.

1.1.2.2 Children with EL1

This term is used to refer to speakers of English that have English as their first and only language; often referred to in the literature as monolingual or native-English speakers. EL1 was decided as the term of use rather than *monolingual* to differentiate between monolingual speakers of other languages and monolingual-English speakers, and rather than *native-English* *speakers* as this is somewhat ambiguous considering some EAL children could also be considered (bilingual) native speakers of English. Children with EL1 speak the majority language and do not have access or exposure to a second language in their everyday home life.

1.2 The Reading Skills of Children with EAL

There is an extensive literature examining the skills needed for successful reading comprehension among monolingual speakers, particularly monolingual English-speakers. This research has demonstrated that children's language and literacy development is a protracted process in which a variety of variables can impact reading achievement, yet much less is known about the components that influence reading comprehension for children learning EAL; particularly, there is a lack of longitudinal research examining the individual differences in EAL children's reading trajectories, spanning the primary school years. Given that children learning EAL are acquiring two languages, the process of literacy acquisition becomes inherently more complex, that is, there are additional factors to consider, including but possibly not limited to; the age of acquisition (AoA) of both languages, the amount of exposure children receive in their L1 and L2, the amount children use their L1 and L2, and parents' command of language in the child's L1 and L2 (De Houwer, Bornstein, & Putnick, 2014; Gámez & Levine, 2013; Gathercole, Kennedy, & Thomas, 2016; Hammer et al., 2012; Sorenson Duncan & Paradis, 2018).

Theories of language acquisition serve as the foundation on which language research is built. While a discussion of the theoretical accounts of language acquisition is beyond the scope of this literature review, it is of contextual relevance to highlight the approach to language development that has influenced this thesis; that is, a constructivist and usage-based approach. Tomasello (2000, 2003) among others e.g., Bates and Goodman (1997) and Ellis and Robinson (2008), suggest that children are able to construct and use language in a creative and independent manner following the statistics they have been taking on their linguistic environments. The usage-based approach suggests that a person's lexicon will develop in accordance with the input they receive. Thus, the importance of the frequency of input is also emphasised. By nature, this approach has clear implications for considering the language and literacy skills of children learning EAL. That is, by comparison to EL1 children, EAL children receive less exposure to English given that they are exposed to two languages, and as such the ideas of this approach are returned to at various points within this thesis in order to enhance some of the ideas and explanations that are presented.

This section will provide an overview of the existing research findings that have examined the reading comprehension abilities of EAL and language-minority learners, followed by a discussion of the theoretical contributions to the understanding of reading comprehension more broadly, and the final section of the literature review will evaluate previous research findings that have examined the predictors of reading comprehension in a variety of monolingual and bilingual contexts.

1.2.1 The Reading Profiles of Children with EAL in the UK

There are a significant number of children in the UK learning to read in their second language; whether these children are also literate/learning to read in their first language (L1) is often less clear as very little information is documented in the UK of EAL learners' L1 experiences. There are several potential reasons for why this may be; methodologically, the accurate assessment of children's L1s is challenging, i.e., carrying out in-depth assessments requires extensive knowledge of the given L1. Additionally, the mainstream monolingual curriculum that operates in schools could be seen to be underpinned by a 'monolingual mindset' (Ellis, 2004), i.e., children's L1 skills are not valued and thus not acknowledged in schools. This is a wider socio-political issue that, while noteworthy to consider, will not be addressed in the literature reviewed here. In terms of the psycholinguistic research that has examined L1/L2 reading skills, the literature suggests that there may be some degree of transfer in reading acquisition skills across languages (Durgunoğlu, Nagy, & Hancin-Bhatt, 1993; Geva & Siegel, 2000; Gholamain & Geva, 1999; Wade-Woolley & Geva, 2000), though this may depend on the degree of similarity between the two languages and the writing systems (Bialystok, Luk, & Kwan, 2005; Bialystok, McBride-Chang, & Luk, 2005; Gottardo, Yan, Siegel, & Wade-Woolley, 2001).

Thus, EAL children's reading outcomes in English may be related to and influenced not only by their literacy skills in their L1 but also by the specific language they speak. Therefore, understanding whether and to what extent EAL children are literate in their L1 may have implications for their reading skills in English.

Moreover, EAL children begin school with wide ranging English language exposure and home literacy practices but all children begin the process of learning to read in English upon school entry. An assessment known as the Phonics Screening Check was introduced into primary schools in England in 2012 to examine the phonological decoding ability of Year 1 children (aged 5-6), i.e., the ability to read the alphabetic script in English through an understanding of the grapheme-phoneme relationship. Children are required to phonetically decode 40 items (20 real words and 20 nonsense words) and must read a minimum of 32 items correctly in order to meet the expected phonological decoding standard. Despite the potential differences in exposure to English prior to school entry, national results reveal that EAL and EL1 children achieve comparable phonological decoding outcomes; national data reports that 81% of EL1 achieved the minimum threshold or above, and similarly, 82% of EAL children (DfE, 2017). Thus, the data suggests that learning how to transfer print into sound does not seem to be problematic for EAL children. That said, automatic and fluent single word reading requires a reader to go beyond phonological decoding skills, drawing also on orthographic, lexical, morphological and syntactic knowledge in order to quickly and accurately process larger orthographic units and/or words with irregular spellings (Snow & Kang, 2006). Nonetheless, research findings maintain that typically developing children learning EAL tend to have comparable word reading skills to their EL1 peers (Babayiğit, 2014; Burgoyne, Kelly, Whiteley, & Spooner, 2009; Burgoyne, Whiteley, & Hutchinson, 2011; Hutchinson, Whiteley, Smith, & Connors, 2003).

The pattern that is consistently documented in the above studies, however, is that despite age-appropriate word reading skills, primary school children learning EAL in the UK often demonstrate weaknesses in reading comprehension in comparison to their EL1 peers (Beech & Keys, 1997; Burgoyne et al., 2009; Hutchinson et al., 2003; Rosowsky, 2001). In a longitudinal study, Hutchinson et al., (2003) examined EAL and EL1 children's reading comprehension with children in Year 2 (mean age 6;10 months), and followed their development into Year 3 and Year 4. They found that the EAL children consistently demonstrated weaker reading comprehension relative to the EL1 children and suggest that this difference may be perceived as a one-year developmental lag. Furthermore, they examined the EAL children in Y4 and the EL1 children in Y3 and found that to obtain comparable comprehension scores, the EAL children had decoded approximately 30% more of the text than the EL1 children. Thus, given that the EAL children were able to read more but not comprehend more, the authors further suggest that the weakness in reading comprehension may be more than a one-year developmental lag. This finding may also suggest that EAL children utilise their word reading skills to compensate for their weaker comprehension skills and in doing so it is plausible that EAL and EL1 children may take a different processing route when comprehending written text, though this needs further empirical examination before any firm conclusions can be drawn.

In further support of this pattern, Burgoyne et al., (2011) examined the development of a range of skills thought to be predictive of reading comprehension as well as reading comprehension itself. The study examined both EAL and EL1 children from Y3 to Y4. Their initial analysis did not reveal a statistically significant difference between the two language groups (EAL/EL1) on the reading comprehension task in either year group. However, it is important to note the potential limitations of the measure of reading comprehension that was administered in the study. The Neale Analysis of Reading Ability - Revised (NARA-R; Neale, 1997) allows participants to progress through passages based on their text reading scores, i.e., participants are able to read more passages and thus answer more comprehension questions when they demonstrate accurate and fluent text reading. Indeed, when accuracy scores were controlled for in further analyses, the EL1 children statistically significantly outperformed the EAL children at both time points. Thus, demonstrating that accurate and fluent text decoding skills may mask the reality of reading comprehension abilities.

Regardless of the possible measurement limitation, the study demonstrated that once reading accuracy was controlled for, reading comprehension differences emerged between EAL and EL1 children with an EL1 advantage. Furthermore, given EAL children's weaker reading comprehension skills in Y3, EAL children would need to show accelerated rates of development in order to approach a comparable level of reading comprehension to that of their EL1 peers in the following years. The researchers identified, however, that while both groups made progress in their reading comprehension from Y3 to Y4, the progress made by EL1 children was greater than that of their EAL peers. This concerning developmental trajectory is suggestive of a possible Matthew effect for children's reading comprehension (Stanovich, 1986). This cumulative advantage phenomenon suggests that children who are able to read well, read more and in doing so become stronger readers, conversely those who are poor readers, read less and in doing so inhibit further growth in their reading outcomes. Given the centrality of reading in academic success, the developmental trajectories of EAL children certainly warrant further examination.

Beyond the contribution of individual language, literacy and cognitive skills to reading comprehension outcomes, there is some literature to suggest that the text a reader engages with needs to be of cultural relevance if a reader is expected to draw on their background knowledge in order to construct meaning (Abu-Rabia, 2003; Ebe, 2010; Yuet & Chan, 2003). This body of research draws on models of comprehension that have emphasised the role for background knowledge in understanding text (e.g., Schema theory, Bartlett, 1932; Construction-integration model, Kintsch, 1988; Kintsch & Rawson, 2005; Nassaji, 2002). These models suggest that a reader's background knowledge interacts with the text, and thereby facilitates the reading process and aids comprehension. With this in mind, Burgoyne, Whiteley, and Hutchinson (2013) examined the reading comprehension performance of EAL and EL1 children in Year 3 using both a standardised measure of reading comprehension and an experimental measure. For the experimental measure, children were explicitly taught the relevant background information, that is, information about the people, places, and objects in the story prior to reading the text and answering the comprehension questions. The results revealed that the EAL and EL1 children had comparable scores on the inferential questions, i.e., the questions that required the children to draw on their (explicitly taught) background knowledge. However, the EAL children scored significantly lower than the EL1 children on questions that required the literal extraction of the answer from the text as well as the questions that required the correct interpretation of a simile. The authors suggest that the language group differences may reflect differences in their abilities to take into account and use contextual cues when producing their answers to the comprehension questions, and/or it may reflect differences in the ability to monitor their understanding. In terms of the incorrect interpretations of the similes, the EAL children were able to accurately identify aspects of the target concept, however they failed to take the wider context of the story into account, thus arriving at an incorrect or incomplete answer. The authors therefore suggest that EAL children may either be less likely to recognise the discrepancy between the context of the story and their own interpretation, or that they are aware of this incongruity but have limited knowledge and/or resources to resolve it. Ultimately, the study suggests that EAL children's reading comprehension difficulties extend beyond the disadvantages resulting from the differences in background knowledge per se.

The discussion of the aforementioned studies has focused on the reading comprehension outcomes, however, these studies also assessed vocabulary knowledge, and in line with the language group difference that emerged for reading comprehension, the studies demonstrate that EAL children also have significantly weaker vocabulary knowledge relative to EL1 children (Burgoyne, Whiteley & Hutchinson, 2011, 2013; Hutchinson et al., 2003). Furthermore, Burgoyne, Kelly, Whiteley and Spooner (2009) attest that EAL children's weak vocabulary knowledge is largely responsible for their reading comprehension difficulties. In this study examining Y3 EAL and EL1 children, they demonstrate that EAL children have weak comprehension in spoken as well as written language, and the authors emphasise the important part that vocabulary knowledge has to play in both reading and listening comprehension outcomes. In a series of regression models, they found that receptive vocabulary was a significant predictor of reading comprehension for the EL1 children but expressive vocabulary was a significant predictor for the EAL children.   Moreover, although receptive vocabulary did not reach statistical significance as a predictor of reading comprehension for the EAL children, it made a greater contribution to reading comprehension than it did for listening comprehension. Taken together the results indicate that the command of language needed for written and spoken comprehension differs but also that the differences between EAL and EL1 children's level of vocabulary impacts their ability to draw upon this knowledge when formulating their response to comprehension questions. These findings highlight the need to examine the different dimensions of vocabulary knowledge of EAL children in further detail; employing a range of vocabulary measures may help to further unpick whether there are any specific aspects of vocabulary that EAL children find particularly challenging and whether these feed into reading comprehension. Additionally, it is of theoretical and empirical interest to examine the developmental trajectory of these skills and how this compares to the typical trajectory of EL1 children's development in order to capture a more nuanced understanding of language development in this population.

Babayigit (2014) examined the oral language skills of EAL and EL1 children using a measure of receptive vocabulary, sentence repetition and verbal working memory; much as expected an EL1 advantage on the oral language measures was observed. Importantly, the study highlights that these differences are present after 4 years of schooling, thus suggesting that the gap between EAL and EL1 children's English language abilities is persistent in the primary school years despite formal instruction in English throughout that period. It was additionally demonstrated that when oral language ability is controlled, differences in reading comprehension no longer emerged, highlighting the centrality of oral language skills in their contribution to reading comprehension, and further demonstrating that the different dimensions of oral language that underpin reading need to be examined in further detail for children learning EAL.

While the UK based research discussed here demonstrates a clear pattern of findings, the discussion of previous research will briefly turn to international studies to review the reading profiles of language-minority learners further afield.

1.2.2 The Reading Profiles of Language-Minority Learners: International Research

The term language-minority learner, in this thesis, refers to children who speak a minority language at home and receive instruction in school in the majority language, much like EAL children in the UK. Unless otherwise stated, this term will be used regardless of the original wording in the study, for the purposes of consistency and coherence.

Melby-Lervåg and Lervåg (2014) conducted a meta-analysis of studies that had examined reading comprehension and the components that underpin this process. Specifically, the meta-analysis included studies that had explored the group differences found between monolingual learners (of various majority languages) and second-language learners on measures of decoding, phonological awareness, language comprehension and reading comprehension (second-language learner is used when discussing this meta-analysis as it included a small number of studies in which children experienced relatively balanced language environments, e.g., Spanish-English speakers in dual immersion programmes in the U.S., and French-English bilingual speakers in Canada). Studies with participants of a sample mean age younger than 18 were included in the meta-analysis and the final number of studies eligible for inclusion was 82. In their examination of reading comprehension outcomes, they demonstrated that the overall mean effect size for language group differences was moderate in favour of monolingual learners (d = -0.62). Similarly, the overall effect size of language group differences for language comprehension outcomes was large (d = -1.12) in favour of monolingual learners. For phonological awareness, a language group difference was observed again with a monolingual advantage, though this was negligible (d = -0.08). Likewise, and in the same direction, small effect sizes were reported between language groups for decoding (d = -0.12). The overarching findings of this meta-analysis reflect the typical pattern of literacy skills observed with EAL and EL1 children in UK based research. That is, the language-minority learners notably underperform on measures of reading comprehension and language comprehension relative to the monolingual speakers. Of course, between studies, there was large variation in factors that are related to reading comprehension outcomes, e.g., age, socioeconomic status (SES), similarities between languages and the types of tasks employed to assess reading comprehension, and as such further analyses examined some of these factors in greater depth.

Somewhat predictably, reading comprehension tasks that involved open-ended questions yielded greater effect sizes for language group differences than multiple choice tasks. However, the tasks that employed open-ended questions were the comprehension tasks that used passages of text and the tasks that employed multiple choice questions were the comprehension tasks that used single sentences; thus, conflating length of text read and question type. This confound makes it difficult, therefore, to tease apart whether second-language learners are more competent at answering multiple choice questions over open-ended questions or whether they are simply better able to answer questions from single sentences than from passages. Longer texts may contain more complex plots and therefore use a more extensive range of language when compared to single sentences, and as such a certain level of language knowledge is required to guarantee comprehension, however it is less clear how monolingual children and second-language learners would compare on passages of text followed by multiple choice questions. Arguably, question type and text length involve dissociable skills, though this seems to be seldom addressed, i.e., it is plausible that some second-language learners may comprehend written passages but lack the productive language skills required to communicate answers to open-ended questions accurately. Understanding where the difficulty lies within the process of reading → comprehending → re-telling, for second-language learners, and language-minority language learners alike, would inform theoretical understandings of L2 literacy acquisition in this population, but equally importantly could help to ameliorate reading comprehension problems that typically emerge; as such it is important to consider the demands and requirements of any given task.

In line with this, additional findings from the meta-analysis relating to language comprehension are of note. As stated above, the overall effect size of language group differences for language comprehension outcomes was large (d = -1.12) in favour of monolingual learners. Melby-Lervåg and Lervåg (2014) further report that the studies involving children, either from low socio-economic backgrounds or from home environments in which the L1 is used exclusively, were the studies that generated the largest language group differences, again in favour of monolingual children. To elaborate, they found a smaller language group difference in language comprehension when children were from a middle or high SES home than from a low SES home. Previous literature suggests that children of high SES parents have accelerated rates of language growth because they are exposed to rich language environments and are engaged in more elaborate, contingent conversations (Hart & Risley, 1995; Hoff, 2006). The results suggest then that language-minority children from low SES backgrounds are likely to be at a greater risk of underachieving in their L2 language skills than monolingual children of comparable SES. Additionally, and perhaps unsurprisingly, language-minority learners who use their L2 more frequently in the home environment have stronger L2 language comprehension skills. Together, the findings highlight the importance of the home language environment in predicting L2 language comprehension outcomes. Moreover, language comprehension was found to predict 30% of the variance in reading comprehension and the influence of language comprehension on reading comprehension outcomes increased with age. These findings emphasise the importance of language knowledge thereby emphasising the need to reduce the language disparities between monolingual learners and second-language learners in order for the prospect of comparable reading comprehension outcomes to be achievable.

With that said, it is necessary to acknowledge that this meta-analysis did not take into account, or rather it did not include studies that had taken into account, the L1 abilities of second-language learners. The holistic view of bilingualism (Cook, 1992, 2002; Grosjean, 1985, 2001) would argue that when emerging bilingual children are not understood as bilinguals, their language abilities are largely underestimated. For example, children learning two languages may have distributed vocabulary knowledge across their languages but if assessed only in one of their languages, it is likely that this inaccurately reflects their overall vocabulary knowledge (Bialystok, 2009; Oller, Pearson, & Cobo-Lewis, 2007). Within much of the language-minority research, this is primarily a methodological issue rather than a lack of understanding regarding the nature of bilingualism. That is, many educational contexts are comprised of children speaking an abundance of L1s and as such it is an inherently complex task to assess these languages in a systematic, comparable and reliable way. Furthermore, while this component of a language-minority learner's development should not be undervalued, much of the research examining the L2 skills of language-minority children has arguably been carried out with the intention of informing practice, and as such it is the skills of the majority language that are most frequently assessed. While there is no disputing the exigencies of assessing children's L1 language skills, L2 language outcomes are consistently reported as a weakness for language-minority learners, and given that the L2 is typically the language in which children are assessed throughout their education and thus the language in which they will receive formal qualifications, it is of practical value to understand the acquisition and development of L2 language and literacy skills.

Much as demonstrated in Melby-Lervåg and Lervåg's (2014) overarching findings, the international literature largely demonstrates that language-minority learners have comparable phonological and word reading skills to their monolingual counterparts (Chiappe & Siegel, 1999; Lesaux, Geva, Koda, & Siegel, 2008; Nakamoto, Lindsey, & Manis, 2007; Snow, Burns, & Griffin, 1998; Verhoeven, 2000) but have poorer language and reading comprehension skills (Aarts & Verhoeven, 1999; Carlisle, Beeman, Davis, & Spharim, 1999; Droop & Verhoeven, 1998, 2003; Garcia, 1991; Geva, 2000; Kieffer & Vukovic, 2013; Lervåg & Aukrust, 2010; Lesaux, Crosson, Kieffer, & Pierce, 2010; Mancilla-Martinez & Lesaux, 2011; Manis, Lindsey, & Bailey, 2004; Nakamoto et al., 2007; Páez, Tabors, & López, 2007; Proctor, Carlo, August, & Snow, 2005; Raudszus, Segers, & Verhoeven, 2018; Scruggs, Mastropieri, & Argulewicz, 1983; Swanson, Sáez, & Gerber, 2006; Verhallen & Schoonen, 1993, 1998; Verhoeven & van Leeuwe, 2012).

In order to look at children's development longitudinally, Verhoeven (2000) examined the language and literacy skills of language-minority children (mixed L1s) and monolingual Dutch-speaking children from the beginning of first grade (mean age 6;8 months) to the end of second grade. The results revealed significant language group differences on measures of vocabulary knowledge in favour of the Dutch monolingual learners in Grade 1. By the end of Grade 2, however, the author reports that this gap had narrowed. While this is a potentially promising finding in terms of language-minority learners' language development, Verhoeven (2000) notes that the language-minority children did indeed continue to have weaker vocabulary knowledge relative to the monolingual children, but importantly that this perceived narrowing of the gap may be explained by the ceiling effects found for the monolingual learners.

Consistent with this explanation, findings from Droop and Verhoeven (2003) show that language-minority learners (*N* = 122) in third grade learning Dutch (Moroccan participants with L1 Moroccan Arabic (n = 25) or L1 Berber (n = 35), mean age 8;10 months; Turkish participants with L1 Turkish (n = 62), mean age 8;11 months) had much poorer vocabulary knowledge than the Dutch-monolingual learners (*N* = 143; mean age 8;7 months). Further, from the beginning of third grade to the end of fourth grade, the vocabulary gap between the language groups (language-minority learners and Dutch-monolingual) had in fact widened. In a further longitudinal study examining older children still, Jean and Geva (2009) found that language-minority children (mixed L1s; age 10;10 months) began the fifth grade with lower levels of vocabulary knowledge than the EL1 children (age 10;8 months) and that this gap remained stable by the sixth grade on a measure of receptive vocabulary but increased on a measure of root word meanings. Thus, this demonstrates that the vocabulary disparities between language groups extends beyond the first few years of schooling. While there are some inconsistencies in these longitudinal findings, the results largely suggest that language-minority learners underperform relative to their monolingual peers on measures of vocabulary knowledge, and that the achievement gap between the two groups is upheld over time. These studies report different ages, different languages, and use varied measures, and as such the lack of consistency between these variables is a factor worth noting. However, despite the variation, the results consistently demonstrate a vocabulary weakness for language-minority learners.

Vocabulary knowledge is well-established as a predictor of reading comprehension for second-language learners (August & Shanahan, 2006; Droop & Verhoeven, 2003; Kieffer, 2012;

Lervåg & Aukrust, 2010; Lesaux et al., 2010; Lesaux, Rupp, & Siegel, 2007; Limbird, Maluch, Rjosk, Stanat, & Merkens, 2014; Proctor, August, Carlo, & Snow, 2006) and further research has suggested that a reciprocal relationship between vocabulary knowledge and reading comprehension exists (Grabe, 2009; Koda, 2005; Stanovich, 2000), which in part is explained by the fact that new vocabulary is primarily acquired through the process of reading (McGregor, 2004; Nagy, 2007; Nagy & Scott, 2000). Thereby making the weaknesses reported in language-minority learners' vocabulary knowledge a concern and this further supports the notion that the dimensions underpinning vocabulary knowledge require further attention.

The international body of research (largely findings from North America and The Netherlands) mirrors the reading profile found in UK based research, that is, language-minority learners tend to have weaker reading and language comprehension relative to monolingual children of the same age despite adequate phonological and word reading abilities. The international findings further highlight: the importance of considering the strengths and weakness of various measures employed to assess comprehension, e.g., passages of text or individual sentences; the importance of taking into account the role of children's SES and the home language environment; that further large-scale longitudinal research would help to inform the evidence base of typical developmental trajectories found in language-minority children's L2 language and reading development; and finally that vocabulary's role in reading comprehension warrants further exploration. Drawing on the reading profiles found in both the UK and international research, the following section discusses a key theoretical account of reading comprehension that has served as the foundation on which the existing findings have been understood and the anchor from which the current study was conceptualised.

1.3 Theoretical Approaches to Reading Comprehension

Given the importance of reading as an educational goal and societal gateway, it is of little surprise that the study of reading development has an extensive and colourful history (Burkart, 1945; Gates, 1927; Gray, 1960; Huey, 1908) and that there is strong public interest on how children can most effectively be taught to read (Castles et al., 2018). Despite the long-held scholarly and public interest in reading acquisition, individual differences in reading outcomes are wide (Bowey, 2005; DfE, 2018; Kwiatkowska-White, Kirby, & Lee, 2016) and it is therefore of theoretical and educational interest to understand the processes that underpin its development. Though the primary aim of this research study is not to empirically evaluate the merit and contribution of any given theoretical model or framework of reading comprehension, this section of the literature review will discuss the key framework that influenced and informed the current study.

1.3.1 The Simple View of Reading

Reading comprehension is a multidimensional skill and despite the seemingly effortless endeavour of successfully extracting meaning from written text in skilled adult readers, reading comprehension involves considerable cognitive resources, knowledge of language, literacy skills and background knowledge. Consequently, understanding and explaining the process of reading is a complex task. The extent of the complexity has long been acknowledged in the literature (e.g., Kintsch & Van Dijk, 1978; Lipson & Wixson, 1986), but there is yet to be a model of reading that captures this process in its entirety. It is important to be clear what is meant by the potentially ambiguous concept of reading; there are theories of word reading as well as theories of reading comprehension and these differ in that they are attempting to capture either how print is transformed into speech or how print is transformed into meaning. Given the nature of this study, this section focuses on the theoretical explanations of reading comprehension and as such the Simple View of Reading (SVR; Gough & Tunmer, 1986), a framework which was important in the conceptualisation of the study, will be discussed. The discussion involves highlighting both the framework's strengths as well as its shortcomings and as such, a number of additional theoretical perspectives relevant to the process of reading comprehension will be presented.

The SVR was published at a time when the *phonics* approach to teaching children to read did not have the quality and scope of scientific evidence to support it that it does today, and as such the *whole-language* approach was very much at the forefront of reading instruction; thus, the

SVR was, to some extent, an attempt to bring the two together by highlighting that the skills underpinning both approaches are both important for successful reading comprehension but that neither one is sufficient independently (Gough & Tunmer, 1986). The framework proposes that successful reading ability is the outcome of two skills; decoding and linguistic comprehension. The two components are weighted with equal importance but recognised as independent processes underpinned by different skills. Decoding is identified as the ability to access information regarding how a word sounds; Gough and Tunmer (1986) emphasised that words should be read quickly and accurately. However, there has been some degree of discrepancy in the interpretation of this component; i.e., whether decoding is sight word reading/orthographic processing or whether it is the ability to sound out words. While Gough and Tunmer emphasised that the decoding of words needed to be quick and accurate, their position was that word reading should be built on a foundation of understanding the grapheme-phoneme correspondence found in alphabetic scripts and as such their interpretation and description of decoding sits somewhere between the two. That is, successful decoding is not sounding out the individual phonemes but translating whole words effortlessly and rapidly into their phonological form. Linguistic comprehension, on the other hand, involves the ability to take word meanings and to successfully process, comprehend and interpret sentences and discourse (Hoover & Gough, 1990). The multiplicative nature of the framework suggests that an individual must master both components in order to achieve success in reading comprehension.

It follows then, that the SVR has been useful in conceptualising specific reading difficulties; that is, children with poor reading comprehension must have weaknesses in either their decoding skills, their linguistic comprehension, or indeed both. For example, children with developmental dyslexia can typically be characterised as having decoding difficulties, but age-appropriate levels of language comprehension, whereas children demonstrating the opposite pattern, i.e., intact decoding skills but difficulties with language comprehension, can be identified as poor comprehenders (Nation, Clarke, Marshall, & Durand, 2004; Nation & Norbury, 2005). These profiles of reading difficulties support the SVR's position that decoding and linguistic comprehension are related but dissociable components.

Although the SVR remains an influential framework within the research in reading, it is has been proposed that this model is somewhat incomplete (Chen & Vellutino, 1997; Chiu, McBride-Chang, & Lin, 2012; Hoover & Gough, 1990; Kirby & Savage, 2008). Firstly, researchers have argued that the SVR does not explore the ways in which decoding and language comprehension may impact reading comprehension at different phases of development (Francis, Fletcher, Catts, & Tomblin, 2005; Storch & Whitehurst, 2002). Further research has consistently documented that the relative contribution of the two components changes over time; that is, decoding is the stronger predictor of reading comprehension among younger children and language comprehension becomes more predictive of reading comprehension for older children once the decoding component has been mastered (Adlof, Catts, & Little, 2006; Chen & Vellutino, 1997; Foorman, Koon, Petscher, Mitchell, & Truckenmiller, 2015; García & Cain, 2014; Vellutino, Tunmer, Jaccard, & Chen, 2007). The curriculum in the UK coincides with this shift, in that the vocabulary, grammar, and discourse demands of reading materials also increase once children have become competent decoders. Thus, emphasising the importance of mastering the decoding component.

Secondly, while research examining the SVR has demonstrated that much of the variance in reading comprehension can be explained by individual differences in decoding and language comprehension (Adlof et al., 2006; Catts, Hogan, & Adlof, 2005; de Jong & van der Leij, 2002; García & Cain, 2014; Hoover & Gough, 1990; Sabatini, Sawaki, Shore, & Scarborough, 2010; Tilstra, McMaster, Van den Broek, Kendeou, & Rapp, 2009) with percentages ranging from 45-90%, the SVR does not explicitly identify the subcomponents involved, and thus, essential skills that underpin the ability to comprehend written language are overlooked. The nature of the language skills that lay the foundations for successful linguistic comprehension, for example, are not specified. While Gough and Tunmer, and subsequent papers, have discussed and identified the skills that underpin decoding, e.g., phonological awareness, rapid automatized naming and letter knowledge (Hulme, Bowyer-Crane, Carroll, Duff, & Snowling, 2012; Kendeou, Savage, & Van den Broek, 2009; Lonigan et al., 2009; Lonigan, Burgess, & Anthony, 2000; Muter, Hulme, Snowling, & Stevenson, 2004; Tunmer & Hoover, 1992), their original paper did not identify the skills that underpin the broad construct of language comprehension. Further research has, however, identified vocabulary and grammar as important prerequisites for this component (Catts, Herrera, Nielsen, & Bridges, 2015; Kendeou, Van den Broek, White, & Lynch, 2009; Muter et al., 2004; Oakhill & Cain, 2012; Oakhill, Cain, & Bryant, 2003; Ricketts, Nation, & Bishop, 2007; Storch & Whitehurst, 2002). Thus, it is clear that while the SVR is useful in demonstrating the components of reading that are integral for successful reading comprehension, its simplicity does not explicitly capture the contribution and interaction of these components. Similarly, the separation of the two components fails to represent reading as a multi-level interactive process. That is, as a reader decodes, understands and takes meaning from individual words, the meanings of whole sentences are comprehended with links being made across successive sentences while the reader simultaneously accesses their general knowledge in order to make sense of what is being read. The SVR fails to capture this process and has been critiqued for its inherent simplicity (Kirby & Savage, 2008).

Further research has thus contended with the issue that the SVR may need expanding, i.e., additional factors that can explain unique variance in the prediction of reading comprehension over and above decoding and linguistic comprehension may add value to the framework if incorporated. A number of researchers have intermittently proposed that the addition of various constructs may help to improve the validity of the framework, including but not limited to: reading fluency, working memory/executive function, motivation and text-level variables (Conners, 2009; Francis, Kulesz, & Benoit, 2018; Guthrie, Wigfield, Metsala, & Cox, 1999; Johnston & Kirby, 2006; Kershaw & Schatschneider, 2012; Kirby & Savage, 2008; Sesma, Mahone, Levine, Eason, & Cutting, 2009). These avenues of research have demonstrated a unique contribution of the additional skills to reading comprehension, albeit to a greater or lesser extent, but nonetheless have demonstrated that the SVR is oversimplified, perhaps deliberately so.

An aspect of the SVR that is of note is that much of the research that has examined the validity of the SVR has been carried out with speakers of English. As Georgiou, Das and Hayward

(2009) argue, it is important that frameworks of reading are tested across languages to understand whether they are language specific or whether they are generalisable to other languages. Subsequent research has demonstrated that the SVR is applicable to other alphabetic scripts, such as Dutch (e.g., de Jong & van der Leij, 2002), Greek (e.g., Protopapas, Simos, Sideridis, & Mouzaki, 2012), Italian (e.g., Tobia & Bonifacci, 2015) and non-alphabetic scripts, such as Hebrew (Joshi, Ji, Breznitz, Amiel, & Yulia, 2015) and Chinese (Ho, Chow, Wong, Waye, & Bishop, 2012) as well as to bilingual populations learning to read in a second language (Bonifacci & Tobia, 2017; Verhoeven & van Leeuwe, 2012).

The research examining alphabetic scripts has highlighted that the relative influence of decoding and linguistic comprehension on reading comprehension is dependent on the transparency of the orthography of the language in question. That is, decoding continues to be predictive of reading comprehension for an extended period of time in scripts with deeper, more opaque orthographies (e.g., Joshi et al., 2015), whereas in more transparent orthographies, the contribution of linguistic comprehension tends to be reported at an earlier stage (de Jong & van der Leij, 2002). Additionally, decoding fluency has been found to be more predictive of reading comprehension than decoding accuracy in more transparent orthographies than English (Florit & Cain, 2011). Given the highly predictable correspondences between graphemes and phonemes in transparent orthographies, the accurate reading of words is acquired relatively quickly, thus Florit and Cain (2011) argue that decoding measures should be sensitive to the properties of a language's orthography. Nonetheless, they maintain that their meta-analysis broadly supports the SVR. Thus, overall, it is largely accepted that the SVR is applicable to readers of languages and orthographies beyond English and to speakers of multiple languages including language-minority learners.

A recent longitudinal study examining Norwegian-speaking monolingual children demonstrates that when the interaction and curvilinear effects of decoding and language comprehension are taken into account in addition to their independent contribution, 99.7% of the variance in reading comprehension can be explained (Hjetland et al., 2018). This study examined children in the early stages of reading (mean age 4;2 months at the beginning of the study) through to an age at which decoding skills should be acquired and thus the role of language comprehension begins to play a more predictive role (the children were age 9 by the final timepoint). The findings are not necessarily generalisable to older children who experience more complex texts, i.e., more complex grammatical structures, higher prevalence of morphologically complex words and the inclusion of more abstract vocabulary. Moreover, the children were monolingual speakers of Norwegian; a language which has a more transparent orthography than English, and as such the role of decoding may differ and thus change the extent to which decoding and language comprehension interacts and/or uniquely contributes to reading comprehension. Aptly, other research has argued that incorporating additional processes into the framework is unnecessary given that decoding and linguistic comprehension explain most of the variance in reading comprehension (Lonigan, Burgess, & Schatschneider, 2018). Thus, the role of additional constructs in reading comprehension outcomes within the context of the SVR remains an ongoing area of research debate.

Though the SVR is not without its limitations, it is important to acknowledge that, in its earliest conception, the SVR was not intended as a complete theory of reading (Tunmer & Chapman, 2012), rather, against the backdrop of the *reading wars* i.e., the *whole-language* approach vs the *phonics* approach, it was to specify that two independent components were required for a reader to successfully extract meaning from text and that weaknesses in either component would result in a failure to do so. Accordingly, this thesis aims to examine the two broad components of the SVR among EAL and EL1 children, whose reading achievements in the final year of primary school are of significant difference (Strand et al., 2015). Since the SVR framework does not explicitly specify the skills that underpin the linguistic comprehension component, coupled with the need for further research to examine the different dimensions of vocabulary knowledge, this thesis will explore further theoretical approaches to reading acquisition that will help to expand on the language component of the SVR.

1.4 The Language Component of the SVR

It is well documented within the literature that once readers have acquired good word reading skills, the relationship between language comprehension and reading comprehension becomes more closely aligned (Adlof, Catts & Little, 2006; Hoover & Gough, 1990; Tilstra et al., 2009). As discussed in the previous section the processes underpinning language comprehension are not explicitly specified in the SVR and as such are open to interpretation. With this, however, an inconsistent understanding of the dimensionality of language comprehension has transpired; namely whether oral language ability is a separable construct to listening comprehension. Oral language encompasses a number of skills and typically studies include measures of expressive and receptive vocabulary knowledge, knowledge of morphemes, syntactic knowledge and conceptual knowledge (Beck, Perfetti, & McKeown, 1982; Bowey, 1986; Clarke, Snowling, Truelove, & Hulme, 2010; Kim, 2015; Lervåg & Aukrust, 2010; Perfetti, 1985; Protopapas, Mouzaki, Sideridis, Kotsolakou, & Simos, 2013; Roth, Speece, & Cooper, 2002; Sénéchal, Ouellette, & Rodney, 2006). Listening comprehension, on the other hand, is typically assessed by measuring children's ability to listen to, comprehend, and answer questions following spoken passages. While this type of task is reliant on the above oral language skills, listening comprehension tasks are higher on memory load in comparison to oral language tasks. That is, there are more complex syntactic structures found in written language relative to spoken language and learners must draw on their inferential skills in order to successfully comprehend spoken passages (Florit, Roch, & Levorato, 2011).

There is some suggestion that both constructs (oral language skills and listening comprehension) load onto a single language factor, particularly for younger children (LARRC, 2017; Tomblin & Zhang, 2006; Tunmer & Chapman, 2012), though there are studies that suggest otherwise, e.g., studies have demonstrated that listening comprehension accounts for additional variance in reading comprehension, over and above the variance explained by vocabulary knowledge (Nation & Snowling, 2004), or have defined components of oral language and listening comprehension as separate constructs in models of literacy (Kim & Philips, 2014). Furthermore, some researchers recognise oral language, particularly vocabulary knowledge, as the foundation on which listening comprehension is developed, suggesting that vocabulary knowledge is predictive of listening comprehension outcomes (Hogan, Adlof, & Alonzo, 2014; Lepola, Lynch, Laakkonen, Silvén, & Niemi, 2012; Silva & Cain, 2015), whereas others place listening comprehension within the wider construct of oral language (Foorman, Herrera, Petscher, Mitchell, & Truckenmiller, 2015; Kendeou, Van den Broek, White & Lynch,, 2009). Needless to say, there is some variability in the way that language comprehension is operationally defined.

In line with Hoover and Tunmer (2018) it is understood that language comprehension is the ability to understand spoken language, and that this is multi-faceted much like reading comprehension itself. Understanding the meaning of words, i.e., vocabulary knowledge, is clearly a necessity in the processes of successful comprehension (Wagner, Muse, & Tannenbaum, 2007) and as such it holds that vocabulary knowledge has received much of the attention in the reading acquisition literature (Lervag, Hulme, & Melby-Lervåg, 2018). However, Hoover and Tunmer (2018) suggest that if language comprehension is assessed solely by one assessment, e.g., receptive vocabulary knowledge, then only a subset of skills required for successful language comprehension is being assessed. Accordingly, this thesis takes the view that for language comprehension to be understood holistically, multiple measures of language must be employed, this includes examining vocabulary, grammar, and listening comprehension skills. The main purpose of this study is not to empirically evaluate the extent to which aspects of language comprehension are correlated, instead it is of interest to examine whether any aspects of language comprehension are particularly problematic for children learning EAL, with the aim of gaining a deeper understanding of how this may impact their reading comprehension.

While it is recognised that going beyond a single measure of vocabulary knowledge is important in understanding children’s language comprehension skills more broadly, the importance of vocabulary knowledge as an individual construct should not be undervalued. Given that EAL children typically enter formal schooling with less developed vocabulary knowledge in English than EL1 children (Cameron, 2002; Mahon & Crutchley, 2006), it seems logical to predict that as a consequence of having less well-developed vocabulary knowledge and less continuity in lexical development (i.e., knowledge about words is divided between two or more languages for EAL children), EAL children may have additional difficulties with reading comprehension. One theoretical explanation supporting this is that of the Lexical Quality Hypothesis (LQH; Perfetti, 2007). The LQH suggests that skilled reading is dependent on high quality representations of words. Perfetti suggests that the extent to which a word's mental representation can activate a given word's spelling, sound and meaning, determines the quality of the representation. This hypothesis is of interest as it highlights that the quality of lexical representations can be both a cause and a consequence of differences in reading abilities. This may be helpful in understanding the differences between the reading comprehension process of EAL and EL1 children. That is, the differences in lexical quality can lead to differences in processing, and differences in processing can help or hinder the opportunity to acquire further knowledge, and the extent to which further knowledge is acquired determines whether existing lexical representations are able to be further attuned. Though the mechanisms that underpin the modifications to the lexical representations are not specified, the hypothesis is useful in highlighting the importance of the reading process itself in developing lexical representations.

Furthermore, as postulated in Levelt's (1989) model of vocabulary acquisition in L2, an important feature of lexical representations is that different types of information (semantics/syntax/morphology/ phonology/orthography) must be highly integrated within each lexical entry, such that all types of information become available once the lexical entry is activated. Research examining the lexical knowledge of Turkish L1 speaking children learning Dutch as an Additional Language in The Netherlands found that these children produced fewer Dutch words and offered less varied meanings relative to their Dutch-speaking monolingual peers (Verhallen & Schoonen, 1993, 1998). Furthermore, and of particular interest, this research found that the language-minority children had less varied knowledge in their L1 (Turkish) relative to their L2 (Dutch). This thereby demonstrates that the language-minority children had a deeper L2 lexical knowledge relative to their L1 lexical knowledge but that this L2 development was weaker than that of the monolingual children of comparable age and years of schooling. Thus, for language-minority learners there may be additional constraints in the lexical development of their L2 (i.e., the majority language). The authors suggest that the lack of an established conceptual/semantic system in the L1 lexical system may inhibit the extent to which gaps in the L2 lexical knowledge can be filled. This research highlights that language-minority learners are faced with the complex task of building high quality lexical representations and navigating this between two languages.

The quantity and quality of lexical knowledge that language-minority children are exposed to is divided between two languages; the integration of the different types of information for each lexical entry is therefore inherently more complex. When considering EAL children then, it is plausible that there may be a difference in the quality of the representations of lexical knowledge between EAL and EL1 children. In support of this supposition, the Lexical Legacy Hypothesis (Nation, 2017) posits that words occur in meaningful contexts and experiencing words in diverse and varied meaningful contexts allows lexical representations to be updated. Thus, emphasising the importance of language environments and reading experiences in the quality of words' representations. Considering EAL children's language environments are divided between two languages, the Lexical Legacy Hypothesis provides a further explanation by which EAL children may have weaker lexical representations than EL1 children.

Given that the quality of a lexical representation concerns the extent to which multiple aspects of a word is known (pronunciation, phonological integrity, meaning and pragmatics), lexical quality links to both components of the SVR. That is, phonology and pronunciation are reciprocally linked to decoding acquisition, and meaning and pragmatics are more closely aligned with language knowledge. Given that language-minority children largely demonstrate adequate decoding, the aspect of lexical quality that is of interest and will be considered in further detail is in the acquisition of meaning. This aspect of lexical quality is arguably closely aligned with the concept of vocabulary depth. A distinction is made in the literature between two dimensions of vocabulary knowledge, that is, vocabulary breadth and vocabulary depth.

Anderson and Freebody (1981) were of the first to consider vocabulary knowledge in this way; breadth is concerned with the number of words a person knows while depth considers how well these words are known. However, there are some disagreements in the literature concerning the extent to which breadth and depth are indeed separable constructs with reports of high correlations (r = .70 - .85) between the two (Qian, 1999, 2002; Vermeer, 2001), and some suggestion that they may be better viewed as two dimensions of the same entity (Li & Kirby, 2014). Regardless of how vocabulary knowledge is conceptualised, it is often assessed using only a single measure. Largely, studies measure vocabulary using a test of breadth, i.e., a receptive vocabulary measure, which is generally accepted as an appropriate proxy for vocabulary knowledge and/or oral language ability (Kieffer & Lesaux, 2008; LARRC, 2017; Li & Kirby, 2014). However, it is argued here that this overlooks the multi-dimensional nature of vocabulary knowledge.

Unlike vocabulary breadth, the assessment of vocabulary depth is a much less consistent research area, in that, studies have used a range and variety of measures to tap depth of vocabulary knowledge. Some researchers have considered vocabulary depth to be the extent to which lexical networks have been established, and as such emphasise the knowledge of word meanings and collocations (Haastrup & Henriksen, 2000; Meara, 1996; Qian, 1999, 2002; Read, 2004). Other researchers have highlighted the importance of morphological awareness and its ability to integrate aspects of word meaning with orthography and phonology, and as such tasks of morphological knowledge have been administered (Bowers & Kirby, 2010; Kieffer & Lesaux 2008; Perfetti 2007; Proctor, Uccelli, Dalton, & Snow, 2009; Qian 1999, 2002). Additionally, other studies have considered how words can be used in different contexts (Beck, McKeown, & Kucan, 2002; Tannenbaum, Torgesen, & Wagner, 2006). The extensive ways in which depth has been operationalised in part may stem from the lack of a clear theory-driven definition of vocabulary depth, combined with the complexity involved with assessing the various ways in which a word can be known.

Li and Kirby (2014) examined the vocabulary breadth and vocabulary depth of eighth grade children enrolled in English-immersion programmes in China (mean age 13;5 months) and assessed the contribution of both vocabulary dimensions to reading comprehension. Depth was assessed using a word definitions task, a multiple meaning vocabulary task and a morphological awareness task, and breadth was assessed using the Gates-MacGinitie vocabulary subtest in which participants are asked to select an answer from a choice of four that most closely aligns to the meaning of a target word; the target word is embedded within a sentence or phrase. Their results revealed a couple of noteworthy findings. Firstly, the authors examined the extent to which the two constructs were related. They reported the correlation between breadth and depth to be moderate (r = .51), and significant (p < .01). With that, the authors suggest that breadth and depth of vocabulary could perhaps be thought of as interconnected dimensions that develop in parallel and facilitate each other; that is, as the number of words a learner knows increases over time, learners become more able to develop lexical links between items, and thus increase their vocabulary depth.

The second interesting finding was in the prediction of reading comprehension. The authors included two measures of reading comprehension; the Gates-MacGinitie reading comprehension task that involves the reading of short passages followed by multiple choice questions, and an author-developed summary writing task of comprehension knowledge which involved the reading of a short passage followed by a short-written summary of the main ideas in the text – summaries were scored for the number of correctly identified main ideas. Interestingly, the results revealed that vocabulary breadth was the stronger predictor of the Gates-MacGinitie reading comprehension task and vocabulary depth was the stronger predictor of the written summary comprehension task, thus, suggesting that a deep understanding of word meanings is needed in order to comprehend and communicate the meaning of more complicated texts. Participants in this study were of an age that the written summary was an age-appropriate task though it is less clear whether the same pattern of findings would emerge had there been open-ended comprehension questions following the passage. A written summary requires a relatively high level of productive language skills as well as relying more heavily on memory demands and narrative skills, which may further explain the predictive role of vocabulary depth for this task.

Information concerning the study sample is relatively limited in that the level of English ability is not documented, the only information is that participants receive 30% of their formal education in English, and as such it is difficult to determine the appropriateness of the tasks used. Additionally, proficiency in English and AoA may have an impact on the extent to which the two dimensions of vocabulary can be identified as separable constructs. That is, a certain level of vocabulary knowledge is needed for differences in breadth and depth to emerge, but equally, high levels of vocabulary knowledge may result in a narrowed distinction between the two dimensions. Given that breadth and depth are thought to interact and influence each other, a proficient speaker may know many words, and may know many words well. Therefore, the moderate correlation between vocabulary depth may differ with participants of varying language proficiencies and ages. Taken together the study demonstrates firstly, that researchers must carefully consider the reading comprehension tasks they employ in order to appropriately align the questions being asked with the requirements of the task, and secondly, that both breadth and depth of vocabulary knowledge contribute to reading comprehension - to varying degrees depending on the task requirements - for L2 learners.

This section has emphasised that language comprehension is multifaceted, comprising of oral language knowledge and listening comprehension abilities, each of which are underpinned by a further subset of skills. There is some suggestion that a learner’s knowledge of vocabulary can be understood using multiple measures, tapping into various dimensions of vocabulary knowledge. This thesis aims to extend the understanding of EAL learners’ language knowledge by employing measures beyond the typically used receptive vocabulary assessment, and to document how this compares to EL1 children’s language knowledge. While a relatively consistent reading profile emerges from the L2 literature, i.e., language-minority learners have comparable word reading skills to their monolingual peers but oral language skills are often significantly weaker, the research has focused less on examining multiple aspects of language comprehension, including the different dimensions of vocabulary knowledge, and their role in comprehension outcomes, particularly in the UK. Considering that language weaknesses can constrain a reader's capacity to comprehend written text, advancing the knowledge base of EAL children's English language skills and reading comprehension is warranted. The final section evaluates and summarises the existing literature that has examined the skills underpinning the broad constructs of the SVR, particularly their contribution to reading comprehension, in various populations of monolingual and bilingual children.

1.5 Predictors of Reading Comprehension

As guided by the SVR, the predictors of reading comprehension can be grouped into skills needed for successful decoding and skills needed for successful language comprehension. Largely the motivation for the comparison of skills between monolingual and language-minority learners stems from the fact that reading development in an additional language has been acknowledged as a challenging experience for children and as such it is possible that the development of reading comprehension may be qualitatively different for EAL children and EL1 children in the UK. Therefore, it is important to consider how the same processes and subskills compare and relate to reading comprehension, at various stages of development, for both groups of learners. While research further afield has demonstrated that literacy acquisition is likely to be underpinned by similar processes for both language-minority learners and monolingual learners (August & Shanahan, 2006), the relative strength of the contributions at different stages of development within populations of varying L1s has received less attention, equally, longitudinal comparisons of the language and cognitive processes of EAL and EL1 children in the UK is less well documented. Moving beyond the broad reading profiles of monolingual and language-minority learners, this section will briefly review the research examining the specific skills underpinning the two components of the SVR in order to demonstrate what is currently known and to contextualise the current study.

1.5.1 Decoding

It is well-established that decoding and reading comprehension are strongly associated; in a meta-analysis of 110 studies and over 420,000 readers, Garcia and Cain (2014) examined the relative importance of decoding skills to reading comprehension and reported that decoding and reading comprehension are related from childhood through to adulthood in readers of English, though the strength of the relationship changes at an early stage in literacy acquisition, that is, there is a decrease in the relationship with an increase in age. In other words, word reading (decoding) becomes less predictive of reading comprehension given that there is minimal variability in word reading skills beyond a certain age. It is important, however, that 'becoming less predictive' is not mistaken for 'no longer important', as such it is of value to reinforce that decoding is a non-negotiable prerequisite to reading comprehension.

As touched upon in section 1.3.1, the conceptualisation of decoding has been somewhat misleading in terms of the specific skills that underpin this process. Much as Gough and Tunmer (1986) proposed, successful decoding is recognised as the ability to accurately and fluently read words, however, and in line with behavioural models of reading acquisition (see Ehri, (2005) for a review), it is also acknowledged here that in alphabetic scripts, this is built upon an understanding of the relationship between letters (graphemes) and sounds (phonemes). As Frith's (1985) developmental model of reading suggests, children move from a logographic stage of attaching individual word labels to specific letter strings without understanding the relationship between graphemes and phonemes, to the alphabetic stage of identifying and using phonemic information to sound out and read words, and finally through to the orthographic stage where reading becomes increasingly automatic as connections between groups of letters and sounds become well formed. The understanding of decoding in this thesis, therefore, is that efficient word reading is built upon such a process.

With this understanding, decoding is often measured using assessments of word reading accuracy, phonological awareness and rapid automatised naming. Accordingly, this section will evaluate what is known about the role and importance of these skills for the development of reading comprehension in monolingual and bilingual children. The wider-reaching term *bilingual* is used in this section in reference to children growing up with two languages, more broadly. Contextual information will be addressed within the discussion of specific studies, but the literature was searched in such a way to obtain an overview of findings and to understand whether any typical findings emerge in the wider bilingual literature.

1.5.1.1 Word reading

A differentiation is made in the literature between word reading accuracy and word reading fluency. Accuracy is typically measured by examining the number of pronunciation errors made either in isolated single-word reading tasks (context-free) or during a passage(s) of text read-aloud (in-context); fluency, on the other hand, is concerned with the speed of accurate reading, again this can be measured using both context-free and in-context word reading tasks, but under time constraints (Fuchs, Fuchs, Hosp, & Jenkins, 2001). Beyond the ability to sound out the written form of a word, reading research has demonstrated that accurate word recognition often involves corresponding lexical activation (Perfetti, 1985; Stanovich, 1991). While decoding is widely identified as the ability to translate print into sound, the link between phonology/orthography and meaning has been acknowledged within the reading process (Seidenberg & McClelland, 1989). However, and in terms of the SVR, the activation of meaning is largely explained through the process of language comprehension. Thus, it is somewhat difficult to clarify, specifically, where decoding ends and language comprehension begins.

Connectionist models of reading, including the Triangle Model (Plaut, McClelland, Seidenberg, & Patterson, 1996) and the Dual Route Cascaded (DRC) Model (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001), attempt to capture this lexical activation by considering the different pathways that may be utilised during reading, and as such suggest that word-reading involves either a sub-lexical route, that is, mapping letters to sounds using learnt grapheme-phoneme correspondences, or a lexical route in which word units directly, and concurrently, activate the phonology corresponding to the stored lexical representation. These models help to explain how children can read non-words, that is, pseudo-words that will have never been seen before, e.g., *gobner* (sub-lexical route), and exception words, that is, words that cannot be accurately pronounced following a correct understanding of grapheme-phoneme rules, e.g., *sugar* (lexical route).

In line with this, studies examining word reading often employ tasks that assess non-word reading, exception word reading and regular word reading. Following the conceptualisation of connectionist models of reading, the correct pronunciation of a regular word could be accessed using either the lexical route or the non-lexical route. Indeed, studies have demonstrated that these categories of words (regular-, exception-, and non-words) are associated with different skills. For example, using a context-free measure, Nation and Snowling (2004) found that expressive vocabulary at age 8 significantly predicted exception word reading at age 12 in typically developing EL1 children. Similarly, Ricketts, Nation and Bishop (2007) demonstrated that the relationship between oral vocabulary knowledge was more strongly associated with exception word reading than regular word reading, again using a context-free measure with EL1 children. Additionally, Ricketts, Davies, Masterson, Stuart and Duff (2016) employed an in-context word reading task and found that sentence context facilitated exception word reading. There a number of possible mechanisms that may underpin this observed relationship, but in line with Share's (1995) self-teaching hypothesis, it is thought that children with a good vocabulary have a large bank of known words to draw on. This is useful for two reasons; firstly, children may know that the exception word when sounded out phonetically, is phonologically close to a word they already know. Secondly, the child may be relatively confident that the unusual sounding word that the exception word makes phonetically is not a real word, and thus must have an alternate pronunciation. Taken together, the studies support the notion that the relationship and/or interaction between lexical knowledge and different categories of word reading may account for individual differences in the accessibility of identifying and understanding word meanings during reading.

In a study examining the early language and literacy skills of EL1 children with language weaknesses and EAL children in the UK, Bowyer-Crane, Fricke, Schaefer, Lervåg and Hulme (2017) used a measure of word reading that assessed regular-, exception- and non-words; using a composite score of the three subscales, the authors report that the EAL children had stronger word reading skills than the EL1 children. Though there are multiple possible interpretations of this finding given the use of the composite score, the authors further demonstrate a phonological processing advantage of the EAL children, that is, the EAL children also outperformed the EL1 children on a measure of non-word repetition. The authors thus suggest that this could, in part, explain the word reading advantage of the EAL group. Given that EAL children typically have weaker vocabulary knowledge than EL1 children (See section 1.2.1; Burgoyne, Whiteley & Hutchinson, 2011, 2013; Hutchinson et al., 2003) and interpreting this within the parameters of a connectionist model, the findings may suggest that EAL children in the early stages of learning to read (as in this study) utilise and perhaps rely on a sub-lexical route to reading. However, further research would need to explore the differences between EAL and typically developing EL1 children in the different categories of word reading, and at different stages of development to understand and explain this further.

Word reading, as a skill underpinning and contributing to the overarching construct of decoding, is thus important to measure when considering the ways in which EAL and EL1 children's reading comprehension outcomes may differ. Given that older children may be more likely to be close to or at ceiling on a word reading task, it may be of added value to compare older language groups (EAL/EL1) on the different categories to determine whether word reading is underpinned by different subskills and is thus achieved following a qualitatively different route for the two groups.

1.5.1.2 Phonological awareness

Phonological awareness refers to an individual's awareness of the sound structure of words and their ability to manipulate and segment those sounds (Melby-Lervåg, Lyster, & Hulme, 2012). Largely, the literature differentiates between implicit phonological awareness, i.e., a sensitivity to the similarities between sounds, and explicit phonological awareness, i.e., a conscious manipulation of phonemes (Cunningham & Carroll, 2015); implicit phonological awareness is thought to begin before the onset of formal schooling, whereas explicit phonological awareness is thought to develop during the early school years (Gombert, 1992; Port, 2007).

The importance of phonological skills in the process of reading is well-established in the literature (Adams, 1990; Bryant & Goswami, 2016; Droop & Verhoeven, 2003; Fowler, Brady, & Shankweiler, 1991; Goswami & Bryant, 1990; Lindsey, Manis, & Bailey, 2003; Snowling, 2000; Wagner & Torgesen, 1987). Largely it is accepted that the relationship between learning to read and phonological awareness is reciprocal (Castles & Coltheart, 2004; Nation & Hulme, 2011; Wagner, Torgesen & Rashotte, 1994) though there have been inconsistencies concerning the contribution of phonological awareness to the various aspects of literacy acquisition. That is, research has demonstrated a direct influence of phonological awareness on word-level reading skills (Lerner & Lonigan, 2016; Wagner et al., 1997), yet the contribution to reading comprehension has been inconsistent; some researchers have reported that phonological awareness has little effect on reading comprehension outcomes (Coles, 2000; Krashen, 2000), others have demonstrated an indirect effect through its impact on word reading, (Cain, Oakhill, & Bryant, 2000; Muter et al., 2004; Vellutino et al., 2007) while others have found a direct effect over and above other cognitive and linguistic variables (Gottardo, Stanovich, & Siegel, 1996). The relationship between phonological awareness and reading comprehension is dependent upon a range of extraneous variables, including the measures employed within studies (both the phonological awareness tasks and the reading comprehension tasks), the age at which children are assessed, and the educational environment that children are exposed to. The fact that these variables are not consistent across studies may explain some of the discrepancies reported.

Despite the inconsistencies, and in line with the indirect and direct effects of phonological awareness on reading comprehension, research has demonstrated the positive impact of phonics instruction on word reading and reading comprehension outcomes (Bus & Van IJzendoorn, 1999; Connelly, Johnston, & Thompson, 2001; Ehri et al., 2001). Largely the effect of phonics instruction on comprehension outcomes is explained through children's increased ability to accurately and efficiently read words and passages of text. Thus, in line with the SVR, the results largely suggest that strong phonological awareness acts as a gateway to accessing written language, without entry through this gateway the opportunity to read for meaning is restricted. In other words, children need to accurately convert letters and words into sounds so that they are able to convert this into meaning, but phonological awareness does not underpin the process of extracting meaning from those words and thus as an isolated variable will not guarantee comprehension.

Much research has been carried out with monolingual children, though there is a growing body of research that has compared the phonological awareness skills of bilingual and monolingual children. Some research findings suggest that bilingual children have stronger phonological awareness skills than monolingual children (Campbell & Sais, 1995; Lesaux & Siegel, 2003; Marinova-Todd, Zhao, & Bernhardt, 2010; Roessingh & Elgie, 2009), whereas others report their skills to be comparable (Chiappe & Siegel, 1999; Chiappe, Siegel, & Wade-Woolley, 2002; Harrison et al., 2016; Jongejan, Verhoeven, & Siegel, 2007; Verhoeven, 2000). There are several differences across these studies including the language pairings of the bilingual children, the phonological awareness tasks used and the age of participants. Therefore, the strong phonological awareness skills found in bilingual children may be more nuanced than the overview of the research implies, i.e., simply being bilingual may not guarantee strong phonological awareness skills. However, in line with the monolingual literature, studies with bilingual children have demonstrated the importance and the limitations of phonological awareness in predicting reading achievement (Erdos, Genesee, Savage, & Haigh, 2011; Haigh, Savage, Erdos, & Genesee, 2011). Largely, and as reported in sections 1.2.1 and 1.2.2, phonological awareness is not considered a weakness for bilingual children.

August and Shanahan (2006) report that the differences in reading comprehension between monolingual and bilingual children seem to stem from limited linguistic comprehension rather than limited decoding skills, which is further supported in other studies and meta-analyses (e.g., (Kovelman, Baker, & Petitto, 2008; Melby-Lervåg & Lervåg, 2014). Before moving on to consider the subskills of linguistic comprehension, the final part of section 1.5.1 will consider the role of rapid automatised naming, the final aspect of decoding to be discussed.

1.5.1.3 Rapid automatised naming (RAN)

RAN refers to children's ability to rapidly and accurately name highly familiar visual stimuli. The way in which RAN is related to word reading has received several plausible explanations. Torgesen, Wagner, Rashotte, Burgess and Hecht (1997) proposed that RAN assesses the ease by which phonological information is retrieved from long-term memory and thus suggest that RAN is much aligned with phonological awareness. Bowers, Sunseth and Golden (1999), on the other hand, report that RAN is more strongly associated with orthographic processing than with phonological processing and thus suggest that it is a separable subskill to phonological awareness. Further still, Kail, Hall and Caskey (1999) suggest that the association between RAN and word reading is underpinned by a general processing speed that is needed for both tasks. Although the exact mechanism by which RAN is related to word reading is not fully understood, the research is consistent in demonstrating that it is an important predictor of word reading.

Beyond the role of RAN in its contribution to word-level reading, RAN has been found to be predictive of reading comprehension (Arnell, Joanisse, Klein, Busseri, & Tannock, 2009; Georgiou, Manolitsis, Nurmi, & Parrila, 2010; Johnston & Kirby, 2006; Neuhaus, Foorman, Francis, & Carlson, 2001). Again, the literature is mixed in terms of the way in which this relationship can be explained. Some researchers have suggested that the relationship is indirect through its effect on word reading (Bowers & Ishaik, 2003; Scarborough, 1998). Others have reported that a certain level of reading speed is needed in order for text to be comprehended effectively, and as such RAN may make an indirect contribution to reading comprehension through reading fluency (Kirby, Parrila, & Pfeiffer, 2003); a final suggestion emphasises the role of working memory in that RAN necessitates the sustained involvement of time-sensitive naming of symbols within a limited working memory system (Amtmann, Abbott, & Berninger, 2007). Again, despite the lack of a clear theoretical explanation, the research has demonstrated that RAN is an important prerequisite of reading comprehension.

In terms of the literature examining this skill with bilingual children, there is some research to suggest that this might be a particular strength of bilingual children relative to monolingual children (Geva & Farnia, 2012; Geva & Zadeh, 2006; Lesaux & Siegel, 2003). The authors allude to a possible cognitive advantage as a result of being bilingual, though the explanation of how bilingualism may allow for a RAN advantage to manifest is limited. Despite a possible difference between bilingual and monolingual children's RAN abilities, studies have demonstrated that RAN predicts reading outcomes in a comparable magnitude for both groups (Bellocchi, Tobia, & Bonifacci, 2017; Chiappe, Siegel, & Gottardo, 2002; Harrison et al., 2016; Jongejan et al., 2007; Swanson, Sáez, Gerber, & Leafstedt, 2004). However, in a study examining EAL children in Canada, Jongejan et al., (2007) report that while RAN was predictive of reading accuracy for all children in Grade 1 and Grade 2, it continued to be predictive of reading accuracy for the EAL children into Grades 3 and 4. The authors suggest that RAN may serve to compensate for EAL children's limited language skills, thus demonstrating that EAL and EL1 children's route to reading outcomes may in fact be underpinned by different skill sets. As such, it is of interest to longitudinally examine the relationship between RAN and reading measures with older EAL and EL1 children to determine whether the strength of this relationship over time is comparable for the two language groups.

Taken together the research indicates that RAN is an important aspect of reading for monolingual and bilingual children, though the way in which it facilitates the reading process, and how this compares for the two language groups remains open to investigation. The overview of findings presented here has demonstrated the importance of three key aspects of decoding: word reading, phonological awareness and RAN. The literature will now consider a number of language skills important for reading comprehension and how these skills compare for monolingual and bilingual children.

1.5.2 Language Comprehension

As discussed in section 1.4., language comprehension encompasses a great many skills and has been assessed using a variety of measures, including measures of vocabulary knowledge, grammatical knowledge and listening comprehension. This section will present an overview of the literature that has examined how monolingual and bilingual children compare on these measures, beginning first with vocabulary knowledge.

1.5.2.1 Vocabulary knowledge

As Raudszus, Segers and Verhoeven (2018) assert, "Good decoding in the absence of vocabulary knowledge is the key to an empty vault—it will not aid comprehension" (p. 407), which serves as a reminder of the unparalleled role of knowing the meaning of words in order to make sense of written or spoken language. *Knowing the meaning of words*, however, is arguably an arbitrary conceptualisation of vocabulary knowledge. Vocabulary knowledge is multi-faceted and is made up of an amalgamation of numerous types of knowledge and as such is complex to understand, conceptualise and measure. Nonetheless, vocabulary knowledge is consistently reported to be a significant predictor of reading comprehension. This section will consider some of the ways in which vocabulary knowledge has been conceptualised, and will then discuss the research findings comparing monolingual and bilingual children's vocabulary outcomes.

As briefly outlined in Section 1.2, this thesis aligns with a usage-based approach to language development (Tomasello, 2000b, 2003) which emphasises the importance of children's linguistic environments and experiences. However, beyond the larger theoretical implications of how language is acquired, and at a more fine-grained level, word knowledge has been conceptualised in a number of ways and continues to be a developing line of research. Early models (e.g., the four-stage word model; Dale, 1965; Dale, O'Rourke, & Bamman, 1971) proposed that word knowledge is acquired sequentially in a stage like manner in which a learner acquires specific types of knowledge of a word before moving to the next stage. Additional models have suggested that the acquisition of word knowledge occurs incrementally and can thus be conceptualised as a continuum of knowledge (Beck, McKeown, & Omanson, 1987) while other research has differentiated between different dimensions of word knowledge (e.g., Nagy & Scott, 2000), and further suggest that knowledge in one dimension does not necessarily predict knowledge in another dimension, e.g., knowledge of *polysemy* (one of Nagy & Scott's dimensions that refers to words that have multiple meanings) does not necessarily predict knowledge of *interrelatedness* (the degree to which words have been organised in the mental lexicon). More recently, Verhoeven, van Leeuwe and Vermeer (2011) proposed that the development of word knowledge is a continuous cycle of restructuring and updating lexical representations. The conceptualisations that are presented here highlight the many ways in which researchers have attempted to explain word knowledge and by no means is an exhaustive list, rather an indication of the complexity of articulating what it means to know a word.

Given the variety of ways in which word knowledge has been conceptualised, researchers have employed several metrics in order to identify different vocabulary skills. The most prevalent distinction that is used in language and literacy research is the differentiation between receptive vocabulary knowledge and expressive vocabulary knowledge. Receptive vocabulary knowledge refers to spoken or written words that a learner recognises, whereas expressive vocabulary refers to spoken or written words that a learner is able to use. Typically, learners are able to recognise more words than they are able to accurately produce, i.e., have stronger receptive vocabulary knowledge than expressive vocabulary knowledge, which can be explained by the fact that contextual cues or similarities to other words can be utilised for receptive vocabulary making otherwise unfamiliar words comprehensible (Wagner et al., 2007) and that expressive vocabulary requires a learner to simultaneously engage in additional articulation processes, e.g., efficient word retrieval and precise phonological processing (Ouellette, 2006). As discussed in section 1.4, research has also made the distinction between vocabulary breadth and vocabulary depth, though conceptually different to receptive and expressive vocabulary, vocabulary breadth and receptive vocabulary are often used interchangeably to refer to vocabulary size.

In terms of understanding which skills are predictive of reading outcomes, research has indicated that expressive vocabulary and receptive vocabulary play separate roles in reading development, and similarly, vocabulary depth and vocabulary breadth relate differently to reading outcomes. For example, Wise, Sevcik, Morris, Lovett and Wolf (2007) found that expressive vocabulary was more closely associated to word reading than receptive vocabulary knowledge. Examining breadth and depth, Cain and Oakhill (2014) found that vocabulary breadth was more closely associated to word reading than vocabulary depth. Moreover, Cain and Oakhill (2014) also found vocabulary depth to be more predictive of reading comprehension than vocabulary breadth. These findings suggest that mastery of productive vocabulary knowledge assists word reading, perhaps in part due to the phonological component of producing words, though additionally, Cain and Oakhill (2014) demonstrated that a wide knowledge of words further aids word reading, whereas a deeper understanding of words is important for comprehending. In order to understand the predictive power of vocabulary knowledge to reading comprehension outcomes for EAL and EL1 learners, it is important to consider the multidimensionality of vocabulary knowledge and thus employ measures that tap into the various dimensions.

As discussed in section 1.2.1 and 1.2.2 , the research evidence has demonstrated that vocabulary knowledge is predictive of reading comprehension for language-minority children and EAL children (August & Shanahan, 2006; Burgoyne, Kelly, Whiteley & Spooner 2009; Droop & Verhoeven, 2003; Hutchinson et al., 2003; Kieffer, 2012; Lervag & Aukrust, 2010; Lesaux, Crosson, Kieffer, & Pierce, 2010; Lesaux, Rupp & Siegel, 2007; Limbird, Maluch, Rjosk, Stanat, & Merkens, 2014; Proctor, Carlo, August, & Snow, 2005), and there is further suggestion that reading comprehension is predicted by different dimensions of vocabulary knowledge for EAL and EL1 children. Burgoyne, Kelly, Whiteley and Spooner (2009) found that receptive vocabulary made a significant contribution to reading comprehension for the EL1 children, whereas expressive vocabulary was the significant predictor of reading comprehension for EAL children. This suggests that varying degrees of mastery of the different dimensions of vocabulary can lead to different routes to reading comprehension, that is, EAL children may not be able to utilise receptive vocabulary skills (i.e., the ability to recognise words) during a reading comprehension task, despite having the opportunity to refer back to the text, because of their limited receptive vocabulary knowledge, and may thus rely on the vocabulary they do have an understanding of when attempting to comprehend, and as such expressive vocabulary skills are utilised.

It is widely identified that bilingual learners, particularly EAL and language-minority learners, have weaker vocabulary knowledge than their monolingual counterparts (Burgoyne, Whiteley & Hutchinson, 2011, 2013; Hutchinson et al., 2003; Lesaux, Crosson, Kieffer & Pierce, 2010; Lervåg & Aukrust, 2010; Mancilla-Martinez & Lesaux, 2011; Verhoeven & van Leeuwe, 2012), though the extent to which the various dimensions of vocabulary knowledge compare for EAL and EL1 children is limited. More specifically, there is a dearth of research examining aspects of vocabulary depth. This dimension of vocabulary knowledge will be discussed in further detail in Chapter 4, where multi-word phrase knowledge, word associations and polysemous word knowledge will be examined. Though, in terms of bilingual learners' lower levels of vocabulary knowledge more broadly, it is important to note the difference between conceptual knowledge, i.e., what words are referring to, and lexical knowledge, i.e., the actual words. Bilingual learners may have smaller vocabularies – potentially in both their L1 and their L2 (lexical items) - but comparable conceptual frameworks to draw from, and thus if vocabulary knowledge was to be assessed in both languages, bilingual learners may in fact have comparable vocabulary knowledge to their monolingual peers (Oller & Eilers, 2002; Barbara Zurer Pearson, Fernández, & Oller, 1995).

To summarise, vocabulary knowledge can be thought of as a multidimensional skill, and as such has been conceptualised in a variety of ways; bilingual children and monolingual children's differing vocabulary knowledge may result in different routes to reading comprehension; and comparisons of the different dimensions of vocabulary knowledge may allow for a more complete picture of how bilingual and monolingual children's language and literacy development compares.

1.5.2.2 Grammar

Broadly, grammatical knowledge refers to knowledge of the structure of language. While a body of research has examined the grammatical knowledge of both monolingual and bilingual children, it is arguably a relatively overlooked component of the reading comprehension process and is often neglected from theoretical conceptualisations; accordingly, much less research in the reading literature has focused on grammar relative to other language and cognitive skills. Nonetheless, knowledge of grammar can be considered at a sentence- or word-level; that is, a distinction is made between syntactic knowledge, i.e., knowledge of the order of words within sentences (Kintsch, 1998; Nagy, 2007), and morphological knowledge, i.e., knowledge of the internal structure of words (Foorman, Petscher, & Bishop, 2012).

Theoretically, syntactic knowledge is thought to contribute directly to reading comprehension through a learner's ability to break down sentences into smaller chunks, supporting the parsing of sentences into smaller components, which are then reunited into a comprehended whole and thus support text level representations (Farnia & Geva, 2013). Additionally, researchers have proposed that syntactic knowledge may indirectly relate to reading comprehension through word reading, specifically as part of high-quality lexical representations (Perfetti & Hart, 2002; Perfetti et al., 2005). Morphological knowledge, on the other hand, has been theorised to enhance a reader's ability to efficiently recognise words whose meanings must be understood if text is to be comprehended and thus may have an indirect influence on reading comprehension through word reading (Coxhead, 2000). Further research suggests that morphological knowledge may assist in the degree of regularity between the spelling of words and their meanings thus again assisting skilled reading (Rastle, 2018). Largely, research suggests that morphological knowledge becomes more predictive of reading comprehension with age, i.e., as children are exposed to a greater number of multimorphemic words.

A number of studies have demonstrated that grammatical knowledge is uniquely predictive of reading comprehension (Adlof, Catts, & Lee, 2010; Bowey, 2005; Brimo, Apel, & Fountain, 2017; Geva & Farnia, 2012; Muter et al., 2004; Silva & Cain, 2015) and intuitively, the relationship makes sense. That is, knowledge of both word and sentence structure should assist the construction of meaning. Further research, however, has demonstrated that grammatical knowledge fails to be uniquely predictive of reading comprehension once vocabulary knowledge and previous reading comprehension is controlled (Oakhill & Cain, 2012). Another study assessing only syntactic knowledge, found that while syntactic knowledge was correlated with reading comprehension, it failed to contribute to reading comprehension beyond the contribution of phonological processing and working memory (Gottardo et al., 1996). Oakhill and Cain (2012) argue, however, that a lack of additional variance in the prediction of reading comprehension does not equate to unimportance, particularly given that the two are significantly correlated. In another study, Oakhill et al., (2003) proposed that there may be a developmental relationship between grammatical knowledge and reading comprehension, that is, the relationship may strengthen with age. However, this was a cross-sectional study and as such this proposal warrants further exploration within a longitudinal study.

Within the bilingual literature, grammatical knowledge has also been shown to play a role in children's reading comprehension (Farnia & Geva, 2013; Geva & Farnia, 2012; Gottardo, Mirza, Koh, Ferreira, & Javier, 2018; Jeon & Yamashita, 2014; Kieffer & Lesaux, 2008; Lesaux et al., 2007). There is some suggestion that the predictive relationship between grammatical knowledge and reading comprehension may be different for monolingual and bilingual children; given that bilingual children typically have weaker vocabulary knowledge than EL1 children, and that tasks of grammatical knowledge are often dependent upon vocabulary knowledge to some extent (Jongejan et al., 2007; Lesaux & Siegel, 2003). However, other studies have reported grammatical knowledge to be a significant predictor of reading comprehension in equal magnitude for both monolingual and bilingual children (Lesaux et al., 2007; Swanson et al., 2008).

Syntactic knowledge and morphological knowledge are both clearly important skills for children to acquire given that both have been found to contribute to reading comprehension, either directly or indirectly. However, the role of morphology and its theorised relationship with the mapping of spelling to meaning in word reading is of interest when considering how EAL and EL1 children may differ in their knowledge of morphemes and thus how this may then feed into comprehension; this evidence base is limited, particularly in the UK context. For this reason, morphological awareness will be discussed in further detail in Chapter 5.

1.5.2.3 Listening comprehension

As discussed in Section 1.4, listening comprehension has been defined and conceptualised in a variety of ways in the literature. It is possible that, in part, the ambiguity and thus misconceptions surrounding listening comprehension stem from the conceptualisation of reading comprehension in the SVR framework, in which reading comprehension is thought to be underpinned by decoding and language comprehension. Language comprehension has been used interchangeably with listening comprehension in some studies, while other studies do not include a measure of listening comprehension (i.e., a passage(s) of text read aloud) in their conceptualisation of language comprehension employing only measures of vocabulary knowledge and/or grammar knowledge.

In a longitudinal study, Babayiğit and Stainthorp (2014) examined the predictors of reading comprehension of Turkish-speaking monolingual children from Kindergarten (mean age 5;8 years) to Grade 2, examining language comprehension with measures of vocabulary, grammar, verbal short-term memory and listening comprehension. The authors report that kindergarten (time 1) listening comprehension explained an additional and significant 11% of the variance of Grade 1 reading comprehension (t2) over and above the other measures. At the final time point, however, t1 listening comprehension failed to make a statistically significant prediction to t3 reading comprehension, though the authors report that it did predict an additional 5% of variance. These findings suggest collectively, vocabulary, grammar and verbal short-term memory sufficiently capture the majority of the variance in reading comprehension and thus there is a reduced need for a listening comprehension task. However, the authors suggest that a larger sample size (n=56) may have found the 5% of additional variance to reach statistical significance as a unique predictor of reading comprehension, and as such further research with a large sample size is warranted to understand this further.

In contrast to the above findings, de Jong and van der Leij (2002) found that Grade 1 listening comprehension (t1; mean age 7;2 years) statistically significantly predicted Grade 3 reading comprehension (t2) over and above t1 reading comprehension, t1 word reading speed and t1 vocabulary knowledge for Dutch-speaking monolingual children (n=141). While the sample size is greater, this study did not assess grammatical knowledge or verbal working memory (as in the previous study), and as such it is possible that listening comprehension was consistently found to be significantly predictive of reading comprehension because other skills (e.g., grammar and verbal short-term memory) were not examined. However, there are further differences between the studies (e.g., the length of the study, the languages spoken by participants and the age of participants), that complicate the comparison and thus the extent to which it can be concluded that listening comprehension does or does not significantly predict reading comprehension. For example, the children in the de Jong and van der Leij study were older which could influence the magnitude of the predictive power of the variables.

Further still, other studies have found measures of vocabulary to be more predictive of reading comprehension than listening comprehension (Protopapas, Sideridis, Mouzaki, & Simos, 2007; Verhoeven & Van Leeuwe, 2008). However, despite the uncertainty, studies examining language comprehension – conceptualised either using vocabulary and grammar knowledge or using a listening comprehension tasks - and reading comprehension consistently report that the two constructs are highly correlated (Diakidoy, Stylianou, Karefillidou, & Papageorgiou, 2005; Protopapas et al., 2012; Tilstra et al., 2009).

The bilingual literature suggests that listening comprehension may be an area of weakness for bilingual children relative to their monolingual counterparts (Droop & Verhoeven, 2003; Geva & Farnia, 2012), and there is a growing body of research that demonstrates listening comprehension to be an important predictor of bilingual children’s reading comprehension skills (Proctor, Carlo, August, & Snow, 2005; Crosson & Lesaux, 2010; Kieffer et al., 2013; Lesaux, Crosson, Kieffer, & Pierce, 2010; Nakamoto, Lindsey, & Manis, 2012). While limited vocabulary knowledge may explain these findings, there is some suggestion that bilingual children, particularly language-minority learners, may have difficulty utilising the acoustic phonetic cues that are available to monolingual native speakers and as such language-minority learners may miss valuable information that is needed in the process of retrieving lexical items and thus accessing meaning (Altenberg, 2005). However, research has not explored this extensively. In consideration of the Lexical Quality Hypothesis, this explanation may be plausible, i.e., learners navigating two languages may not activate all aspects of each lexical entry to the same extent as a learner navigating only one language.

Little research has directly compared the predictive relationship between listening comprehension and reading comprehension with both language-minority learners and monolingual learners within the same study, and as such it is less clear whether listening comprehension tasks predict variance in reading comprehension to the same magnitude for both language groups in a study where vocabulary and grammar are controlled. However, despite the inconsistencies discussed and the limited direct comparisons, the research highlights that the skills required for successful listening comprehension are important and feed into reading comprehension outcomes for both groups of learners.

Moving beyond the language and literacy skills that predict and underpin the process of reading comprehension, the next section will consider the essential role that key cognitive skills play within this multifaceted and complex process.

1.5.3 Cognitive Skills

Following the unresolved discussions surrounding the potential need for additional constructs within the SVR framework, a number of cognitive variables will also be considered; specifically, working memory and non-verbal skills have been identified as important prerequisites for the ability to successfully comprehend written text and as such will be considered in this final section.

1.5.3.1 Working memory

Working memory is the system that temporarily holds information in an active state to support the simultaneous storage and processing of various forms of information, i.e., written or spoken information as well as non-linguistic forms such as visuo-spatial information (Daneman & Merikle, 1996; Oakhill, 1993). It is well-established within the literature that working memory is required for a multitude of academic endeavours (Daneman & Carpenter, 1980; Gathercole, Alloway, Willis, & Adams, 2006). More specifically, working memory has been found to be involved in reading at various levels, including individual word decoding, speed of reading, spelling, comprehending text and comprehension monitoring (Bayliss, Jarrold, Gunn, & Baddeley, 2003; Cain, Oakhill, & Bryant, 2004; Christopher et al., 2012; Daneman & Merikle, 1996; Sesma et al., 2009; Swanson, Zheng, & Jerman, 2009).

Baddeley and Hitch (1974) developed a working memory model that consists of three components, with a fourth added a number of years later (Baddeley, 2000). Their model suggests that there are different components within the memory that accommodate different types of information. The phonological loop is one such components of the model and is believed to manage spoken and written information. The visuospatial sketchpad is concerned with visual information and managing spatial awareness and the central executive, considered the most important component of the model, is responsible for coordinating the operation of the phonological loop and the visuospatial sketchpad. The episodic buffer, which was later added to the model, is recognised as a backup store that transfers information between components of the working memory and the long-term memory. This working memory model proposes that each component has a limited capacity, and also that the components are relatively independent of each other.

Though it is well-established that working memory is important for reading achievements, the degree to which each of the memory components is related to reading is not as well understood (Nevo & Breznitz, 2011). One of the reasons for this is perhaps due to a lack of rigorous replication studies. There are a number of studies examining working memory components and reading abilities, however, researchers have arrived at different conclusions concerning the relationship and predictive power of working memory as well as the mechanism by which it is utilised (Cain, Oakhill, & Bryant, 2004; Gathercole, Pickering, Knight, & Stegmann, 2004;

Meyler & Breznitz, 1998). This can, in part, be explained by the variety of tasks employed to measure each of the working memory components as well as the diversity of participant characteristics within studies.

Despite this, verbal working memory (VWM) is widely recognised in the literature as the subset of the working memory system that specialises in processing different types of verbal tasks. A number of studies have demonstrated the contribution of VWM to vocabulary learning, sentence processing, inference and reading comprehension more generally (Cain, Oakhill, & Lemmon, 2004; Daneman & Merikle, 1996; Montgomery & Evans, 2009). Researchers had previously theorised that learners have a set of verbal processing resources that can manage all verbal tasks (Just & Carpenter, 1992; King & Just, 1991), whereas the VWM system is thought to consist of specialised components that handle specific aspects of verbal tasks (Caplan & Waters, 1999). More specifically, it has been proposed that VWM provides the cognitive support necessary for the language processes involved in reading comprehension to operate, i.e., a language user is able to process and represent written and spoken information accurately which can then be integrated into an appropriate mental representation of the text (Carretti, Borella, Cornoldi, & De Beni, 2009).

It is important to highlight that while the specific components of working memory and their relation to specific aspects of reading requires further clarity, it is widely agreed that working memory has a limited capacity, which is supported by the fact that information can be lost from working memory. Individual differences in working memory capacity could therefore impact upon the skills important for comprehension, such as memory for facts and the inference of unknown word meanings from context (Daneman & Carpenter, 1980; Daneman & Green, 1986; Masson & Miller, 1983). Furthermore, and in agreement with an earlier suggestion that language skills influence working memory; it is thought that individuals who can read text relatively quickly are using less of their working memory resources in processes such as the decoding of words and are therefore able to give more resources to comprehending the text (Goff, Pratt, & Ong, 2005), i.e, a reader who has mastered decoding can devote their processing resources on more complex tasks such as comprehension monitoring. Thus, the trade-off between processing and storage is a potential source of individual differences in reading comprehension (Cain, 2010; Seigneuric, Ehrlich, Oakhill, & Yuill, 2000), which is arguably more complex when considering how language-minority learners may be processing and storing information given that concepts and words of their L1 may be also activated in this process.

1.5.3.2 Non-verbal IQ

Intelligence Quotient (IQ), specifically non-verbal aspects of IQ (NVIQ) are widely used as measures of domain-general cognitive ability in studies of reading comprehension. NVIQ tasks typically require children to engage with problem solving through the analysis of information and/or through employing abstract reasoning skills. Largely, NVIQ is assessed to understand whether weaknesses in language and literacy skills can be explained by weak cognitive skills more generally or whether difficulties lie specifically within the language and/or literacy domain. NVIQ is thought to be relatively stable over time (Deary, Whalley, Lemmon, Crawford, & Starr, 2000), and while tasks are typically norm-referenced on monolingual populations, they are deemed suitable for use with language-minority learners.

1.6 Summary

The large body of research reviewed in this chapter demonstrates the complexity of capturing the reading comprehension process. Though not without its limitations, the Simple View of Reading (Gough & Tunmer, 1986) conceptualises that two broad components are required for a learner to successfully comprehend written text; decoding and language comprehension. Largely, the literature provides a convergent picture of language-minority and EAL learners' reading profiles; that is, decoding skills tend to be comparable or stronger than monolingual children's, however language comprehension skills are often weaker. There is of course variability within groups, and EAL learners in the UK, specifically, are not a homogenous group, and as with monolingual learners, there are children who will under- and out-perform national averages. This thesis will explore the components of reading comprehension discussed within section 1.5, with the aim of addressing some of the gaps in current understanding as well as replicating a number of studies that have been carried out in contexts outside the UK.

Chapter 2 - Methodology

2.1 Introduction

This chapter will discuss the methodology of the current research project. Details of the research design, recruitment, participants, the measures used and the research procedure will be provided, followed by information concerning the ethical considerations and the statistical analyses employed.

2.2 Overarching Research Aims

Few studies have examined the language and literacy profiles of children with English as an additional language (EAL) in the UK context. Thus, the purpose of this study was to examine whether, and to what extent, children learning EAL differ from children with English as their first and only language (EL1) in terms of i) their cognitive, language and literacy skills in English and ii) the contribution of these skills to later reading comprehension outcomes.

2.3 Research Design

This thesis adopted a sequential research design to enable cross-sectional and longitudinal data collection and analysis. At each time point, data was collected from two different year groups which allowed for developmental differences to be observed cross-sectionally, and allowed for a wider range of ages to be examined longitudinally, i.e., the younger children's longitudinal development was observed from Y2 → Y4 and the older children's development was observed simultaneously from Y4 → Y6.

The decision to use a sequential design was motivated by the lack of existing research in the UK on EAL children's reading comprehension development in the primary school years, particularly through to the final year of primary school. Although an experimental design could provide insights into EAL and EL1 children's ability to learn or acquire specific skills or knowledge, the literature review suggested that insufficient cross-sectional and longitudinal data was available on the range of skills that underpin and contribute to reading comprehension for EAL children at different stages of development. Therefore, the current study was considered necessary in order to establish a comprehensive understanding of the development and comparison of reading skills between EAL and EL1 children in primary schools in the UK, the results of which would inform future experimental research.

The study employed descriptive and inferential statistical techniques to explore the differences in reading comprehension, and the skills that underpin this process, between EL1 and EAL children. A between-groups design was employed which was quasi-experimental in nature, i.e., for the various analyses, language group (EAL/EL1) was the independent variable (IV) and language and literacy skills were the dependent variables (DV).

Pragmatic concerns ultimately influenced the implementation of the research design; that is, the requirement to complete data collection within a given timeline dictated the extent of the longitudinal element, and thus children were examined over three academic years.

2.4 Statement of Research Aims

The study was designed to establish a comprehensive understanding of EAL children's reading comprehension relative to typically developing EL1 children. As such the overarching research aims are:

1. To cross-sectionally examine the language and literacy skills of EAL and EL1 children in two different year groups;

2. To examine the development of these skills over time, comparing the two language groups; and

3. To examine the longitudinal predictors of reading comprehension.

2.5 Statement of Research Questions

In order to address the research aims, this thesis asks a number of research questions that will be answered in the four chapters that follow. Chapter 3 presents data collected at t1 and addresses the following RQs:

1. How do EAL and EL1 children's cognitive, language and literacy skills compare in i) Y2 and ii) Y4?
2. To what extent do language skills concurrently contribute to reading comprehension for EAL and EL1 children in i)Y2 and ii)Y4?
3. How do the language skills of EAL children compare to that of EL1 children in i) Y2 and ii) Y4?
4. How do the language skills of EAL children who are good and who are poor comprehenders i) compare and ii) compare to that of EL1 children who are good and poor comprehenders?

Chapter 4 focuses specifically on vocabulary knowledge and addresses four key RQs:

1. Do EAL and EL1 children differ in their performance on a) a receptive measure of multi-word phrase knowledge, b) a measure of word association and c) a measure of polysemous word knowledge?
2. Does performance on these measures of vocabulary differ by age for the EAL and EL1 children?
3. How does single word vocabulary knowledge (receptive and expressive) relate to measures of multi-word phrase knowledge, word associations and polysemous word knowledge?
4. Does the proportion of English spoken outside of school affect performance on these vocabulary measures for the EAL children?

Chapter 5 explores morphological awareness and addresses the following RQs:

1. How do EAL and EL1 children compare on measures of morphological awareness, within and across year groups?
2. Do any differences emerge in relation to i) task demands (production/judgement task) ii) morphology type (inflectional/derivational) iii) the use of real and nonsense words (word type) and iv) the morphophonemic structure of the items (morphological change/ morphophonemic change)?
3. How does the predictive relationship between morphological awareness and reading comprehension compare for EAL and EL1 children?

Finally, Chapter 6 examines the longitudinal data and answers the remaining RQs:

1. How do EAL and EL1 children compare on measures of reading comprehension at each time point?

2. To what extent do EAL and EL1 children show similar patterns of growth in their language and literacy skills from t1 to t3?

3a. Do the longitudinal predictors of reading comprehension differ depending on children's language group? (EAL/EL1)

3b. Within the EAL sample, do the longitudinal predictors of reading comprehension differ depending on English language use?

2.6 Study Overview

Data was collected at three time points. Time 1 began in February 2016 and Time 3 was completed by February 2018. Table 2.1 provides details of the time points as well as the number and age of participants.

2.7 Sampling Procedure

Recruitment for the study began in December 2015; initially primary schools within and surrounding Bradford, West Yorkshire were contacted due to the high numbers of EAL children living in this area. However, there were(are) several large-scale research projects running in this area and as such many schools did not think it would be feasible to facilitate further research projects. Consequently, the recruitment location expanded to the West Yorkshire region more broadly. Schools in West Yorkshire were contacted via email which was then followed up with phone calls. Over thirty schools were contacted to take part in the study and three primary schools agreed to participate and were all involved in the three phases of data collection. Once headteachers had agreed to participate in the study, consent forms were sent to the parents of children in Year 2 and Year 4; the aims of the project were outlined and the contact details of the researcher were provided. Once consent had been obtained from parents, data collection began. The consent forms and information sheets can be found in Appendix 1.

2.8 Description of the Schools

The three West Yorkshire schools, located within a ten-mile radius of each other, were somewhat different in terms of participant characteristics. Table 2.2 presents pupil population data for each school; this data was obtained from the UK government website (*https://www.compare-school-performance.service.gov.uk*) and is recorded from the academic year 2016/2017.

Table 2. 1
Overview of the study; time points and participant information

	t1 February – July 2016		t2 February – March 2017		t3 September 2017 – February 2018	
	Younger (Y2)	Older (Y4)	Younger (Y3)	Older (Y5)	Younger (Y4)	Older (Y6)
N	49	61	47	57	43	55
% EAL	53.1%	55.7%	53.2%	56.1%	48.8%	54.5%
% male	47%	30%	45%	30%	42%	31%
Mean age (s.d.)	85.16 (3.75)	109.11 (4.09)	95.09 (3.24)	118.88 (3.86)	105.02 (3.31)	128.67 (4.56)

Table 2. 2
Pupil population of participating schools

	School 1	School 2	School 3	National Average
% EAL in the school	32%	93%	6%	*20.8%*
% FSMs in the school	62%	21%	18%	*24.9%*
Total number of pupils on roll	625	485	729	-
Total number of participants in the current study (in brackets = number of EAL children)	45 (26)	35 (34)	30 (0)	-

School 1 had an EAL population higher than the national average and the school office reported that there were over 40 languages spoken collectively by the EAL children. School 2 was comprised predominantly of EAL children, all of whom spoke an Indo-Aryan language as their L1 (specifically Punjabi, Urdu and Bengali were the languages on file as being spoken) and school 3 had a low EAL population, but like school 1 the EAL children spoke a variety of L1s. The percentage of pupils eligible for free school meals (FSMs) is provided as an indicator of socio-economic status (SES). The relationship between SES and language development/academic attainment is well documented in the literature (e.g., Fernald, Marchman, & Weisleder, 2013; Hart & Risley, 1995) and as such it was an important factor to consider. Where possible, SES should be controlled in order to have participants of comparable demographics, however this was not entirely achieved in this study; School 2 and School 3 were thought to represent pupils of a similar SES, whereas School 1 was thought to serve pupils of a low SES (and much lower than school 2 and 3). Although SES could be considered an extraneous variable in this study, EAL and EL1 children were represented relatively evenly across the two levels of SES reducing the risk of language group differences being attributable to SES disparities.

2.9 Description of the Sample

In total 60 EAL children and 50 EL1 children were recruited at t1. The criteria for inclusion in the study were that, i) children had attended their current school for a minimum of two academic years prior to the year in which they participated in this study for the first time, ii) the EAL participants had to speak a language other than or as well as English in the home, iii) participants did not have any known learning difficulties and were not on the SEN register. These inclusionary requirements were explained to the key contact in each school (e.g., the head teacher or EAL coordinator) and consent forms were handed out accordingly. An overview of the number of children tested at each time point, and details of their age and gender can be found in Table 2.1. As can be seen in Table 2.1, there is an unequal gender split in the older year group. A chi-square analysis was carried out to examine whether there was equality between the two language groups (EAL/EL1) in terms of gender. The result was not significant indicating that there were no gender disparities between the two language groups, χ^2 (1) = .341, p = .559. An independent samples t-test was run to examine whether there were any language group differences on age. The results revealed that there was no statistically significant difference between the language groups in the younger year group; EL1 children (M= 85.96, SD = 3.67), EAL children (M=84.46, SD =3.74), t(47) = 1.41, p = .642, or the older year group; EL1 children (M= 110.52, SD =4.29), EAL children (M=108.00.46, SD =3.60), t(59) = 2.49, p = .250. Unfortunately, it was not possible to compare the socioeconomic status of the two language groups because FSM data was not collected at the individual level.

The participating EAL children spoke a range of L1s. Data on L1s was initially obtained from classroom teachers and/or the school office records and was verified by parents on the consent form as well as by child self-report. The L1s spoken by the EAL pupils included Punjabi (26 EAL pupils); Urdu (7); Portuguese (5); Mandarin (3); French (3); Arabic (2); Lithuanian (2); Polish (2); Twi (2); Bengali (1); Hungarian (1); Italian (1); Mandinka (1); Potwari (1); Shona (1); Tamil (1); and Tigrinya (1). Initially, there was some deliberation in deciding whether to recruit EAL children with a diverse and varied range of L1s or whether to recruit EAL participants that spoke a specific L1, which could enable certain linguistic variables to be controlled. Ultimately, the decision was made to involve a heterogeneous sample in terms of L1s for two reasons. The first reason is that of practicality, the first school to agree to participate in the study was the school with a multilingual population and the second reason, not unrelated to the first, is that the UK is not comprised of a homogenous group of English language learners and as such the educational implications of the findings are able to be generalised beyond that of a linguistically neat sample. Thus, there were 17 different L1s spoken between the 60 EAL participants involved in this study.

2.10 Study Measures

At time 1, a battery of language, literacy and cognitive tests was administered. An overview of the time 1 measures is presented in Table 2.3. Given that this study is guided by the SVR, the tasks are clustered according to the broad components that the tasks are thought to measure.

Each task is discussed in further detail below.

Table 2. 3
t1 measures

Construct	Measure
Reading	
Reading Comprehension	York Assessment of Reading Comprehension (YARC)
Reading Rate	YARC
Reading Accuracy	YARC
Decoding	
Regular Word Reading	Diagnostic Test of Word Reading Processes (DTWRP)
Non-word Reading	DTWRP
Exception Word Reading	DTWRP
Phonological Processing	
Phonological Awareness	Spoonerisms; Phonological Assessment Battery (PhAB)
Phonological Memory	Non-word Repetition; Working Memory Test Battery for Children (WMTB-C)
Speed of Lexical Access	Rapid Automatized Naming (CELF-4)
Language Skills	
Expressive Vocabulary	Wechsler Abbreviated Scale of Intelligence (WASI)
Receptive Vocabulary	British Picture Vocabulary Scale (BPVS)
Listening Comprehension	Understanding Spoken Paragraphs; Clinical Evaluation of Language Fundamentals (CELF-4)
Expressive Grammar	Formulated Sentences; CELF-4
Morphological Awareness	Word Analogy task taken from Kirby et al., (2012)
Associated Cognitive Skills	
Verbal Working Memory	Listening Span Test (WMTB-C)
Non-verbal working memory	Spatial Span; Wechsler Non-verbal Scale of Ability (WNV)
Non-verbal Ability	Matrices task; WNV

2.10.1 Time 1 Measures

2.10.1.1 Reading comprehension, reading accuracy and reading rate

The York Assessment of Reading Comprehension (YARC; Snowling et al., 2009) was used to assess text reading accuracy, reading rate and reading comprehension. Form A of the test was used. Children read aloud three passages of text and were asked eight comprehension questions at the end of each passage; this included both literal and inferential questions. For the purpose of this study, the number of passages a child read differed from the instruction given in the manual. The manual explains that two passages should be read; an age appropriate passage must initially be selected and participants then move up or down a passage level in accordance with their score. The raw scores can then be converted into standardised scores and directly compared. The standardised scores take into account the difference in difficulty of the passages. However, for this study, the analyses include the raw scores only; because the standardised scores had not been normed using an EAL sample, it did not seem fair to employ the standardised scores when comparing the EL1 children to the EAL children. Therefore, the Y2 children read Level 1, 2 and 3. And the Y4 children read Level 3, 4 and 5. This ensured that the children within a year group had read the same passages and therefore the raw scores could be directly compared. Furthermore, this allowed for across year group analyses as there was one passage that all participants read (Passage Level 3). The Y2 children began at Level 1 and worked their way through to Level 3, though test administration still ended when the prescribed number of reading accuracy errors were made. Because of this discontinuation rule, several participants in Y2 did not reach passage Level 3 and were given a comprehension score of 0 for this passage. Similarly, the Y4 children began at Level 3 and worked their way through to Level 5; the same discontinuation rule applied and as such a number of participants did not reach passage Level 5 and were, by default, given a score of 0. Reading Accuracy was calculated according to the number of errors made per passage, reading rate was calculated based on the time taken to read a passage, and reading comprehension was assessed by asking eight relevant comprehension questions following each passage. The comprehension questions were asked immediately after a passage was read and children were permitted to refer back to the text.

Though there is a potential threat of how culture-bound this test may be, it was developed with a large number of children including a number of EAL children, and was considered the most suitable test at the time of testing. As the number of passages each child read differed to that prescribed in the manual, score reliabilities were manually computed for the specific passage sets that were used.

2.10.1.2 Word reading

Word reading was tested using the Diagnostic Test of Word Reading Processes (Forum for Research into Language and Literacy, 2012). Each child was presented with a set of words or non-words and asked to read the items aloud. The first page consisted of graded non-words, the second regular words and the third exception words. Administration of each list ends if a child scores five consecutive scores of 0. The child's score was the total number of words read correctly.

2.10.1.3 Phonological awareness

The Spoonerisms subtest of the Phonological Assessment Battery (PhAB) (Frederickson, Frith, & Reason, 1997) was administered to assess phoneme-level awareness skills. The Spoonerisms task consisted of two parts. In the first, children are asked to replace the first sound of a word with a new sound (e.g., cat with a /f/ gives fat). In the second part children were asked to take the initial sound from two words and swap these to create two new/non-words (e.g., sad cat gives cad sat). Testing was discontinued in part 1 when children scored three consecutive scores of 0. Part 2 was discontinued once three minutes had elapsed. The total subtest (part 1 + part 2) had 20 items and raw scores were out of 30; 2 points available for a complete correct answer in part 2.

2.10.1.4 Phonological memory

The Non-word List Recall taken from the Working Memory Test Battery for Children (WMTB-C; Pickering & Gathercole, 2001) was used to assess phonemic memory; children are orally presented with increasing strings of monosyllabic words that each have a consonant-vowel-consonant structure. Children are then asked to recall the nonwords that are presented. The subtest consists of six spans, and six trial sequences per span. The number of nonwords in each span sequence correlates with the number of the span, i.e span 3 includes 3 non-words in a sequence. If the first four sequences of non-words in a span are correct, the child is credited with correct recall of all six sequences and the child progresses to the next span. Items must be recalled exactly as presented, i.e with all three phonemes correct, and in the same sequence order as they are delivered. Testing discontinues when three sequences in one span are recalled incorrectly.

2.10.1.5 Speed of lexical access

The Clinical Evaluation of Language Fundamentals – Fourth Edition (CELF-4; Semel, Wiig, & Secord, 2006) was used to assess children's speed of lexical access. The Rapid Automatic Naming subtest assesses the ability to connect visual and verbal information to produce automatic speech. Each child was asked to firstly name colours, then shapes, and finally shape–colour combinations, all of which were familiar to the child as determined in the practice test. The time taken to complete the test was recorded as well as the number of errors made. This subtest gives additional information regarding the accuracy and speed of lexical retrieval and speech production. All items are administered irrespective of the time taken or errors made.

2.10.1.6 Expressive vocabulary

The Vocabulary subtest from the Wechsler Abbreviated Scales of Intelligence (WASI; Weschler, 1999) was used to assess expressive vocabulary. In this task, children are asked to provide definitions of words that are presented both orally and visually, i.e. the words are spoken by the researcher as well as written on a list for the child to see. While the manual guidelines were followed to administer the task, a modified scoring system was developed by the researcher, and as such the task was not scored according to the WASI guidelines. A decision was made to develop a more fine-grained scoring system for two reasons; firstly, with the EAL children in mind, it was thought that capturing different ways of providing information about a word's meaning could provide a more in-depth understanding of EAL children's knowledge of words, i.e., not simply assessing children's ability to articulate a clear definition but instead looking beyond a narrow criteria of acceptable responses thus enabling a broader sense of whether children have an understanding of the word meanings. Relating to this is the second reason for the nuanced scoring system; because a large battery of tests was administered at t1 and t3, vocabulary was only being assessed by two measures – receptive vocabulary and expressive vocabulary. Receptive vocabulary (specifically, the BPVS) is widely considered as a measure of vocabulary breadth, whereas the vocabulary definition task could arguably be seen to fall somewhere between a task of vocabulary breadth and vocabulary depth, i.e., children need to understand a range of words (breadth) but they are also required to produce and provide a certain level of detail in their response (depth). Thus, beyond the ability to coherently define a word, a scoring system that captures a wider scope of the ways in which a word can be known can arguably be considered a measure of vocabulary depth and thus, the vocabulary tasks included at t1 and t3 capture the various ways in which words may be known.

The raw scoring system is outlined in Table 2.4 and clarifying details can be found in Table 2.5. Ultimately, participants could obtain a score of 0, 0.5, 1, 2 or 3 per response and there are multiple ways in which a response could receive a score of 1, 2 or 3. The children's definitions were audio-recorded and transcribed so that the data could be scored by a second researcher. The second researcher was provided with verbal instructions as well as the two tables below and they scored a randomly selected subsample of the two language groups (EL1 and EAL), corresponding to 10% of the total sample. Inter-rater reliability, calculated using Cohen's kappa statistic was relatively high at .87. On the basis of this reliability coefficient, the ratings of the first coder were used for all subsequent scoring. Though the scoring system was adapted, the discontinuation rule remained constant and the test ended if the child obtained three consecutive scores of zero.

Table 2. 4
Scoring system for the Vocabulary Definitions task

Total Score	Total Score Description	Total Score Guidelines
3	A clear definition	The response captures the word's meaning explicitly, fully or in an abstract sense. Alternatively, this can be made up of any combination of 3 or more background knowledge*/lexical knowledge** items that demonstrate a thorough understanding
2	A definition that demonstrates clear knowledge of the word	The response shows understanding of the word's meaning. May use target word within the definition, e.g reveal: when you reveal a secret. Alternatively, this can be comprised of two separate items from background knowledge* / lexical knowledge**
1	A definition that demonstrates basic knowledge of the word	The response demonstrates a basic understanding but is not elaborated. This can be comprised of one item from any knowledge category, e.g lunch: you eat it
0.5	A gesture†	This form of response provides a correct understanding of the word but oral language is either not used or does not help to explain the word meaning, e.g., dance: it's a thing like this *does dance*
0	Incorrect response	The response demonstrates a misunderstanding or no understanding of the word's meaning.

Note: *Background Knowledge can consist of: Situational Knowledge, Contextual Knowledge, Knowledge of the Functions/Attributes; **Lexical Knowledge can consist of any appropriate synonym related to the target word or any antonym that is stated as an antonym (see Table 2.5); † an appropriate gesture is only accepted when a verbal response is not provided or receives a score of 0, gestures are not added onto verbal response scores

Table 2. 5

Types of word knowledge

Knowledge Type	Knowledge Item Scores
Background Knowledge	Situational Knowledge: 0 points: explanation of a situation that demonstrates an incorrect understanding 1 point: explanation of a situation that demonstrates an understanding Contextual Knowledge: 0 points: additional words, phrases or concepts that are unrelated to the target word 1 point: additional words, phrases or concepts that related to the target word Functions/Attributes: 0 points: no functions or attributes mentioned. 1 point: any correct function or attribute
Lexical Knowledge	Synonym/Antonym: 0 points: any synonym that is not closely associated with the target word 1 point: any appropriate synonym that is related to the target word or any appropriate antonym that is stated as an antonym Related words/phrases: 0 points: use of a word or phrase that is not related to the target word 1 point: any related word based on the same stem/lemma or any related phrase/expression containing the target word.
Non-verbal:	Non-verbal responses: 0 points: a gesture that is unrelated to the target word 1 point: any gesture that demonstrates an understanding of the word

2.10.1.7 Receptive vocabulary

Receptive Vocabulary was assessed using The British Picture Vocabulary Scale - II (BPVS; Dunn, Dunn, Whetton, & Burley, 1997). The children were shown four pictures at a time and the researcher read aloud a single word, children were required to point to the picture or give the label number of the picture that matched the spoken word. Children began at an age appropriate set of items, but would move back a set if more than one error was made. Otherwise children would continue working forwards through the sets until a score of eight or more errors is made within one set.

2.10.1.8 Listening comprehension

The Clinical Evaluation of Language Fundamentals – Fourth Edition (CELF-4) (Semel et al., 2006) was used to assess children's listening comprehension. The Understanding Spoken Paragraphs subtest was used to evaluate the student's listening comprehension skills. Children listened to three short stories and answered 5 questions at the end of each story. The questions tap children's understanding of the paragraph's main idea, detail and sequence of events, and their ability to make inferences and predictions from the information presented. For the purpose of this study, the prescribed paragraphs as per the manual were not adhered to; instead, 3 paragraphs were selected and read aloud to all children regardless of age or errors made. To begin, the first passage from the age 5-6 test paragraphs was read aloud followed by the questions, next, the first passage from the age 7-8 test paragraphs was read aloud followed by the questions and the final passage was read aloud from the first passage of the 9-10 age test paragraphs. As with the YARC, this was done so that scores could be directly compared between year groups, i.e., standardised scores could not be utilised as they were not normed on monolingual English-speaking children. No discontinuation rule was applied.

2.10.1.9 Expressive grammar

The Clinical Evaluation of Language Fundamentals – Fourth Edition (CELF-4) (Semel, Wiig & Secord, 2003) was used to assess children's expressive grammar. The Formulated Sentences subtest requires children to orally produce a sentence that includes a stimulus word (provided orally by the researcher) and must refer to the illustration presented. For example, the researcher would tell the child that the word 'book' must be included in their sentence whilst also providing a picture of a girl sat in a library reading a book. The child should generate a sentence similar to "The girl is reading a book." This subtest examines children's ability to formulate sentences when given specific constraints, i.e., syntactic and semantic. A score of two was given when a child produced a complete sentence that was syntactically and semantically correct, that referred to the picture and used the stimulus word appropriately. A score of one was given when a sentence demonstrated the correct structure but with one or two syntactic or semantic errors. A score of 0 was given when any of the following occurred: the required stimulus word was not used, the response was unrelated to the picture, the sentence did not demonstrate an appropriate structure and/or had more than two deviations in syntax or semantics. The test was discontinued after five consecutive scores of 0.

2.10.1.10 Morphological awareness

Morphological awareness was measured using a Word Analogy task taken from Kirby et al., (2012). The researcher orally presented a set of words and the child was asked to complete the set by providing the final word e.g., run: ran:: walk: ?. The researchers explained that the first two words would be related run: ran, and that the next two words should be related in the same way. The child hears the third word *walk* and is asked to work out what should be said next, *walked*. The task consisted of two subtasks; ten inflectional items e.g. push: pushed:: jump: ? *jumped* and ten derivational items e.g. high: height:: long: ? *length*. The words were delivered in a fixed order. Approximately half of the root words had phonological changes e.g., stood–stand and half had no phonological change e.g., walk–walked; six phonological changes for the inflectional items and five for the derivation items. All items were administered on each subtask unless the participant made four consecutive errors, in which case the subtask was discontinued. The child's score was the total number of inflected and derived items correct.

2.10.1.11 Verbal working memory

The Listening Recall test was also taken from the WMTB-C (Pickering & Gathercole, 2001) and was used to measure verbal working memory; to complete this task participants listen to a number of short sentences, at the end of each sentence the child is required to judge the semantic veracity of the sentence by stating whether the sentence is true or false. Followed by their true or false response they must then recall the final word of the sentence, for example the researcher would say "lions have four legs" to which the participant should respond 'true' and then 'legs'. Test trials begin with the child hearing a single sentence but as the child progresses to the succeeding span, a further sentence is added. Children must answer true or false immediately after hearing each sentence, but the final word of each sentence is to be recalled once all sentences have been heard. Testing again discontinues when three sequences in one span are incorrectly recalled.

2.10.1.12 Non-verbal working memory

To measure non-verbal working memory, the backward Spatial Span task of the Wechsler Nonverbal Scale of Ability (WNV; Wechsler & Naglieri, 2006) was administered. Each child was presented with a board on which a number of blocks were attached. The researcher tapped a sequence of blocks with one finger, and the child was required to repeat the same sequence but in backward order. Two sequences were presented at each span. The first span started with two items (taps) and was increased by one item (tap) following the correct response, until a maximum span was reached. If the child succeeded on at least one of the sequences within a span, the child moved on to the next span until both trials were incorrect in any one span. Backward spatial span is recognised as an appropriate measure of nonverbal working memory as it requires multiple units of information to be recalled and manipulated as this information must be reverse-ordered in memory before carrying out the block-tapping sequence (Lezak, 1995).

2.10.1.13 Non-verbal ability

To measure non-verbal ability, the Matrices task of the WNV (Wechsler & Naglieri, 2006) was administered. The instructions were presented with a series of pictures; the pictures reflect what is presented to the child by the researcher, i.e., a pattern with a missing part. Four possible options were displayed, one of which correctly completed the pattern. The child is required to choose an answer from the four options. If the child did not understand the task once looking through the visual information, verbal prompts were used, for example, the researcher pointed to the four possible options and to the missing part and asked "which one goes here?". If a score of 0 was obtained on either of the first two items, the preceding items (items from a younger age group) were administered in reverse order until two consecutive perfect scores were obtained. A score of one point was given per correct response. The test was discontinued if a child scored four consecutive scores of zero.

2.10.2 Details of Time 2 and Time 3

At t2, a measure of multi-word phrase knowledge was administered alongside three assessments of morphological awareness. At the final timepoint, t3, the battery of language, literacy and cognitive tests that was administered at t1 was administered again with some alterations and additions; the t1 morphological awareness measure was replaced by new inflection production and derivation production tasks that were considered to be more comprehensive measures of morphological awareness – this is discussed in further detail below. Non-verbal ability was assessed using the Wechsler Abbreviated Scale of Intelligence–Second Edition (WASI-II; Wechsler, 2011) at t3 rather than using the Wechsler Nonverbal Scale of Ability (WNV; Wechsler, & Naglieri, 2006) as was used at t1; the reason for the change was due to the administration of the WNV task. As will be discussed in Chapter 3, there were some surprising findings in relation to the non-verbal task at t1 and it was thought that the way in which the WNV task is administered, i.e., through limited verbal instruction, may be a confounding factor of the differences observed, or it may, at least, have contributed to some difficulties with the task. The manual encourages the researcher to guide the delivery of the task though non-verbal gestures which was in contrast to all other items where a verbal explanation was provided. Therefore, at t3, a similar non-verbal task, i.e., a matrices task, was administered, but the delivery of this task enabled the researcher to explain the task verbally and thus to examine the language group differences on a non-verbal task when the instructions are provided in a familiar way. Further details of this decision can be found in section 2.10.4. Additionally, at t3, a word association task was administered as well as a measure of polysemous word knowledge. Details of the additional t2 and t3 measures are discussed below.

2.10.3 Time 2 Measures

2.10.3.1 Multi-word phrase knowledge

A bespoke task of multi-word phrase knowledge was employed to assess the receptive knowledge of multi-word units. Riches, Letts, Awad, Dabrowska and Ramsey (in preparation) developed the original measure and have deposited their testing materials in the Open Science Framework (*https://osf.io/u5kqm/*) under the first author's name. The task consists of three distinct categories of multi-word phrases; binomials, collocations and similes. Binomials are x-and-y word sequences where x and y are from the same lexical class. They have a specific word order that is favoured and used by native speakers more frequently than the reverse order, e.g., fish and chips is the favoured word order over chips and fish. Binomials can be literal or figurative and often constitute semantic associates. Notably, frequency, word order preference, i.e., number of occurrences of the forward and reversed form from a corpus, and semantic association are factors that influence binomial processing. The stimuli were originally generated through a multi-stage process; at the outset, items were generated through a brain-storming process by the authors and frequencies were then checked against existing corpora. To facilitate selection of binomials specifically, the authors identified the thousand most frequent binomials in the British National Corpus (British National Corpus, version 2, 2002); the corpus was accessed via an online portal hosted by Brigham Young University (Davies, 2004). The authors then excluded items where the second word contained more syllables than the first word, with the reasoning that children would therefore be unable to make use of a word-length heuristic (Benor & Levy, 2006).

The second category of the multi-word phrase task included collocations; collocations can be very broadly defined as co-occurring word pairs, or combinations of words that are entirely compositional and semantically ‘free’, but which co-occur in conventional and recurrent patterns. The authors included items that consist of Verb + Noun collocations, e.g., make the bed, Verb + Adjective collocations, e.g., go crazy and Adjective + Noun collocations, e.g., hard worker.

The final category of the multi-word phrase task involves similes; similes are sequences of words that compare two items, often used for emphasis or to make a description more vivid, e.g., as quiet as a mouse. The similes followed the structure as + Adjective + as + Noun, or Verb + like + Noun (e.g. as quiet as a mouse, she swims like a fish). The collocations and similes were initially selected via a process of brain-storming and were then presented to 96 native English-speaking adults; the adults were presented with the target item and a distractor item and were asked to select the item that sounded “better”, there was also a third option for respondents to say that neither one sounded better than the other. For the binomials, the distractor consisted of the same words in reverse order, e.g. fish and chips / chips and fish. For the other items, distractors were designed to sound plausible, and be semantically similar to the targets, e.g. fast drink / fast food, go crazy /go sad, as quiet as a mouse / as quiet as a snail. Items were dropped if less than 57% of respondents chose the target. Although this is close to chance the authors argued that including items with a weak collocational relationship may improve the sensitivity of the measure by minimising ceiling effects. The authors measured the internal consistency of the items and removed items that were considered unreliable although the statistics (e.g., cronbach's alpha) were not reported. Their final assessment contained 47 binomials, 9 V + N collocations, 2 V + A collocations, 7 A + N collocations, and 24 similes (89 items in total).

Once they had administered the measure with their participants, a further 10 items were dropped because the performance of the EL1 children fell below chance, according to a binomial probability test ($p < 0.5$). Additionally, a further 34 items were dropped because they yielded an item-total correlation less than 0.2 for both EAL and EL1 children; this is reported to have been calculated using the point-biserial method. Overall 49% of items were dropped due to reliability and validity concerns. The authors report that the internal consistency of the remaining 45 items was investigated using a KR20 analysis (Kuder & Richardson, 1937) and they report that this yielded an alpha coefficient of 0.83, demonstrating strong internal consistency (Kline, 2000). Their measure was originally developed to be used with Key Stage 1 children (mean age 6;2) and as such there were concerns that the task may not be suitable for use with the older children in this study. It was thus adapted for this study in an effort to reduce possible ceiling effects; an items analysis was conducted on the 45 items that were included in the final analyses carried out by Riches et al. (in prep); items with a percentage of over 85% correct were removed with the intention of minimising ceiling effects. The task was thus reduced to 36 items, which have, in this study, been explicitly grouped into the three distinct categories; binomials which consisted of 8 noun + nouns items, e.g., fish and chips, 2 verb + verb items, e.g., read and write, 1 preposition + preposition item, in and out, and 1 adjective + adjective preposition, black and white; collocations, which can be further divided by word class groupings and consisted of 5 verb + noun collocations, e.g. make the bed, 2 verb + adjective collocations, e.g. go crazy, 4 adjective + noun collocations, e.g. scary monster and 1 adverb and noun collocation, hard worker; and finally, the similes consisted of 11 as + Adjective + as + Noun, e.g., as light as a feather, or Verb + like + Noun, e.g., she swims like a fish. While all 36 items seemed likely to be encountered by children, the authors did not report whether this was considered systematically during the creation of the measure.

In this study, the MWP task was delivered as a language detective task in which the children were asked to play the role of detective in deciding which sentence sounded right. To complete the task, the children were presented with a booklet that consisted of two items per page; on each page was an image of one correct MWP and one distractor phrase, e.g., as good as gold vs as good as diamonds. The distractors were designed to sound plausible and semantically similar. The researcher presented the items by saying out loud both the correct phrase and the distractor phrase out loud whilst pointing to the corresponding picture. Items were delivered in a fixed random counterbalanced order, that is, an equal number of items were delivered with the distractor phrase first followed by the target phrase and vice versa. All children were given three practice trials. The children were asked to select the phrase that they thought sounded right – they could do this orally or by pointing to the appropriate picture. For the collocations and the similes, the first part of the item was written at the top of the page, e.g. the word do was printed for the item do some damage. The researcher said the word at the top of the page, then produced the collocations while pointing at the pictures from left to right, e.g. do (points to picture on the left) some damage, do (points to the picture on the right) a mess. For the binomials, there were no words printed just a depiction of the relevant items. The final 36 items that were used in the measure of MWP knowledge in this study are presented in Appendix 2.

2.10.3.2 Morphological awareness

Children completed three morphology tasks taken from a bespoke test battery of morphological awareness developed by Cain and James (2014). The full battery included three aspects of morphological awareness comprised of; two compounding tests, two inflectional morphology tests and two derivational morphology tests. Due to time restrictions in data collection, the full comprehensive test battery was reduced from six tests to three. A decision was made to exclude the compounding tests from the assessment battery. Because compounding involves combining root words together as opposed to attaching affixes to root words, it was thought that examining knowledge of inflectional morphology and derivational morphology may be more informative in terms of understanding whether children learning EAL have specific difficulties with morphological awareness. Thus, this study examined knowledge of inflectional morphemes and derivational morphemes. For each aspect of morphology, the original test battery consisted of a judgement task and an analogy task. As stated, for time purposes, a decision was made to reduce the number of tests; building on previous research, and because derivational morphology is thought to become increasingly more predictive of reading comprehension, both the analogy and judgement task of derivational morphology were included in this study. For inflectional morphology, however, only the production task was employed.

2.10.3.2.1 Inflectional morphology

The three classes of inflections that were included in this task were; singular present tense, singular past tense and plural nouns. Half of the items were real words and half of the items were nonsense words, with an equal number of each across the three categories. Furthermore, half of the items in each category involved regular transformations and half involved irregular forms. The age of acquisition (AoA) for all real word items was less than 6 years 6 months (Kuperman, Stadthagen-Gonzalez, & Brysbaert, 2012) and the items were delivered in a fixed random order.

Analogy Task. Much like the t1 task, children were presented with a pair of words and were required to decompose the morphological relationship between the words in order to complete the pattern. For example, toy: toys:: car: ___ *cars*. For the inflection production task, three practice items and 24 test items were visually and orally presented to each child individually by the researcher and children were required to give an oral response. There were an equal number of real words and non-word items. Each test item was delivered with a real-word example. Half of the items required children to produce the same inflected form as the example – these items were considered to be morphophonemic items., i.e., children could complete the task through an understanding of the morphological change or through an understanding of the phonological change, e.g., lake: lakes :: lemon: lemons, and half required children to produce a different inflected form, i.e., could only be solved with a morphological understanding, e.g., child: children:: beach: beaches. Each correct answer was given a score of 1. For the nonsense items a score of 1 was given to any suffix that produced the same morphological function, thus irregular suffixes were acceptable e.g., hop: hopped:: trun: trunned or tran would be given a score of 1. This task gives a maximum total of 24 points.

2.10.3.2.2 Derivational morphology

Test items assessed five morphological transformations: noun-to-noun, noun-to-adjective, adjective-to-noun, verb-to-adjective and verb-to-noun. As with the inflection words, all real word stems had an AoA that was less than 6 years; 6 months (Kuperman et al., 2012).

Analogy task. Children were presented with three practice items and 20 test items; the task was administered as described for the inflection analogy task. Again, the items consisted equally of real words and nonsense words as well as being comprised of an equal number of items that were either phonologically transparent or that required a phonological change. Each correct answer was given a score of 1 with a maximum score of 20 points.

Judgement task. Three items and 20 test items were verbally and orally presented to each child individually. The stem-word for each test item was presented together with an indicator of its word class (e.g., to, the, it is). Children were asked to complete a sentence by selecting the most appropriate word from a choice of three variations of the stem word. For example, “To farm. I want to be a farmer / farmist / farming.” Each test item offered the same three categories of variations; the correct form / an incorrect answer formed using a suffix that was syntactically appropriate but incongruent with the initial word class / an inflected form. Children were given a syntactic cue towards the correct form but have little semantic information available for support. The task allows for a maximum score of 20.

2.10.4 Time 3 Measures; Changes to the Time 1 Assessment Battery

2.10.4.1 Non-verbal ability

As outlined above, non-verbal ability was assessed at time 3 using the Wechsler Abbreviated Scale of Intelligence–Second Edition (WASI-II; Wechsler, 2011) rather than using the Wechsler Nonverbal Scale of Ability (WNV; Wechsler, & Naglieri, 2006). Because the t1 results yielded unexpected language group differences on the non-verbal measure, the potential reasons for the observed language group difference were considered. One suggestion was that the delivery of the measure may have been problematic; the non-verbal nature of the measure may have confused participants, and potentially, EAL children who may have less experience with test formats may not have fully understood what was required of them. This is of course speculative and the empirical evidence for this is limited, but a decision was made to employ a task of a similar nature at t3 but one in which the administration involves more direction from the researcher. The task chosen was again a matrices reasoning task in which children are required to complete a pattern by selecting one of five options though the WASI-II enables a verbal introduction to the task by the researcher.

2.10.4.2 Polysemous word knowledge

To extend the understanding of vocabulary depth and how this compares for EAL and EL1 children, a decision was made between t1 and t3 to include additional measures of vocabulary. Polysemous words have the potential to cause some confusion; they are words that can be used both in a casual, everyday sense but also in an extended more abstract sense, often used in academic contexts, for example, the word followed can have a literal, every day sense e.g., the puppy followed the children through the forest, and an abstract, academic sense e.g., I followed the author's argument through the book. Thus, meanings are different but related and dependent on the context in which they are found in.

A measure developed by Logan and Kieffer (2017) was employed in this study. To complete the task children were required to choose the meanings of seventeen words that appeared in two different sets of sentences (therefore, a total of 34 sentences); sentences were read aloud and simultaneously presented in written format to the children by the researcher. The target word was written in bold, and following each sentence children were given five options to choose from that would explain the bold word's meaning, e.g., *her **flexible** nature made her easy to like* followed by the five following options *a) easily movable b) thin c) easy-going d) funny e) smart*. Again, the options were presented both orally and visually. The task is attached in the appendices, see Appendix 3 (with minor changes from the original task, such as changing American-English spellings to British-English spellings e.g., favorite to favourite, and similarly, culturally comparable words were replaced, e.g., president to prime minister). The original task can be found on the following digital archive, *https://archive.nyu.edu/handle/2451/37858* and details of how the original task was developed is explained by Logan and Kieffer (2017) which followed a systematic and clear approach. The authors report good internal consistency reliability coefficients for the casual set of items and the academic set of items and this was followed with confirmatory factor analyses to examine whether the task assessed two distinct dimensions, they used item response theory to test this hypothesis and report that the two-factor models provided better goodness of fit than the one-factor models. In agreement with the results presented in Kieffer and Logan's (2017) study and the conclusion that they draw, this study adopted the measure as it taps the two closely related but distinct dimensions of polysemy and is thus considered to be an acceptable measure of polysemous word knowledge. One potential problem, however, was that the task was used in their study with children aged 12.6 years old (mean age; sd = 0.56). At t3 participants in this study would be in Y4 (aged 8-9) and Y6 (aged 10-11). The researcher spoke to teachers who worked in these years groups and asked whether they thought children would be familiar with the word and sentence meanings; most teachers responded that children would be familiar however there were a number of items that the younger year group may find quite challenging. Because of this and because the task was originally carried out with seventh grade students, a decision was made to only administer this task with the older children. The task contains 34 items and correct responses are given a score of 1, making the highest achievable raw score 34, and the lowest raw score 0. There was no time limit in which children had to select an answer.

2.10.4.3 Word associations

To further examine vocabulary knowledge beyond single-word knowledge, a measure of word association was chosen and administered, though unlike the measure of polysemous word knowledge, both year groups completed the word association task. Word associations tap into learners' mental lexicons by examining the links that can be made between words, whether that is through counting the number of responses provided by a participant or through examining the types of associations being made. This study employed the Word Associations subtest of the Clinical Evaluations of Language Fundamentals – Fourth Edition (CELF-4; Semel et al., 2006). The task comprises three categories; an animal category, a food category and a job category. Children are given 60 seconds for each category and are asked to name as many items as they can. The task was administered and scored according to the manual. Each correct response is given a score of 1, repeated items are not counted. To examine the responses in further detail, i.e., to examine the way in which EAL and EL1 children organise their responses, a scoring system was developed in addition to the manual scoring system. This scoring system enabled the researcher to examine the associations between responses in further detail, specifically allowing further understanding of how EAL and EL1 children compare in their retrieval and production of semantic associations. As children gave their responses, the researcher wrote them down. The task was also audio-recorded so that answers could be transcribed and scored following the task where in-the-moment transcribing and scoring was not possible, i.e., participants spoke quickly and had many answers to give. To examine the associations between the responses, the researcher looked through the answers provided by the participants in order to understand whether there were any clear groupings within the sub-categories and to assess whether it would be plausible and/or worthwhile to investigate this avenue further. The animal category enabled participants to group animals in a way that could be examined relatively objectively, e.g., 'animals from the cat family' were clustered, or 'reptiles' were clustered. While the foods category could be grouped into vegetables or fruit for example, the groupings were not always obvious and there seemed to be a high level of assumption on part of the researcher for why food might be grouped, for example pizza followed by cake may have been grouped by the child because this is popular food at British birthday parties, however decisions made by the researcher were much less objective for this category. For the job category, semantically linked responses were even less clear. Therefore, a semantically linked score was derived but this was done using only the animal category responses. Several clear semantic associations were recognised in this scoring system: i) the natural habitat of the animals e.g., woodland animals/desert animals, ii) the animal family to which the animals belong e.g., the cat family, iii) domesticated animals, iv) farm-yard animals and v) animal class, e.g., reptile. The way in which the responses were analysed is explained through the following example; Participant X provided 8 responses: dog, tiger, lion, cat, leopard, giraffe, monkeys, baboons. Dog and tiger are the example given in the CELF-4 task, but are acceptable answers as per the manual nonetheless. Because dog and tiger are offered as examples by the researcher during the administration, when provided as the first two answers, dog and tiger were not considered to be semantically associated i.e., as mammals, rather they were thought to be recalled from recent memory. For this reason, dog was not considered to be semantically linked to tiger in the example. Tiger, lion, cat and leopard were all considered semantically linked, i.e., as members of the cat family, and then, leopard and giraffe were considered semantically linked, i.e., both survive on arid land and in dense forests as natural habitats. Giraffe and monkeys whilst not obviously linked were accepted as semantically linked in that both are mammals and are native to countries overseas, and finally monkeys and baboons were semantically linked given that both are catarrhine primates. Thus, of the 8 responses, 7 were semantically linked to at least one of their neighbours. This was then calculated as a percentage, 7/8 = 0.875 x 100. Therefore, Participant X achieved a semantically linked score of 88%. A second researcher was given a verbal explanation of how the animal category was scored and was asked to score a randomly selected 10% of the sample. Cohen's *k* was run to determine whether there was agreement between the first and second researcher on the extent to which responses were semantically associated, the agreement was high at k = .90, p <.001. As such the first researcher followed the scoring system to calculate all children's semantically organised responses.

2.10.5 Reliability

Table 2.5 provides a summary of all the tests used in the study and gives their reliability coefficients; some of which were published in the manual, others have been computed using the study's data either due to an altered scoring system, because of the use of a bespoke measure or because they were not provided in the manual. Where reliability has been calculated, the age range that is provided is the age group of the participants in this study and not the age range that the task accommodates for. Where tasks were used more than once, the reliability coefficient is reported from the first point of testing.

Table 2. 6

Published and computed reliability coefficients for t1 language and literacy tests

Test	*Reliability (Cronbach's α)*	*Age Range for Reliability Calculation*	*t1*	*t2*	*t3*
*YARC Reading Comprehension Y2**	*.92*	*6;0;7-11*	✓		✓
*YARC Reading Comprehension Y4**	*.87*	*8;0-9;11*	✓		✓
*DTWRP Total Word Reading**	*.93*	*6;0-9;11*	✓		✓
PhAB Spoonerisms~	*.95* *.93*	*6;0-7;11* *8;0 -9;11*	✓		✓
*WASI-II Vocabulary Definitions**	*.91*	*6;0-9;11*	✓		✓
*BPVS Receptive Vocabulary**	*.88*	*6;0-9;11*	✓		✓
*CELF-4 Understanding Spoken Paragraphs**	*.82*	*6;0-9;11*	✓		✓
*CELF-4 Formulated Sentences**	*.92*	*6;0-9;11*	✓		✓
*CELF-4 RAN**	*.81*	*6;0-9;11*	✓		✓
*t1 Morphological Awareness**	*.87*	*6;0-9;11*	✓		
*t2 Morphological Awareness:** *Derivation Judgement Task* *Derivation Production Task* *Inflection Production Task*	 *.74* *.81* *.70*	*7;00-10;11*		✓	✓
WMTB-C Non-word Repetition~	*.56*	*5;0-15;11*	✓		✓
WMTB-C Listening Recall~	*.83*	*5;0-15;11*	✓		✓

*WNV Non-verbal Working Memory**	*.72*	*6;0-9;11*	✓		
WNV Matrices~	*.91*	*4;0-21;11*	✓		
*Multi-word Phrase Knowledge**	*.82*	*7;0-10;11*		✓	
*Polysemous Word Knowledge**	*.80*	*10;0-11;11*			✓
*Word Associations**	*.71*	*8;0-11;11*			✓
*WASI non-verbal**	*.78*	*8;0-11;11*			✓

* Cronbach's alpha based on raw data; ~ reliability from manual

2.10.6 Background Questionnaires

At t1, language background questionnaires were sent to the parents of the EAL children. Given that parents could potentially have varying degrees of English proficiency, the questionnaires were developed with this in mind. Pictorial cues were provided and instructions were made as clear as possible. Despite this, less than half of the questionnaires were returned. At t2, a questionnaire was developed and administered for use with the children themselves. This allowed for the same data to be collected for all participants. The questionnaires provided information on language use at home, including frequency and which languages were spoken with whom, the questionnaires were relatively short to administer, taking approximately 5 minutes. The child questionnaire can be found in Appendix 4 and the parental questionnaire in Appendix 5.

2.11 Piloting the Research Design

Though not a pilot study, per se, prior to collecting data at t1, the researcher administered the measures and running order of the measures with an EAL child known to the researcher. Parental approval was sought and the sessions took place on 3 separate occasions as per the schedule designed for phase 1 of data collection. Because many of the assessments were standardised assessments created with monolingual children in mind, it was considered necessary to gauge the appropriateness of the tasks for use with EAL children. Furthermore, this was also an opportunity also for the researcher to practise administering the tasks, and to ensure that the running order of the tasks was appropriate, i.e., to ensure the testing session was suitably timed and to gauge the level of interest for the various tasks. This was done on three separate occasions in December 2015 with one EAL participant, prior to t1 data collection. Although this was not an exhaustive pilot study, the nature of the research project, i.e., the longitudinal design, did not allow for an extensive piloting phase, nor was it deemed necessary. Despite the small-scale pilot, a number of changes were made following a review of the sessions; the phonological awareness task that was used in this session was taken from the CELF-4 and took longer to administer than anticipated. While the task was of value, a decision was made for purposes of time, to administer a shorter phonological awareness task. Given that the literature largely suggested that phonological awareness was not a typically problematic component of the reading process for EAL children, the replacement of the CELF-4 task with the spoonerisms subtask of the PhAB was a theoretically informed decision. Additionally, the running order was tweaked following the observed preference of some of the tasks. That is, tasks that elicited a more favourable response were distributed more evenly throughout the sessions in order to circumvent a potential lack of engagement. The running order of tasks and the approximated time are presented in Table 2.7.

Table 2. 7
Schedule of data collection: running order and timings

	Measure	Time Approximation
Time 1: Session 1		30 minutes
	YARC Reading Comprehension	
	Y2: Passage 1, 2 & 3	
	Y4: Passage 3, 4 & 5	
	WMTB-C Non-word Repetition	
	WMTB-C Listening Recall	
	Morphological Awareness (Kirby et al.)	
	DTWRP Total Word Reading	
Time 1: Session 2		30 minutes
	WNV Non-verbal Working Memory	
	WASI-II Vocabulary Definitions	
	WASI non-verbal	
	PhAB Spoonerisms	
	CELF-4 Formulated Sentences	
Time 1: Session 3		30 minutes
	BPVS Receptive Vocabulary	
	CELF-4 Understanding Spoken Paragraphs	
	CELF-4 RAN	
Time 2:		30 minutes
	Multi-word Phrase Knowledge task (Riches et al.)	
	Morphological Awareness: Inflection Production & Derivation Production (Cain & James)	
	Child Language Questionnaire	
Time 3: Session 1		30 minutes
	YARC Reading Comprehension	
	Y4: Passage 3, 4 & 5	
	Y6: Passage 5 & 6	
	WMTB-C Non-word Repetition	
	WMTB-C Listening Recall	
	Morphological Awareness (Cain & James)	
	DTWRP Total Word Reading	
Time 3: Session 2		30-40 minutes
	WASI-II Vocabulary Definitions	
	WNV Matrix Reasoning	
	PhAB Spoonerisms	
	CELF-4 Formulated Sentences	
Time 3: Session 3		30-40 minutes
	BPVS Receptive Vocabulary	
	CELF-4 Understanding Spoken Paragraphs	
	Polysemous Word Knowledge (Logan & Kieffer)	
	CELF-4 Word Associations*	
	CELF-4 RAN	

2.12 Research Procedure

The measures were administered in a quiet space in participants' schools, though this space varied slightly from school to school, that is the back of a staff room/an individual study space/ a corridor. The researcher worked with each child individually on multiple occasions. As can be seen in Table 2.7, at t1 and t3, each participant was seen for 3 x 30 minute sessions, each of which took place on different weeks. At t2, participants were seen only once for one 30 minute session. The researcher made every effort to ensure that the testing space was a quiet undisturbed space but due to limited space and resources within schools, the testing environment was sometimes in shared areas or in a space in which people walked through. On a number of occasions, the researcher paused tasks where unpreventable disruption occurred. Each session was organised to include varied tasks/testing formats to increase motivation and engagement and to avoid fatigue. Tasks that were seemingly more enjoyable in the pilot, e.g., word reading and RAN, were included at the end of sessions. Every effort was made to make the children feel relaxed throughout testing and all children were given a sticker at the end of each session and were thanked for their hard work and efforts.

2.13 Ethical Considerations

Ethical clearance for the full study was provided by the University of York's Department of Education Ethics Committee. Schools were contacted via email and telephone, and were sent an information sheet detailing the aims and design of the project. Upon expressing an interest in participation, the researcher met with the relevant gatekeeper of each school (head teacher, deputy head teacher or EAL co-ordinator) and discussed some of the more fine-grained and practical details. When gatekeepers approved the school's participation, letters were sent to the parents of children in Year 2 and Year 4. The letters included information concerning the project's aims, details of the timeline of the project and an overview of the tasks children would complete given parental consent. The letter was written in a way that aimed to be accessible for all parents, including parents with potentially lower levels of English proficiency, this followed typical school procedure of accessing parents through letters sent home. However, one school had an open-door policy in which parents were invited to come into the classroom for 5-10 minutes on a morning before the school day began to look through work books/talk to the teacher/ask questions etc. In this school, letters were hand delivered to the parents together with a brief discussion of what the project entailed. The study followed an opt-in policy; together with the letter outlining the relevant details of the project, a consent form was sent to parent. This meant that children were only eligible to participate if the consent form had been returned and signed. The principles of confidentiality and anonymity were followed during the data collection process, that is, on all testing booklets children were identified by a unique code rather than by name and access to the data was limited to the researcher. All physical data for the project was stored securely in locked filing cabinets. Prior to beginning the data collection process, a Disclosure and Barring Service (DBS) check was obtained and the researcher was familiarised with safeguarding and child protection policies set out by BERA, BPS as well as each school's individual policy.

Chapter 3 - The Language and Literacy Skills of Children Learning EAL and Monolingual English-speaking Children: A Cross-sectional Analysis

3.1 Introduction

The aim of this chapter was to examine the English language and literacy skills of children learning English as an Additional Language (EAL) and of monolingual English-speaking children (EL1) in Year 2 and Year 4. The chapter examines a number of skills that have previously been identified as contributors and/or key predictors of successful reading comprehension and reading variance (e.g., Cain & Oakhill, 2006; Ehrlich, Kurtz-Costes, & Loridant, 1993; Perfetti, Marron, & Foltz, 1996; Stanovich, 2000). Ultimately, and as discussed in Chapter 1, the existing literature suggests that EAL children have age-appropriate word reading skills but have difficulty comprehending written text. Within EL1 samples, this profile of skills is typically identified as the *poor comprehender profile*, however the reason underpinning this profile for EAL learners is thought to be different to that of EL1 learners, that is, EAL children typically have weaker language skills from a limited exposure to English, and not a language deficit or delay as is thought of EL1 children with this profile (Spencer & Wagner, 2018). In order to gain more insight into the reading comprehension skills of EAL children, this chapter explored how EAL and EL1 children compare, as well as how good and poor comprehenders of both language groups compare. To examine group differences, the t1 cross-sectional data was analysed using multivariate analyses of covariance (MANCOVA); this enabled the comparison of skills between groups (i.e., EAL and EL1 children) and regression analyses were also performed allowing for an examination of the extent to which language and literacy skills concurrently contributed to reading comprehension for EAL and EL1 children.

It is widely accepted that reading comprehension is a multidimensional process in which a number of skills underpin specific aspects of reading (Bernhardt, 2011; Grabe, 2009). The component-skills approach suggests that reading is comprised of multiple cognitive processes and that each of these subskills should be measured separately (e.g., decoding, vocabulary knowledge). Such methodology allows researchers to observe the individual and collective contribution each sub-skill makes to reading comprehension (Carr & Levy, 1990; Stanovich, 2000) and has been considered the most appropriate approach to adopt within this research study.

As children move from being novice to skilled readers, research suggests that the relative contribution of sub-skills will change over time. That is, as children become competent decoders, the relative contribution of this skill decreases and underlying oral language processes begin to carry greater weight as predictors of reading comprehension (e.g. Gough et al., 1996; Joshi et al., 1998; Vellutino, Tunmer, Jaccard, & Chen, 2007). In line with this, it is predicted that developmental differences will be observed in this study. That is, the relative contribution of the concurrent predictors of reading comprehension will differ by age, with oral language skills accounting for more of the variance of reading comprehension among the Y4 children than the Y2 children.

While much is known regarding the reading development of EL1 children, it is less clear whether children learning EAL in the UK follow the same pattern of development. The lack of clarity stems from the limited amount of research among this group of learners. Further afield, research suggests that children learning the majority language as an L2 typically acquire comparable word reading skills to their monolingual peers (see Lesaux & Geva, 2006; Lipka & Siegel, 2007; Mancilla-Martinez & Lesaux, 2011), but often achieve lower levels of oral language and reading comprehension proficiency (Carlisle et al., 1999; Geva, 2000; Kovelman et al., 2008; Lervåg & Aukrust, 2010; Proctor et al., 2005). Further, Melby- Lervåg and Lervåg (2014) conducted a meta-analytic review of studies comparing reading comprehension and the skills that underpin this process in monolingual and language-minority learners and concluded that language-minority learners need further support with language comprehension skills. The international findings suggest, then, that reading comprehension problems for language-minority learners stem from difficulties with language comprehension in the second language as opposed to weaknesses in word reading.

Although international research may indicate that the nature of reading development will differ between EAL and EL1 children, it cannot be assumed that these findings can be generalised to the UK context where there are considerable demographic, social, cultural and educational differences. However, to summarise the literature presented in Chapter 1, the small but growing body of research that has been conducted in the UK does suggest that EAL children often score significantly below their EL1 peers on measures of reading comprehension (e.g. Beech & Keys, 1997; Burgoyne et al., 2009; Burgoyne et al., 2013; Hutchinson, Whiteley, Smith, & Connors, 2003; Rosowsky, 2001). In the pre-school years, EAL children have demonstrated lower levels of English vocabulary in comparison to their EL1 peers (Dockrell, Stuart, & King, 2010). Although this finding may not be surprising considering their limited exposure to English, further research suggests that poor vocabulary skills may persist through the primary school years (Burgoyne, 2009, 2011).

Burgoyne et al., (2011) report English vocabulary as a significant predictor of comprehension for both EAL and EL1 children, though they argue that weaker English vocabulary skills within the EAL group limits the extent to which they are able to comprehend written and spoken language in English. They further speculate that the reciprocal relationship between vocabulary knowledge and comprehension could result in increasing gaps in comprehension between EAL and EL1 children over time. There are too few longitudinal research studies that examine the reading development of EAL children in the UK to confirm or reject this hypothesis; however, it is the intention of this thesis to extend the scope and understanding of EAL reading development that currently exists. This chapter will focus on a single time point within two separate year groups; the intention of this chapter is to understand the language and literacy skills of EAL children at different stages in their development and how this compares to that of EL1 children matched by age.

3.1.1 Chapter 3 Research Questions

Specifically, this study will address three main research questions:

1. How do EAL and EL1 children's cognitive, language and literacy skills compare in i) Y2 and ii) Y4?

2. To what extent do language skills concurrently contribute to reading comprehension for EAL and EL1 children in i)Y2 and ii)Y4?

3. How do the language skills of EAL children compare to that of EL1 children in i) Y2 and ii) Y4?

4. How do the language skills of EAL children who are good and who are poor comprehenders i) compare and ii) compare to that of EL1 children who are good and poor comprehenders?

In consideration of the literature, it is predicted that the EL1 children will outperform their EAL peers on measures of vocabulary and reading comprehension. It is also predicted that the contribution of language skills to reading comprehension for EAL children will differ between Y2 and Y4, with oral language skills accounting for more of the variance for the older children. There are few studies comparing good and poor comprehenders across EAL and EL1 populations, therefore this will be an exploratory component of the chapter, though in view of the literature that currently exists, it is predicted that children with similar levels of reading comprehension will also be closely matched on measures of language ability irrespective of language background.

3.2 Method

3.2.1 Participants

In total, data were collected from 110 children at t1 (February 2016-July 2016); of the Y2 children 26 were identified as learning EAL and 23 were monolingual English-speaking children, and of the Y4 children, 34 were EAL and 27 EL1. The participating children attended one of three primary schools in the West Yorkshire region. The children learning EAL spoke their L1 in the home, to some extent; they were selected based on the school and teacher knowledge of L1 use in the home. The L1s spoken by the EAL pupils included Punjabi (26 EAL pupils); Urdu (7); Portuguese (5); Mandarin (3); French (3); Arabic (2); Lithuanian (2);

Polish (2); Twi (2); Bengali (1); Hungarian (1); Italian (1); Mandinka (1); Potwari (1); Shona (1); Tamil (1) and Tigrinya (1). Though the gender split was relatively equal for the children in Y2 (46% boys), it was less equal for the children in Y4 (30% boys). The average age, in months (sd), of the Y2 children was 85 (3.75) and the Y4 children, 109 (4.09).

3.2.2 Measures

13 individually administered tests made up the t1 assessment battery and are listed below, details of the assessments can be found in Chapter 2, Section 2.9.

The York Assessment of Reading Comprehension (YARC; Snowling et al., 2009) was used to assess text reading accuracy, fluency and comprehension.

Verbal working memory and non-verbal working memory was assessed using two subtests of the *Working Memory Test Battery for Children* (Pickering & Gathercole, 2001) were administered; The *Non-word List Recall* and the *Listening Recall*.

Word reading was tested using the *Diagnostic Test of Word Reading Processes* (Forum for Research into Language and Literacy, 2012)

Morphological awareness was measured using a *Word Analogy* task taken from Kirby et al., (2012).

Non-verbal ability and non-verbal working memory were assessed using the *Wechsler Nonverbal Scale of Ability* (Wechsler & Naglieri, 2006) was used to measure

To measure non-verbal working memory, the backward *Spatial Span* task was administered.

Expressive vocabulary was assessed using the *Vocabulary* subtest from the *Wechsler Abbreviated Scales of Intelligence* (Wechsler, 1999).

The Spoonerisms subtest of the *Phonological Assessment Battery* (PhAB) (Frederickson, Frith & Reason, 1997) was administered to assess phoneme-level awareness skills.

Receptive Vocabulary was assessed using *The British Picture Vocabulary Scale - II* (Dunn et al., 1997).

Children's expressive grammar, speed of lexical access and listening comprehension skills were assessed using *The Clinical Evaluation of Language Fundamentals – Fourth Edition* (CELF-4) (Semel, Wiig & Secord, 2003), the three subtests selected were: *Formulated Sentences, Rapid Automatic Naming* (RAN) and *Understanding Spoken Paragraphs.*

3.2.3 Procedure

All tests described above were conducted in a quiet space in the children's schools during three half hour sessions on separate days. All tests were administered individually and test order was held constant across all children.

3.3 Results

3.3.1 Descriptive Statistics

Descriptive statistics for the whole sample's raw scores, split by year group, are presented in Table 3.1. Distributions for most variables were acceptable, however a slight negative skew was observed for both Y2 and Y4 for reading accuracy. For Y4 only, a negative skew is also observed on measures of verbal working memory and exception and regular word reading. The skewness on word reading may be explained through approaching ceiling effects, indeed 81.5% of the Y4 sample scored 25 and above out of 30 on measures of regular word reading. Conversely, a highly positive skew is observed for both year groups on the time taken and errors made for Rapid Automatic Naming (RAN), though, the direction of the skew is unsurprising for this measure considering that a lower score corresponds to higher performance.

Table 3.2 displays the group means for the monolingual children and the EAL children in each year group. The data is presented here in its raw descriptive form, though further inferential analyses will be carried out to examine the differences between the two language groups.

Table 3.1
Language and literacy: descriptive statistics for whole sample (Y2, n=49; Y4, n=61)

	Year 2				Year 4			
Measure	Mean (SD)	Range	Skewness	Kurtosis	Mean (SD)	Range	Skewness	Kurtosis
Reading Rate	49.16 (15.78)	5-70	-1.057	.546	64.69 (18.3)	2-86	-1.160	1.24
Reading Accuracy	41.90 (12.09)	16-59	-.753	.077	53.16 (11.19)	26-70	-.572	-.52
Reading Comprehension	11.49 (6.63)	0-22	-.259	-1.037	10.48 (5.99)	0-21	.070	-1.11
Phonological Memory	12.82 (2.97)	6-19	-.167	-.426	14.15 (3.15)	7-20	-.350	-.31
Verbal Working Memory	8.69 (3.80)	0-16	-.243	-.249	11.93 (3.83)	0-18	-1.012	1.60
Non-word Reading	14.16 (6.91)	3-28	.388	-.950	19.56 (7.58)	3-29	-.740	-.67
Exception Word Reading	15.67 (6.73)	2-26	-.464	-.744	21.82 (5.89)	4-30	-1.120	.63
Regular Word Reading	18.73 (6.57)	5-28	-.610	-.668	24.46 (5.73)	8-30	-1.559	1.51
Morphological Awareness	7.31 (4.23)	0-16	.468	-.556	10.66 (4.42)	1-19	-.124	-.75
Non-verbal Working Memory	3.98 (2.12)	1-8	.069	-1.459	5.56 (1.88)	1-10	-.316	.027
Expressive Vocabulary	13.02 (5.05)	0-31	.451	3.454	20.27 (8.07)	2.5-34	-.074	-1.17
Non-verbal Ability	14.73 (3.82)	8-24	.023	-.518	17.20 (3.80)	9-30	.435	1.22
Phonological Awareness	13.61 (7.38)	2-30	.317	-.555	18.93 (7.66)	5-30	-.160	-1.32
Expressive Grammar	24.08 (9.45)	8-45	.250	-.757	31.66 (9.04)	0-46	-.340	-.66
Receptive Vocabulary	87.59 (18.42)	56-131	.207	-.524	104.00 (22.36)	63-148	-.015	-.94
Listening Comprehension	9.24 (2.65)	3-14	-.241	-.749	11.05 (2.76)	3-15	-.983	.64
RAN (in seconds)	100.08 (27.13)	68-194	1.683	2.780	83.51 (51.46)	45-442	5.901	40.45
RAN (errors)	3.12 (5.97)	0-25	2.778	7.247	1.48 (2.91)	0-17	3.677	15.46

On initial examination of the mean scores presented in Table 3.2, the raw scores revealed that the EL1 children in both year groups outperformed the EAL children on all variables. These group differences will be explored in further detail.

Normality tests were run on the variables showing skewness greater than +/-1, and all had distributions considered to be non-normal as determined by the Shapiro-Wilk statistic, $p < .05$. Variables were thus subjected to square root transformations, making the distributions acceptable for the parametric statistical techniques that follow. While the transformations generated normally distributed scores, the RAN task still demonstrated a slight skew. The RAN error and RAN time scores were log transformed which helped to reduce the skew, however the non-normal distribution for the RAN measures were explained by a number of outliers. Inclusion of the outliers would exert considerable influence on the outcome, particularly as the sample is reduced when comparing EAL and EL1 children within each year group, and this also violates the assumptions of carrying out a MANOVA. For the purposes of the following inferential analyses, a decision was therefore made to exclude the outliers from the following inferential analyses (n=3; 2 EAL, 1 EL1); the extensive length of time and/or number of errors made by these three participants suggests that their difficulty to complete the task was perhaps underpinned by a task-specific issue, i.e., not knowing the correct shape/colour names, which may not be reflective of the average language group abilities, therefore the exclusion of the outliers was deemed appropriate.

Table 3. 2
Mean raw scores for language groups in Y2 and Y4

Measure	Year 2		Year 4	
	EAL	EL1	EAL	EL1
Reading Rate	46.87 (16.57)	51.67 (14.85)	65.00 (16.49)	66.67 (18.98)
Reading accuracy	42.87 (8.64)	46.24 (10.43)	52.66 (9.40)	55.41 (11.75)
Reading Comprehension	9.83 (5.31)	15.71 (5.16)	7.41 (4.32)	14.52 (5.45)
Phonological Memory	12.39 (3.26)	13.33 (2.46)	14.03 (2.42)	14.70 (3.59)
Verbal Working Memory	8.65 (4.17)	9.62 (3.28)	11.66 (3.73)	13.00 (2.87)
Word Reading	49.26 (16.89)	54.71 (16.53)	66.12 (14.33)	68.22 (19.51)
Morphological Awareness	7.22 (4.18)	8.48 (4.11)	10.03 (3.99)	11.85 (4.61)
Non-verbal working memory	3.30 (2.12)	5.19 (1.63)	5.28 (1.85)	6.19 (1.52)
Expressive Vocabulary	11.96 (3.87)	14.91 (5.39)	16.375 (6.21)	25.704 (6.47)
Non-verbal ability	13.09 (3.38)	16.95 (3.12)	15.59 (2.95)	19.48 (3.39)
Phonological Awareness	13.00 (7.91)	15.57 (6.79)	17.69 (6.58)	21.11 (8.35)
Expressive Grammar	21.83 (7.25)	29.05 (9.59)	27.88 (7.60)	36.81 (8.24)
Receptive Vocabulary	79.43 (14.48)	100.90 (14.83)	91.22 (16.97)	120.63 (16.95)
Listening Comprehension	8.83 (2.67)	10.05 (2.64)	10.22 (2.80)	12.30 (2.07)
RAN (no. of errors)	4.46 (7.52)	1.61 (2.98)	2.21 (3.68)	.56 (.85)
RAN (in seconds)	104.72 (29.83)	95.30 (23.43)	91.41 (67.03)	73.56 (14.98)

3.3.2 Group Differences

1. How do EAL and EL1 children's cognitive, language and literacy skills compare in i) Y2 and ii) Y4?

MANOVAs were run in order to examine the differences between the EL1 children and the EAL children in Y2 and Y4 on constructs associated with successful reading comprehension. When broken down into year group, sample sizes were reduced and the number of variables (i.e., the large battery of tests) was high - for this reason, the variables that were highly correlated and that were theoretically thought to contribute to the same underlying construct were aggregated into composite variables, which will be discussed in further detail in Section 3.3.2.2. The creation of composite variables adhered to the assumption that variables should be largely uncorrelated whilst also reducing the number of estimated parameters of the model. That is, for MANOVAs, one degree of freedom is lost per dependent variable entered into the analysis. Therefore, reducing the number of variables was both necessary and appropriate to enable comparisons of the two language groups within the two year groups.

Firstly, for the reasons presented above, correlations amongst the variables were examined. The subsequent examination of the correlations addresses RQ1.

3.3.2.1 Correlations among variables

Table 3.3 displays the correlations between the variables for Y2 and Y4. Correlations for the Y2 group are displayed above the diagonal and correlations for the Y4 are shown below.

As anticipated, many of the variables were intercorrelated. For both year groups reading rate, reading accuracy, non-word reading, exception word reading and regular word reading were highly intercorrelated. Phonological memory, surprisingly, did not correlate at a highly significant level with any of the variables for the Y2 children, though for the Y4 children it correlated most highly with measures of word reading. Phonological awareness, on the other hand, correlated with all variables to some extent. Non-verbal ability correlated with non-verbal working memory, and measures of oral language were also highly intercorrelated in both year groups.

3.3.2.2 Theoretically informed composites

In order to address the first research question regarding the language group differences, the variables were reduced into composites that were believed to measure the same underlying constructs. Initially, an exploratory factor analysis was carried out using SPSS, entering all the variables that are listed in Table 3.2. The sample size acceptable to run a factor analysis is inconsistently reported and disputed in the literature, with some asserting that it depends entirely on the data itself, i.e., the size of the communalities (e.g., MacCallum, Widaman, Zhang & Hong, 1999). Some consider a sample of approximately 100 to be poor (e.g., Comrey & Lee, 1992), whereas others suggest a sample of 50 would be adequate (Sapnas & Zeller, 2002). In spite of the inconsistencies, or perhaps because of them, a decision was made to run a factor analysis. An exploratory factor analysis using the principal components method was carried out. First, the Oblimin rotation method was selected and the component correlation matrix was examined for absolute values greater than .32. Due to the fact the values were lower than .32, the analysis was run again, this time selecting Varimax as the rotation method. The results of both analyses revealed high communality values, Bartlett's test of sphericity was statistically significant, $p > .001$, and three components with Eigenvalues > 1 were identified, generating a cumulative percentage of 69.5%. When examining the rotated component matrix, however, the factor loadings are high for a number of the variables, making it difficult to determine and isolate which variables load onto which components. For clarity, the analysis was run again but with small coefficients suppressed (absolute value < .3) and with the data sorted by size. The new rotated component matrix lists the variables that load onto the three components, and can be found in Appendix 6. While there are some meaningful patterns found in this data, the analysis did not reveal distinct components that could be utilised in further analyses. For this reason, a decision was made to create theoretically informed composites. The composites were primarily based on a conceptual framework of reading comprehension, though it was also important to draw upon the data itself, looking at the correlations, to examine whether the data was in agreement with the guiding framework that is The Simple View of Reading (SVR). As outlined in Chapter 1, the SVR suggests that reading comprehension is ultimately the product of two separate processes; decoding and linguistic comprehension. The definition of *decoding* is somewhat ambiguous and has consequently had varied interpretations; an independent word recognition skill vs an independent grapheme-phoneme-conversion skill. However, Gough and Tunmer (1986) in their definition of decoding, acknowledge that word recognition cannot be measured to the exclusion of grapheme-phoneme correspondence. In consideration of this and through examining the correlations of the current data set, the first composite to be created was the 'Word Reading' composite. This is comprised of Reading Rate, Reading Accuracy, Exception Word Reading, Regular Word Reading, Non-word Reading, Phonological

Memory and Phonological Awareness. Previous research has suggested that phonological processes contribute to word reading (Adams, 1990; Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993) and consistent with this, phonological memory and phonological awareness correlated most highly with the measures of word reading and were therefore included in this composite. Given that a number of variables correlated statistically significantly with all other variables, e.g., phonological awareness, the *r* values and the *p* values were considered. Correlations > .4 and with a *p* value < .001 were considered highly correlated. This was taken into account when creating the composites.

Table 3. 3

Correlations between language and literacy variables; Y2 above diagonal (n=44), Y4 (n=61) below diagonal

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
1.Reading Rate		.761***	.437**	.033	.265	.640***	.812***	.849***	.819***	.435**	-.053	.187	.245	.443**	.463**	.283†	.216	-.473**	-.058
2.Reading Accuracy	.876***		.698***	.149	.479***	.709***	.880***	.848***	.867***	.643***	.317*	.379**	.417**	.509***	.694***	.469**	.370**	-.344*	-.365*
3.Reading Comprehension	.572***	.611***		.164	.715***	.406**	.698***	.646***	.621***	.620***	.535***	.507***	.586***	.524***	.765***	.733***	.675***	-.329*	-.395**
4.Phonological Memory	.494***	.610***	.452***		.383**	.183	.123	.266†	.203	.228	.139	.072	.286*	.134	.361*	.170	.151	.074	-.023
5.Verbal Working Memory	.498***	.533***	.524***	.455***		.296*	.486***	.497***	.454**	.571***	.502***	.433**	.527***	.568***	.603***	.465**	.705***	-.398**	-.363*
6.Non-word Reading	.764***	.840***	.545***	.631***	.527***		.774***	.792***	.916***	.416**	.248	.271†	.281†	.585***	.460**	.244	.182	-.215	-.195
7.Exception Word Reading	.898***	.863***	.688***	632***	.560***	.746***		.873***	.942***	.607***	.301*	.331*	.416**	.660***	.651***	.483***	.332*	-.371*	-.385**
8.Regular Word Reading	.862***	.866***	.513***	.621***	.529***	.823***	.859***		.948***	.593***	.260†	.314*	.429**	.567***	.623***	.430**	.358*	-.377**	-.363*
9.Total Word Reading	.894***	.916***	.620***	.673***	.576***	.932***	.919***	.950***		.574***	.288*	.326*	.400**	.646***	.616***	.411**	.309*	-.341*	-.335*
10.Morphological Awareness	.530***	.644***	.660***	.580***	.583***	.573***	.658***	.519***	.625***		.429**	.400**	.617***	.542***	.665***	.524***	.480***	-.439**	-.376**
11.Non-verbal Working Memory	.083	.178	.392**	.214	.396**	.270*	.163	.195	.230†	.436***		.503***	.643***	.376**	.443**	.591***	.547***	-.383**	-.460**
12.Expressive Vocabulary	.425**	.485***	.752***	.439***	.437***	.379**	.577***	.424**	.485***	.578***	.409**		.390**	.353*	.599***	.527***	.414**	-.224	-.269†
13.Non-verbal Ability	.180	.300*	.515***	.292*	.297*	.240†	.225	.237†	.251†	.480***	.578***	.409**		.480***	.490***	.554***	.541***	-.280†	-.409**

14.Phonological Awareness	.718***	.788***	.694***	.555***	.536***	.694***	.727***	.653***	.741***	.720***	.365**	.630***	.453***		.462**	.356*	.461**	-.313**	-.215
15.Expressive Grammar	.543***	.639***	.807***	.473***	.544***	.533***	.667***	.552***	.621***	.767***	.418**	.758***	.583***	.738***		.732***	.575***	-.255	-.359**
16.Receptive Vocabulary	.449***	.527***	.828***	.399**	.474***	.298*	.603***	.407**	.454***	.653***	.354**	.760***	.464***	.607***	.773***		.572***	-.383***	-.431***
17.Listening Comprehension	.442***	.419**	.606***	.258*	.495***	.358**	.490***	.377**	.433***	.380**	.277*	.592***	.271*	.469***	.577***	.619***		-.405***	-.394***
18.RAN (in seconds)	-.483***	-.537***	-.333**	-.209	-.290*	-.376**	-.448***	-.336**	-.418**	-.434**	-.247†	-.317*	-.166	-.578***	-.402**	-.284*	-.282*		.170
19.RAN (errors)	-.390**	-.396**	-.416**	-.263*	-.559***	-.320**	-.411**	-.365**	-.387**	-.283*	-.280*	-.320*	-.241†	-.418**	-.395**	-.358**	-.321*	.361**	

Note: †p<.08 *p<.05 **p<.01 ***p<.001

The next composite, ‘Language Skills’ is comprised of all the language measures; Receptive Vocabulary, Expressive Vocabulary, Listening Comprehension, Morphological Awareness, Expressive Grammar. In addition, upon examination of the correlations, Verbal Working Memory was also included in this broad ‘Language Skills’ composite. In consideration of the extensive literature that looks at the role of vocabulary knowledge in reading comprehension, a separate ‘Vocabulary Knowledge’ composite was considered, consisting of Receptive Vocabulary and Expressive Vocabulary (thereby removing these two measures from the ‘Language Skills’ composite). However, after examining the correlations of the composites, a multicollinearity problem occurred. That is, ‘Vocabulary Knowledge’ correlated too highly with the ‘Language Skills’ composite, therefore the two were collapsed into one complete ‘Language Skills’ composite.

The next composite created was ‘Lexical Retrieval’. The combined RAN measures make up this composite. Initially, these measures were to be included as part of the ‘Word Reading’ composite as research suggests that naming speed facilitates the rapid recognition of letters and whole orthographic units (Kirby et al., 2003; Konold, Juel, McKinnon, & Deffes, 2003) though the SVR does not explicitly state the unique role of rapid naming in its contribution to reading success. On examining the correlations, the RAN measures did not correlate highly (in comparison to the other variables) with any of the other measures, therefore a decision was made to create an individual ‘Lexical Retrieval’ composite. Because reading comprehension demands considerable cognitive resources, which are of limited supply, it has been theorised that the rate at which items are retrieved may have an indirect influence on comprehension (Kirby et al., 2003), therefore it was thought that the inclusion of a separate ‘lexical retrieval’ composite may make an additional contribution to the prediction of reading comprehension after taking into account the core concepts of the SVR (decoding and oral language). The ‘Lexical Retrieval’ composite was multiplied by -1, so that higher scores would correspond to better performance. The final composite, ‘Non-verbal Ability’ is comprised of the Non-verbal Working Memory measure and the Non-verbal Ability measure. In order for all variables to be equally weighted in the composites, raw scores were converted into z-scores. The composite variables are presented in Figure 3.1.

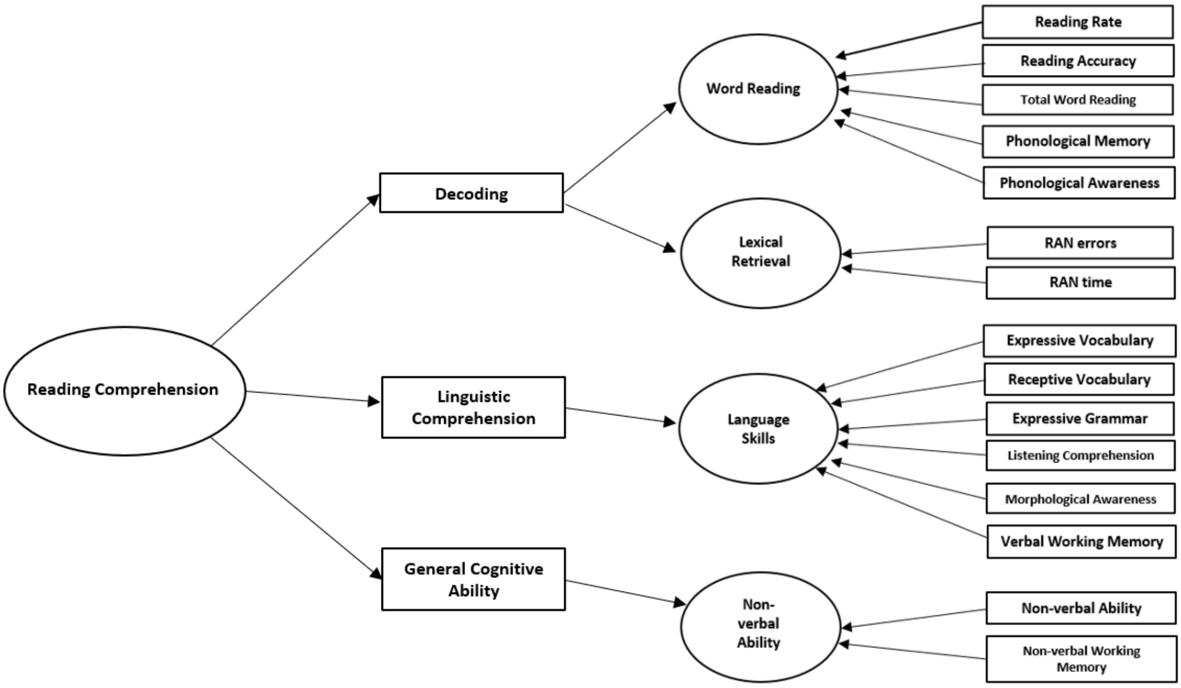

Figure 3. 1 Theoretically informed and data driven composite variables

Figure 3.1 presents the composite variables and outlines how these relate to both the concepts of the SVR and the cognitive, language and literacy skills that have been measured in this study. These theoretically informed and data driven composites will be used in further analyses. Although the composites explained here have been used in the following analyses, a confirmatory factor analysis could have helped to verify how well this model fits the data.

3.3.2.3 MANOVAs

MANOVAs were run using the composite variables in order to examine the differences between the two language groups. The results of the Y2 and Y4 MANOVAs are presented in Table 3.4. Due to the conversion of raw scores into z-scores, the mean values that are presented in both tables provide information relating to the distance from the overall year group mean. Effect sizes were calculated using Cohen's *d* and are presented here to demonstrate the magnitude of the difference between EL1 and EAL children on the composite variables. In line with Plonsky and Oswald's (2014) suggestion for a field-specific interpretation of effect sizes, between-group analyses with *d* values in the region of .40 will be considered small, .70 will be considered medium and 1.00 and above, large. This interpretation will be applied throughout the thesis.

Table 3. 4
MANOVA results; EAL and EL1 composites

	Y2					Y4				
Composite	EAL mean score	EL1 mean score	Effect Size *d* - 95% CI for *d* [LL, UL]*	*F*	*p*	EAL mean score	EL1 mean score	Effect Size *d* - 95% CI for *d* [LL, UL]*	*F*	*p*
Word Reading	-.02 (.27)	.06 (.23)	0.31 [-.025, 0.88]	1.06	.311	-.02 (.19)	.07 (.30)	0.35 [-0.14, 0.88]	2.20	.144
Lexical Retrieval	-.37 (.67)	-.07 (.58)	0.47 [-0.10, 1.04]	2.43	.127	.11 (.88)	.48 (.58)	0.49 [-0.03, 1.00]	3.50	.067
Language Skills	-.38 (.36)	.01(.47)	0.67 [0.34, 1.53]	8.63	.005	-.07 (.48)	.62 (.51)	1.39 [0.83, 1.96]	30.01	.001
Non-verbal Ability	-.68 (.83)	.19 (.67)	1.15 [0.53, 1.75]	13.72	.001	.04 (.72)	.74 (.64)	1.03 [0.48, 1.55]	15.37	.001
Reading Comprehension	-.16 (.81)	.74 (.81)	1.11 [0.50, 1.71]	12.78	.001	-.58 (.69)	.55 (.86)	1.45 [0.89, 2.03]	31.27	.001

*Cohen’s *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

The results presented here show that language group has a statistically significant effect on reading comprehension in Y2 $F(1, 42) = 12.78$, $p < .001$ and in Y4 $F(1,59) = 31.27$, $p < .001$, with large effect sizes, $d = 1.11$ and 1.45, for Y2 and Y4, respectively. Interestingly, language group has a bigger effect on language skills for Y4 $F(1,59) = 30.01$; $p < .001$; $d = 1.39$ compared to Y2, $F(1,42) = 13.609$, $p = .005$; $d = 0.67$. As expected, word reading was not statistically significantly different between the two language groups in either year group. Lexical retrieval was approaching significance for the Y4 children with an EL1 advantage with a small effect size, however the confidence intervals (of *d*) pass through zero and therefore support the non-significant *p* value. An unexpected finding was the difference in non-verbal ability, $F(1,42) = 13.72$, $p < .001$; $d = 1.15$ in Y2, and in Y4 $F(1,59) = 15.37$, $p < .001$; $d = 1.03$. A MANCOVA was carried out to control for the differences in non-verbal ability; and, the significant differences in Language Skills and Reading Comprehension still emerged in Y4 (Language Skills, $p < .001$; Reading Comprehension, $p < .001$) but in Y2, these differences no longer reached statistical significance (Language Skills, $p = .325$; Reading Comprehension, $p = .071$). These results indicate that for the children in Y2 in this study, the differences in non-verbal ability may account for some of the differences in Language Skills and Reading Comprehension between EAL and EL1 children. Because of these differences, non-verbal ability will be controlled in the subsequent analyses.

Other than the surprising finding of non-verbal differences and their possible interaction with reading outcomes in Y2, the MANOVA results confirm and replicate what has been presented in previous literature. In order to understand how the broad composite variables concurrently contribute to Reading Comprehension for the EAL and EL1 children, regression analyses were carried out.

3.3.3 Concurrent Predictions of Reading Comprehension

To what extent do oral language skills concurrently contribute to reading comprehension for EAL and EL1 children in i)Y2 and ii)Y4?

3.3.3.4 Regression analyses

A number of multiple regressions were carried out in order to determine the relative contribution of each of the composite variables to the total variance explained. That is, how much of the variation in reading comprehension performance can be explained by the composite variables. At this stage, all the predictors (the composite variables) were entered simultaneously into the regression. This method of analysis examines the unique contribution of each independent variable as all other independent variables are held fixed. Thus, the test of significance for each variable is calculated much as it would if it was the final variable in a hierarchical analysis. Four models regressing reading comprehension on this set of predictor variables were carried out and are presented in Table 3.5. Due to the sample size when broken down into language group within year group (i.e. Y2 EAL or Y4 EAL) the power of the regression is limited. Thus, the analyses were carried out for exploratory purposes but the results must be interpreted with caution.

Adjusted R^2 values are reported here; this takes into account the sample size and reduces the overestimation of the amount of predictor capacity in the model. Entering Word Reading, Lexical Retrieval, Language Skills and Non-verbal Ability simultaneously into the model accounted for 54% of the variance (adjusted R^2) in the reading comprehension scores of the Y2 EL1 children, F (4, 16) = 6.84, p = .002, and 62% of the variance (adjusted R^2) in the reading comprehension scores for Y4 EL1 children, F (4, 22) = 11.78, p < .001. This model accounted for a lower overall percentage of the variance for EAL children; for the Y2 EAL children this model accounted for only 29% of the variance (adjusted R^2) in reading comprehension, F (4, 16) = 3.09, p = .046, and for Y4 EAL children it accounted 47% of the variance (adjusted R^2), F = (4, 27) = 7.92, p <.001. As stated, these results need to be interpreted with caution but they suggest that the contribution of the composite variables for EAL and EL1 children are quite different, particularly in Y2 (In Y2 the model explains 29% of the variance for EAL children and 54% for EL1 children).

Table 3. 5

Multiple regression models, concurrently predicting reading comprehension

Predictor	R^2	Adjusted R^2	β (SE β)	*p*
Y2 EAL	.44	.29		
Word Reading			-.46 (.69)	.509
Lexical Retrieval			.36 (.26)	.183
Language Skills			1.01 (.47)	.048
Non-verbal Ability			.19 (.23)	.404
Y2 EL1	.63	.54		
Word Reading			.44 (.63)	.496
Lexical Retrieval			.17 (.23)	.479
Language Skills			1.61 (.40)	.001
Non-verbal Ability			-.36 (.32)	.273
Y4 EAL	.54	.47		
Word Reading			-.70 (.48)	.155
Lexical Retrieval			.06 (.11)	.598
Language Skills			.97 (.21)	.001
Non-verbal Ability			.05 (.13)	.730
Y4 EL1	.68	.62		
Word Reading			-.28 (.53)	.610
Lexical Retrieval			.35 (.20)	.100
Language Skills			1.28 (.27)	.001
Non-verbal Ability			.05 (.22)	.826

Word Reading Skills did not significantly contribute to reading comprehension scores for the EAL or EL1 children in either year group, though of the four models, Word Reading Skills makes the largest contribution for Y4 EAL children, β = -.70, p <.155. The contribution of Lexical Retrieval Skills, however, is different for the EAL and EL1 children. The results show that Lexical Retrieval Skills make a bigger contribution to reading comprehension for Y2 EAL children β =.36, p =.183 compared to Y2 EL1 children, β =.17, p =.479, yet in Y4 this composite contributes to a greater extent for the Y4 EL1 children, β =.35, p <.100 than the Y4 EAL children, β =.06, p <.598.

The Language Skills composite was found to make the largest contribution to reading comprehension for EAL and EL1 children in both year groups, Y2 EL1, β = 1.61, p < 0.01; Y4 EL1, β =1.28, p < .001; Y2 EAL, β = 1.01, p < .048; Y4 EAL, β =.97, p < .001, though this is to a greater extent for all Y4 children. Though for the Y2 EAL children this only reached statistical significance at the p < .05 level. Non-verbal ability was not predictive of reading comprehension in Y4 (EL1: β =.05, p < .826; EAL: β =.05, p <.734) though in Y2 it made a bigger contribution to reading comprehension than did Word Reading for the EAL and EL1 children (EL1: β = -.36, p <.273; EAL: β =.19, p <.404).

3.3.3.5 Summary of findings

The regression models show that language skills make a substantial contribution to reading comprehension for both EAL and EL1 children in Y2 and Y4. Though, as predicted, this was to a greater extent for the children in Y4. This pattern emerged for EL1 and EAL children. Language skills were the largest contributor for the Y2 children, though considering that typically developing children in Y2 in the UK should have mastered decoding skills by this age, it is unsurprising that language skills also account for a significant amount of the variance in reading comprehension for the Y2 children. Although to a lesser extent, this pattern also emerged for the EAL children in Y2. Following on from this and in order to address research question 2, the next section will examine the language skills of EAL and EL1 children in further detail.

3.3.4 Language Skills

How do the language skills of EAL children compare to those of EL1 children in i) Y2 and ii) Y4?

3.3.4.1 MANCOVAs

Because Hoover and Gough's (1990) conceptualisation of reading comprehension in the SVR serves as the guiding framework for the current study, the variables included in the following analyses were selected in order to understand and elaborate on Hoover and Gough's broad concept of linguistic comprehension and how this compares for EAL and EL1 children. The specific component skills that were examined were the variables that were included in the *Language Skills* composite. That is, Receptive Vocabulary, Expressive Vocabulary, Listening Comprehension, Morphological Awareness and Expressive Grammar.

In order to address RQ3, a MANCOVA was run to examine differences between EAL and EL1 children on all language measures, with non-verbal ability used as a covariate in the model. Because the sample size is relatively small, Pillai's Trace was used; the MANCOVA model showed a significant effect of language group (EAL/EL1) on Language Skills for Y2, V=.35, $F(5, 42) = 4.61$, $p = 0.02$, $d = 0.67$, and for Y4, V=.48, $F(5,54) = 10.12$, $p < .001$, $d = 1.39$.

3.3.4.1.1 Y2 MANCOVAs

Table 3.6 presents the MANCOVA results for Y2. The results show a significant effect of language group on the Receptive Vocabulary measure only. Figure 3.2 displays the median and interquartile range scores of the Y2 children with EL1 and EAL on the measure of receptive vocabulary.

Table 3. 6

MANCOVA results; Language Skills of Y2 children (n= 23 EL1, 26 EAL)

Language Skill	EAL mean score	EL1 mean score	Effect Size *d* - 95% CI for *d* [LL, UL]*	*F*	*p*
Receptive Vocabulary	77.54 (14.61)	98.96 (15.60)	1.41 [0.81, 2.08]	13.19	.001
Expressive Vocabulary	11.29 (4.37)	14.98 (5.14)	0.77 [0.19, 1.36]	3.00	.090
Listening Comprehension	8.58 (2.63)	10.00 (2.52)	0.55 [-0.02, 1.12]	.18	.673
Morphological Awareness	6.81 (4.10)	7.87 (4.40)	0.25 [-0.31, 0.81]	1.50	.227
Expressive Grammar	20.58 (7.70)	28.04 (9.83)	0.85 [0.39, 1.43]	3.00	.090

*Cohen’s *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

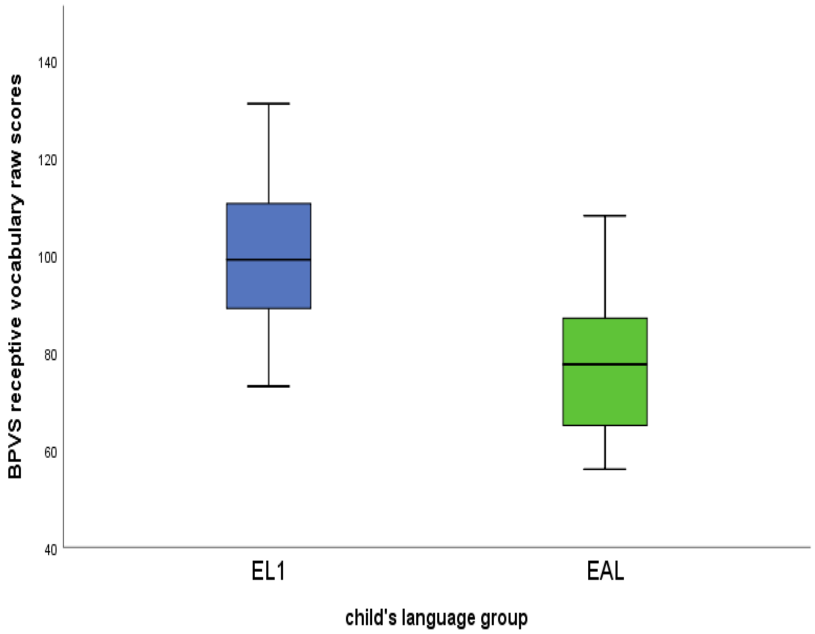

Figure 3. 2: The median receptive vocabulary scores of Y2 EL1 and EAL children

In addition to the MANCOVA, a univariate ANCOVA was carried out to assess for effects of language group on the measure of Receptive Vocabulary. This further demonstrated that the difference between the scores was statistically significant $F(1, 48) = 13.19$, $p < .001$, $d = 1.41$. Considering the difference between reading comprehension scores in this year group (see Table 3.4) the limited effect of language group on listening comprehension is perhaps surprising. The difficulties in reading comprehension for the EAL children in Y2, then, seem to stem from limited vocabulary only.

3.3.4.1.2 Y4 MANCOVAs

Table 3.7 reports the MANCOVA results for Y4.

Table 3. 7
MANCOVA results; Language Skills of Y4 children (n= 27 EL1, 34 EAL)

Language Skill	EAL mean score	EL1 mean score	Effect Size *d* - 95% CI for *d* [LL, UL]*	*F*	*p*
Receptive Vocabulary	90.79 (16.63)	120.63 (16.95)	1.78 [1.18, 2.37]	26.51	.001
Expressive Vocabulary	15.96 (6.48)	25.70 (6.47)	1.50 [0.92, 2.07]	12.45	.001
Listening Comprehension	10.06 (2.86)	12.30 (2.07)	0.90 [0.35, 1.41]	6.63	.013
Morphological Awareness	9.71 (4.09)	11.85 (4.61)	0.49 [-0.02, 1.00]	.030	.864
Expressive Grammar	27.56 (7.48)	36.81 (8.24)	1.18 [0.63, 1.73]	5.29	.025

*Cohen’s *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

In Y4, however, the MANCOVA results show a significant effect of language group on both measures of vocabulary; Receptive Vocabulary and Expressive Vocabulary. And, in contrast to Y2, Listening Comprehension scores and Expressive Grammar scores also differed by language group. Language group differences did not emerge for the measure of Morphological Awareness.

Figure 3.3 shows the z-scores (median and interquartile ranges) of the Y4 EL1 and EAL children on both measures of vocabulary. Z-scores are presented here, as opposed to the raw scores. The two vocabulary measures use different scoring systems and therefore the Z-scores allow for a clear representation of how the groups compare on the two vocabulary measures.

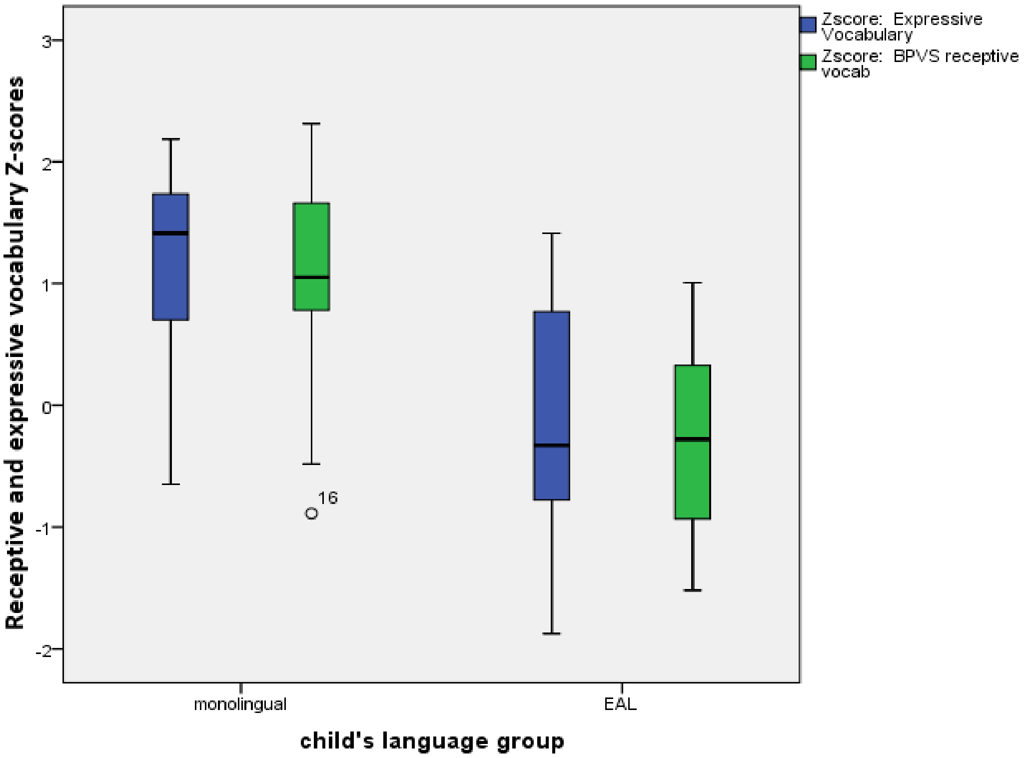

Figure 3. 3: The median receptive and expressive vocabulary scores of EL1 and EAL children in Y4

As carried out in Y2, univariate ANCOVAs were run to assess for effects of language group on the scores of both vocabulary measures. Language group was shown to have a significant effect on both measures with large effect sizes; Receptive Vocabulary F (1, 60) = 26.51, $p < .001$, d =1.78, expressive Vocabulary F (1, 60) = 12.45, $p < .001$, d =1.50.

Although this is not longitudinal, it is potentially important to note that the effect sizes for the Y4 cohort are indeed bigger than the effect sizes for the Y2 cohort on measures of vocabulary.

This pattern of vocabulary scores could indicate that the gap in vocabulary knowledge may widen for EAL and EL1 children within the primary school years.

3.3.4.2 Summary of findings

To summarise the results presented here, the MANCOVA analyses showed a significant difference of language skills for EAL and EL1 children in Y2 and Y4. In both year groups and on all language measures, the EL1 children outperformed the EAL children. The difference in receptive and expressive vocabulary knowledge and listening comprehension is significant in Y4. Overall, the analyses suggest and support previous literature that EAL children have difficulties in comprehension due to limited vocabulary knowledge.

3.3.5 Research Question 4

How do the oral language skills of EAL children who are good and who are poor comprehenders i) compare and ii) compare to that of EL1 children who are good and poor comprehenders?

In order to address RQ4, the language skills of children with similar comprehension levels were compared. To do this, the standardised reading comprehension scores were analysed and three groups were created. The use of standardised scores allowed children in both Y2 and Y4 to be included in the analysis, i.e., data was collapsed across year group. The three groups were comprised of: *low comprehension scores* - children with standardised scores below 90; *average comprehension scores* - children with standardised scores that fall between 90-100; and *good comprehension scores* - children with standardised scores above 100.

37% of the EAL children had comprehension scores of < 90 (n=22). Of the 22 EAL children, 7 also achieved a standard score below 90 on the YARC Reading Accuracy and were thus classified as poor readers (poor decoding + poor comprehension). Because of the focus on comprehension, the poor readers were not included in the following analyses. 28% of the EAL children had comprehension scores of higher than 100 (n= 16) and were considered good comprehenders. The oral language skills of the EAL children that were considered to be good and poor comprehenders were then examined. Table 3.8 shows the scores of the EAL children on the YARC reading comprehension measure in the lower and upper ranges and the approximate percentage of children in each group.

Table 3. 8
Comparison of high and low comprehension scores of the EAL children

	Scores on YARC	% of children with EAL
EAL children with lower comprehension (n=15)	70-89	25%
EAL children with good comprehension (n=16)	100+	28%

A MANCOVA model, controlling for age, showed a significant overall effect of reading comprehension (good/poor comprehenders) on measures of oral language (Pillai's Trace), V = .62, $F(5, 24) = 7.79$, $p < .001$. Table 3.9 presents the scores of children with EAL who are considered good and poor comprehenders and indicates where these differences reach significance.

Table 3. 9
Language skills of the EAL children who are good and poor comprehenders

Measure	Mean score (sd)	*p*	Effect Size *d* - 95% CI for *d* [LL, UL]*
Receptive Vocabulary		.001	1.03 [0.27, 1.77]
EAL children with low comprehension (n=15)	75.20 (15.45)		
EAL children with good comprehension (n=16)	90.88 (15.06)		
Expressive Vocabulary		.001	0.99 [0.23, 1.72]
EAL children with low comprehension (n=15)	11.87 (4.27)		
EAL children with good comprehension (n=16)	16.94 (5.83)		
Listening Comprehension		.001	1.16 [0.38, 1.90]

EAL children with low comprehension (n=15)	7.47 (3.14)		
EAL children with good comprehension (n=16	10.63 (2.34)		
Morphological Awareness		.006	0.70 [-0.04, 1.41]
EAL children with low comprehension (n=15)	6.73 (4.15)		
EAL children with good comprehension (n=16)	9.70 (4.42)		
Expressive Grammar		.001	0.73 [-0.01, 1.45]
EAL children with low comprehension (n=15)	22.40 (7.93)		
EAL children with good comprehension (n=16)	27.81 (6.99)		

*Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

Though the sample size is small, the EAL children with good comprehension statistically significantly outperform the EAL children with poor comprehension on all measures of language skills. The effect sizes demonstrate the magnitude of this difference with both vocabulary measures and the listening comprehension task yielding the greatest differences between the two groups.

The percentage of EL1 children who fit the *good comprehender* criteria, was much higher than percentage of EAL children; with 36 EL1 children obtaining a score higher than 100. Table 3.10 compares the EAL and EL1 children with good comprehension on the language skill measures. The mean score for the EAL children with good comprehension on the YARC reading comprehension test was 107.94 (6.78) compared with a mean score of 112.94 (7.36) for the EL1 children with good comprehension. Interestingly, the MANCOVA analysis, controlling for age, showed that there was a significant difference between the EAL and EL1 children with good comprehension on two of the language skills measures. Pillai's trace is used to report the statistical difference between the groups as this also accounts for the difference in group size, V= .42, $F(6, 44) = 5.25$, p <.001.

Table 3. 10
Language Skills of EAL and EL1 children with good comprehension

Measure	Mean score (sd)	*p*	Effect Size *d* - 95% CI for *d* [LL, UL]*
Receptive Vocabulary		.001	1.64 [0.96, 2.29]
EAL children with good comprehension (n=16)	90.88 (15.06)		
EL1 children with good comprehension (n=36)	117.31 (16.67)		
Expressive Vocabulary		.193	
EAL children with good comprehension (n=16)	16.94 (5.83)		0.72 [0.11, 1.32]
EL1 children with good comprehension (n=36)	22.08 (7.63)		
Listening Comprehension		.247	
EAL children with good comprehension (n=16)	10.63 (2.34)		0.57 [-0.04, 1.16]
EL1 children with good comprehension (n=36)	11.89 (1.98)		
Morphological Awareness		.427	
EAL children with good comprehension (n=16)	9.69 (4.42)		0.50 [-0.11, 1.09]
EL1 children with good comprehension (n=36)	11.78 (4.15)		
Expressive Grammar		.003	1.14 [0.50, 1.76]
EAL children with good comprehension (n=16)	27.81 (6.99)		
EL1 children with good comprehension (n=36)	36.42 (7.86)		

*Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

The EL1 children with good comprehension skills showed a significant advantage on the measures of Receptive Vocabulary and Expressive Grammar, with large effect sizes. Thus, at similar (good) levels of reading comprehension the children with EAL have significantly lower levels of receptive vocabulary and expressive grammar. However, it is important to consider the sample size difference and that the EL1 children also had a higher average score for reading comprehension. There were no EL1 children with *low comprehension scores*, except those who also had poor reading accuracy skills, therefore there were no analyses comparing the EAL and EL1 children with poor comprehension.

3.4 Discussion

This chapter aimed to explore the language and literacy skills of EAL and EL1 children in Y2 and Y4. It was predicted that the EL1 children would outperform the EAL children on measures of vocabulary and reading comprehension and that the relative contribution of language skills to reading comprehension would differ for the Y2 and Y4 children. There was no specific hypothesis concerning the EAL/EL1 group differences in terms of how the contribution of language skills to reading comprehension would compare. Further, a number of preliminary analyses were run to examine within-group differences for the EAL children with good and poor comprehension and between-group differences to compare EAL and EL1 children with good comprehension; it was predicted that children with similar levels of reading comprehension would also have comparable abilities on measures of language skills.

Overall, the results revealed that EAL children did indeed have lower levels of vocabulary knowledge and reading comprehension than the EL1 children, additionally this study found that EAL children had lower average scores than the EL1 children on all measures. Regression analyses revealed that language skills were the biggest predictor of reading comprehension for all groups of children regardless of year or language group, and the good/poor comprehender analyses revealed that EAL children with good comprehension outperformed the EAL children with poor comprehension on all language measures. Further, of the language measures, the EL1 children with good comprehension outperformed the EAL children with good comprehension on the measures of receptive vocabulary and expressive grammar. The relevance of these findings will be considered in relation to previous research and the potential implications will be discussed.

The current chapter replicated many others (e.g., Burgoyne et al., 2009, 2011) in finding that EAL children have comparable word reading skills but weak vocabulary knowledge and reading comprehension outcomes relative to their EL1 peers. However, this chapter found that EAL children had weaker non-verbal skills than the EL1 children. This finding was unexpected and is inconsistent with previous research. As discussed in Chapter 1, there is some evidence of a bilingual advantage for a number of cognitive skills, e.g., memory (Morales et al., 2010), attention (Martin-Rhee & Bialystok, 2008) and executive functioning (Bialystok, Craik, & Luk, 2012; Ferjan Ramírez, Ramírez, Clarke, Taulu, & Kuhl, 2017). Although these findings have not been consistently reported, and there is some evidence that the advantages emerge with increased proficiency (Blom, Boerma, Bosma, Cornips, & Everaert, 2017), there has been limited suggestion of a bilingual disadvantage in non-verbal skills and as such the findings were unexpected. Another study with Welsh-English bilingual children also found a monolingual-English advantage when using a matrices task to measure non-verbal ability. Though, as with this chapter, the authors did not anticipate this finding (Rhys & Thomas, 2013). It remains unclear as to what may be underpinning these differences.

Due to the difference found in NVIQ scores, NVIQ was controlled for the in the analyses that followed. When examining the concurrent predictors of reading comprehension, language skills made the biggest contribution for EAL and EL1 children in both year groups. Previous research has found that oral language predicts reading comprehension to a greater extent for language-minority learners (Babayğit, 2014; Droop & Verhoeven, 2003) albeit inconsistently; other research has found no difference between monolingual speakers and language-minority learners in the contribution of oral language to reading comprehension (Babayiğit, 2015; Kieffer & Vukovic, 2013; van den Bosch, Segers, & Verhoeven, 2018). In line with the latter findings, this chapter found that the contribution of oral language in the prediction of reading comprehension did not differ by language group, that is, oral language plays an important role in reading comprehension for both EAL and EL1 children. Furthermore, this chapter examined whether the lexical retrieval composite, i.e., the rapid automatised naming task, predicted reading comprehension for either language group. This did not reach statistical significance for the EAL children or the EL1 children in either year group, suggesting that the speed at which children are able to orally produce familiar labels does not play a direct role in reading comprehension within these age groups. In consideration of the regression analyses more broadly, it is important to note that the regression model for the Y2 EAL children only explained 29% of the variance in reading comprehension compared to 54% for the Y2 EL1 children; it is possible that Y2 EAL children's low reading comprehension performance is underpinned by underdeveloped language skills, which may explain the weak prediction of the regression model overall for the Y2 EAL learners. However, given that the sample sizes for the regression analyses were small, potential interpretations of the findings are made tentatively.

Extending the regression analyses, group differences were examined for the individual measures that formed the language skills composite. For the Y2 children only one significant difference emerged and that was on the measure of receptive vocabulary, suggesting that receptive vocabulary could be the key driver of the EAL/EL1 language group differences on the reading comprehension task for the younger children, and thus again suggesting that limited knowledge of vocabulary may explain the limited variance accounted for in the regression model. In Y4, however, significant differences emerged for several measures; receptive vocabulary, expressive vocabulary, listening comprehension and expressive grammar. The EAL/EL1 group differences found in the language tasks could perhaps be indicative of a Matthew effect (Stanovich, 1986), i.e., the magnitude of the differences between the language groups, for all language measures, was greater for the Y4 children than the Y2 children. Although this is not longitudinal data it is potentially concerning that, as demonstrated in the effect sizes, there are greater differences between languages groups for the older children. Further, it is possible that the language group differences found in Y4 for the measures of listening comprehension and expressive grammar could be underpinned by the EAL children's weaker vocabulary knowledge, (and as such the Matthew effect may be specific to vocabulary knowledge which then impedes various related skills, e.g., listening comprehension), though a larger sample size would be required to perform such analyses and thus provide empirical evidence for this claim.

The final construct included in the language skills composite was morphological awareness; no language group differences emerged for the morphological awareness task in either year group. This could either be because morphological awareness develops at the same rate for both EAL and EL1 children, or it could be due to the fact that morphological awareness becomes more important with age, i.e., children are increasingly exposed to a greater number of morphologically complex words (Nagy, Berninger, & Abbott, 2006; Singson, Mahony, & Mann, 2000; Verhoeven & Perfetti, 2011), and as such any potential language group differences may not yet emerge because knowledge of morphemes may not yet be utilised within this age group. Additionally, it is argued that the word analogy task used in this study may not fully capture the construct of morphological awareness; in Y4, the correlations (see Table 3.3) demonstrate that this measure of morphological awareness is highly correlated with phonological awareness ($r = .720$, $p < .001$), and indeed, of the 20 items in this task, 8 of the items could be performed through a phonological imitation of the example given in the task item (*e.g. doll:dolls:: shoe: <u>shoes</u>)*. Therefore, there are concerns over the construct validity of this measure and it is argued that a more comprehensive battery of morphological awareness tasks could be used to further compare EAL and EL1 children's morphological knowledge and the role this plays in reading comprehension.

Beyond the examination of broad language group differences, a number of analyses were run to examine how children with different reading comprehension profiles compare. The within EAL group analyses between those considered to be good and poor comprehenders showed that these two groups of EAL children performed significantly differently on the measures of language, i.e., the good comprehenders outperformed the poor comprehenders on tasks of receptive vocabulary, expressive vocabulary, listening comprehension, expressive grammar and morphological awareness. This highlights the heterogeneity of EAL learners, and, as discussed in chapter 1 (see section 1.1.1), this shows how the term EAL is a very broad all-encompassing term that does not capture the diversity of EAL children's language and literacy abilities when considered as a single group. Whilst the analyses here suggest that there are within-group differences, the sample size, when broken into EAL children with good and poor comprehension, was small. It is argued then that while the analyses indicate within-group differences, the individual differences of EAL children need to be explored further.

Finally, analyses of EAL and EL1 children considered good comprehenders demonstrated that EAL children had weaker vocabulary knowledge than their EL1 peers. This suggests that, relative to EL1 children, vocabulary knowledge is an area of weakness for EAL children, even when reading comprehension is comparable. However, this must also be interpreted with caution as the sample sizes were not equal and despite both groups having above average reading comprehension scores, the average reading comprehension score of the EL1 good comprehenders was in fact higher than the average reading comprehension score of the EAL good comprehenders. Overall, the results indicate that EAL children have weaker vocabulary knowledge and reading comprehension skills than EL1 children, though further research exploring language and literacy skills across a distribution of abilities may yield more insightful results than EAL and EL1 group differences alone.

The present chapter has provided further evidence that EAL children underperform in comparison to their EL1 peers on measures of English vocabulary knowledge and English reading comprehension. Although the study was cross-sectional, the results revealed that the achievement gap between the two language groups is larger for the older children than the younger children, though this will be examined longitudinally in further studies, enabling a clearer understanding of the development of EAL children, and thus allowing for educational implications to be discussed. Importantly this chapter identified that the key concurrent predictor of reading comprehension for all children was the language composite, indicating the importance of language skills for all children. Despite the language group differences reported here, a number of preliminary analyses also showed that there are EAL children with above average reading comprehension skills, as well as EAL children with below average reading comprehension skills, thus raising further questions over the usefulness of the label "EAL" within schools. The EAL children in this study were recruited based on school lists of EAL children, however further studies should aim to assess EAL children's language proficiency rather than using the broad label 'EAL' as a means of recruitment in order to unpick the theoretical and educational implications of EAL children's development. Further large-scale, longitudinal research is needed to examine EAL children's proficiency in English and how this relates to their trajectories of language and literacy skills, this could potentially enable teachers and educators to identify which children may need further support. Despite the study's limitations, the results presented in this chapter support previous literature that identifies EAL children to have lower levels of reading comprehension than their EL1 peers and the results suggest that reading comprehension disparities, in part, may be explained by lower levels of vocabulary knowledge.

Chapter 4 – Vocabulary Knowledge

4.1 Introduction

Vocabulary knowledge is not a one-dimensional construct, it is multi-faceted in nature and goes beyond form-and-meaning knowledge. How well a word is known can be considered a measure of vocabulary depth (Freebody & Anderson, 1989; Read, 2000) while the quantity of words a learner knows, or at least has some knowledge of, is typically thought of as vocabulary breadth (Nation, 2011; Qian, 2002). While vocabulary breadth is an informative dimension of vocabulary, it does not fully capture a learner’s vocabulary knowledge (Verhallen & Schoonen, 1998) nor does it consider that there are differences in the extent to which words are known (Nagy, 1988; Schmitt & Meara, 1997). In accordance with this, Meara and Wolter (2004) suggest that examining features of a learner’s whole lexicon is a better approach to understanding the vocabulary knowledge of a learner than examining the features that are only characteristic of single words. Consistent with this, this chapter will discuss vocabulary knowledge beyond measures of single orthographic words.

While the terms *vocabulary-breadth* and *vocabulary-depth* are ubiquitous in vocabulary research, there is some criticism in the polarisation of the terms (see Gyllstad, 2013) and a convincing argument that their interrelation should at least be acknowledged (Qian, 2002; Schmitt, 2010; Vermeer, 2001). Gyllstad (2013) postulates that *vocabulary depth* is not a single construct and part of the reason why it is difficult to define (Milton, 2009) is because there are many different aspects of word knowledge that have been listed under the heading *vocabulary depth* in the literature. This chapter considers three different components of vocabulary knowledge that go beyond single-word knowledge: multi-word phrase knowledge, word associations and polysemous word knowledge. Their inclusion in this chapter is not an attempt to conflate the different aspects into an all-encompassing construct of *vocabulary depth*, rather it is an attempt to acknowledge that there are many ways in which a word can be known and ultimately that *vocabulary depth* itself is multi-faceted in nature.

This chapter will also revisit the single word vocabulary measures that were discussed in Chapter 3 in order to explore the relationship between single-word vocabulary knowledge and the different measures of vocabulary depth. Previous research examining vocabulary breadth and depth have found relatively high correlations between the two dimensions (Qian, 1999; Vermeer, 2001) with further research indicating that the strength of the relationship increases as proficiency levels increase (Nurweni & Read, 1999), though this pattern of association is not consistently found (e.g., Wolter, 2005). Depth has been operationalised in various ways in the literature making it difficult to compare the findings from studies. This chapter aims to identify whether a relationship exists between single word vocabulary knowledge and the measures of vocabulary outlined above for EAL and EL1 children. Additionally, this chapter considers the frequency and quantity of English used outside the school environment and how this relates to vocabulary knowledge for children learning EAL. The chapter will briefly discuss the existing literature concerning multi-word phrase knowledge, word associations and polysemous word knowledge followed by an overview of the relationship between language use and vocabulary outcomes.

4.1.1 Multi-Word Phrases

It is well established that multi-word phrases (hereafter referred to as MWPs) occur extensively in spoken and written English (Biber, Conrad, & Cortes, 2004; Conklin & Schmitt, 2008; Erman & Warren, 2000; Nattinger & DeCarrico, 1992). They have, however, been defined and conceptualised in a variety of ways within the literature (see Chapter 1 for a detailed discussion). MWPs in this thesis are operationally defined as commonly co-occurring word combinations and orders, such as *get angry*, *read and write*, *as good as gold*. MWPs are believed to be an important part of the English lexicon (Garnier & Schmitt, 2016; Wray, 2008) with research suggesting that L2 learners of English should be aware of such items in order to use and comprehend English efficiently (Conklin & Schmitt, 2012). Research with adults suggests that knowledge of MWPs can support reading and reading-related skills (Conklin & Schmitt, 2008; Wray, 2002) though growing research indicates that MWPs can present a challenge to adult L2 learners of English (Barfield & Gyllstad, 2009; Farghal & Obiedat, 1995) and that the presence of MWPs can, in fact, negatively impact reading comprehension for this group of learners (Martinez & Murphy, 2011). Since this area of vocabulary is challenging for L2 English adult learners, it is of theoretical and practical interest to examine the MWP knowledge of EAL and EL1 children.

In a study examining the features of writing abilities at Key Stage 2, Cameron and Besser (2004) examined over three hundred pieces of writing from the English National Curriculum Tests and found that the writing of "advanced EAL learners" (children who had been enrolled in UK schools for at least 5 years) contained more errors in the use of formulaic phrases in comparison to their monolingual English-speaking peers, which in turn caused difficulties in writing at KS4. The study identifies a formulaic phrase much like the definition of an MWP outlined above; "a group of words that are 'bound' together, in that certain words must, or tend to be, accompanied, by certain other words" (Cameron & Besser, 2004, p. 8). These findings demonstrate that the productive use of MWPs, when used in writing, is an area of weakness for children learning EAL.

Similarly, Smith and Murphy (2015) explored this area of research and developed a productive measure of MWP vocabulary knowledge that focused specifically on verb + noun phrases. This was administered to EL1 and EAL children in years 3, 4 and 5; children completed the task by selecting the most appropriate pair of words from a choice of 3 verbs and 3 nouns to complete a sentence. The test included literal and non-literal items: *transparent* verb + noun phrases, that is the verb and noun are both literal, e.g. break a bone; *semi-transparent* verb + noun phrases where the verb is non-literal and the noun is literal, e.g. break the silence; and the *non-transparent* verb + noun phrases where both items are non-literal, e.g. break the ice. The results revealed that EAL children had lower levels of verb + noun multi-word phrase knowledge at all age groups, though this only reached significance in Y4 for all 3 transparencies, and for the transparent and non-transparent items in Y5. Further, the results indicate a steady development from Y3-Y5 for the EL1 children with differences in transparent and semi-transparent items from Y3-Y4 and differences in the non-transparent items from Y4-Y5. For the EAL children however, improvements were only seen from Y4-Y5 for the semi-transparent and non-transparent items. Thus, the transparent items did not differ from Y3-Y5 despite the fact that the children were not at ceiling. Though these findings are somewhat surprising, in that there are no differences by year group for the transparent items for the EAL children, they highlight that MWP knowledge may develop qualitatively differently for EAL and EL1 children. Additionally, the results revealed that MWP knowledge correlated with other measures of vocabulary knowledge, such as, *receptive vocabulary*, though the strength of this association was weaker for the EAL children, and *expressive vocabulary,* though the strength of this relationship varied between EAL and EL1 children across year groups. It is important to note, that the results presented in this study are cross-sectional, therefore the analyses comparing year group differences should be interpreted with this in mind.

To extend the work of Cameron and Besser (2006) and Smith and Murphy (2015), this chapter aims to explore the receptive MWP knowledge of EAL and EL1 children in the UK. Research suggests that expressive vocabulary is weaker than receptive vocabulary for children learning EAL (e.g. Burgoyne, Kelly, Whiteley & Spooner, 2009; Burgoyne, Whiteley & Hutchinson, 2013) and as such the findings may differ with the use of an oral receptive task. Furthermore, it is unclear whether the differences found by Smith and Murphy (2015) are generalisable to a wider scope of MWP types. This chapter will explore the receptive knowledge of 3 categories of MWPs; binomials, collocations and similes. Each of the 3 categories occur frequently in spoken and written English and will be examined at the receptive level to establish whether this aspect of vocabulary knowledge differs for EAL and EL1 children.

4.1.2 Word Associations

The second aspect of vocabulary knowledge that this chapter addresses is word associations (WAs). As with MWP knowledge, WAs are subject to a variety of operationalisations in the literature, but largely, WA research is driven by the idea that association behaviour can provide information relating to the development and organisation of a learner's mental lexicon (Nation, 1990; Wilks & Meara, 2002). The mental lexicon, as discussed in this thesis, is a metaphoric reference to a learner's representation of lexical items. The 'network approaches' perspective extends this metaphor through thinking of the mental lexicon as a network, and suggests that vocabulary items find a place in a learner's mental lexicon through the process of network building, i.e., having a multitude of experiences with words (Haastrup & Henriksen, 2000). Advocates of this perspective (e.g., Aitchison, 2012; Meara, 2009) argue that the number of links that are able to be made between and among lexical items gives an indication of how well a given lexical item is known.

Research has identified three main types of word associations; clang relations, syntagmatic relations and paradigmatic relations. Clang relations are identified as words that are related in phonological terms only (Wolter, 2001) e.g., run and fun. Syntagmatic relations between words are at a syntactic or collocational level (Qian, 1999) e.g., strong and tea, and paradigmatic relations are recognised as words of the same class at a semantic or meaning level (Söderman, 1993) e.g., chair and table. Many studies examining WAs with children have suggested that there is a developmental shift in the type of responses provided; specifically, the literature is concerned with the notion that over time responses become more paradigmatic than syntagmatic or clang (Cronin, 2002; Stolz & Tiffany, 1972). This is referred to in the literature as the syntagmatic-paradigmatic shift (Entwisle, 1966) and is thought to be the function of language exposure.

While research has intermittently explored WAs and the mental lexicon for several decades, research examining how second language learners compare to monolingual and/or native learners has revealed interesting yet inconclusive information. Maera (1996) first proposed that there are native-speaker norms in terms of word association responses as produced by adult native speakers. With this in mind, Zareva and Wolter (2012) compared three groups of adult learners: native English speakers, high proficiency second language learners of English and intermediate second language learners of English. The results revealed that neither the advanced nor the intermediate learners came close to producing a similar degree of associative organisation to that of the native speakers. Thus, suggesting that a higher level of English language proficiency is not likely to noticeably change the degree of L2 learners' associative 'nativelikeness'. Extending this, Higginbotham (2010) proposed that as L2 proficiency develops, responses produced by second language learners shift from syntagmatic to paradigmatic, much like the development found in children's L1 development. However, in challenging psycholinguistic assumptions regarding word associations, Fitzpatrick (2007) found that native speakers were not predictable in their responses and as such could not be identified as a homogenous group in terms of their word association responses. Similarly, Nissen and Henriksen (2006) found that many adult native speakers do in fact regularly provide syntagmatic responses. Thus, the notion of a syntagmatic–paradigmatic shift is, arguably, inadequate for understanding L1 norms and thus challenges two aspects of WA research: 1) whether native-norms exist and 2) whether L2 learners' responses should be profiled against native-speaker responses.

Considering the inconsistency in word association research regarding L1 and L2 learners and the dearth of research examining this with EAL children in the UK, this chapter will examine word associations in a relatively crude manner; in that, language groups (EAL/EL1) will be compared purely on their number of responses and age group differences will be examined within language groups. This will give an initial indication of how the two language groups compare in terms of accessing and producing associated words. Secondary to this, the way in which responses are organised will be examined - this is discussed in further detail in section 4.2.3.4. A range of extralinguistic factors influence the way in which lexical items are organised, and of particular interest are the findings suggesting that associative connections are socio-culturally influenced (Yoshida, 1990). EAL children have a range of cultural experiences that EL1 children have not necessarily experienced and vice-versa and while the magnitude of a socio-cultural influence has not been discussed extensively in the literature, it is plausible that EAL children may encode associations differently to their EL1 peers. Therefore, this chapter aims to extend the understanding of EL1 children's word association behaviour and to examine how this compares for EAL children.

4.1.3 Polysemous Word Knowledge

The final aspect of vocabulary knowledge that this chapter seeks to explore is polysemous word knowledge. Although psycholinguistic research differentiates between different forms of lexical ambiguity (e.g., Foraker & Murphy, 2012; Klepousniotou, 2002), this chapter will focus on polysemy. Polysemy is identified as words that are spelled and pronounced the same but have different yet closely related meanings, (e.g., the *strength* of an athlete and the *strength* of an argument). Examining this component of vocabulary depth provides an opportunity to examine the extent to which children understand the more abstract vocabulary that is often encountered in academic contexts. Stahl and Nagy (2006) proposed that of the 3,000 most frequently used English words, there are up to 10,000 distinct meanings and as such understanding polysemous words, or more specifically the different shades of meaning a word may possess, involves learning to be flexible with vocabulary items that have already been learned (Nagy & Townsend, 2012).

Researchers have reported polysemous word knowledge to be a likely source of difficulty for struggling readers (e.g., Pearson, Hiebert, & Kamil, 2007; Stahl & Nagy, 2006) though the evidence is limited. It is thought that a learner with a large vocabulary not only knows more words than a learner with a smaller vocabulary but also knows more meanings for many words (Qian, 1999; Vermeer, 2001). Considering the prevalence of polysemous words and the theoretical possibility that a larger vocabulary equates to a more nuanced representation of individual words, it is of interest to examine this skill among EAL learners.

Studies examining polysemous word knowledge with L2 learners often combine polysemy with other aspects of vocabulary knowledge such as word associations, morphology or syntax (Read, 1993; Qian, 1999) making it difficult to tease apart the unique role of polysemy. In addition, findings are not always compared to monolingual controls (Logan & Kieffer, 2017), making it difficult to understand how L2 learners and monolingual learners compare in terms of polysemous knowledge. In a study examining the polysemous word knowledge of linguistic minority and majority children, Appel, (1998) proposed that the minority speakers had a lexical disadvantage in terms of the number of meanings that they had attached to each word. Further, Kieffer and Lesaux (2012) proposed that second-language learners often have less experience with and exposure to the academic meaning of words outside school as compared to their monolingual English-speaking counterparts. With that proposal, it is thought that the knowledge of polysemous word meanings, on average, is likely to be weaker for EAL children than that of their EL1 peers. Conversely, though without empirical evidence, it is plausible that being bilingual could in fact enhance polysemous word knowledge due to the fact that bilingual learners are inherently flexible in their language use - frequently using different words to refer to the same concept and using different syntactical structures to express the same meanings (Nagy & Anderson, 1995), though this is likely to be related to the level of proficiency in the L1 and L2 and how frequently both languages are used. It is thought that the EAL children in this study are likely to have less experience with the more abstract, academic senses of words than the EL1 children and as such may not yet benefit from potential bilingual advantages.

In a recent study Logan and Kieffer (2017) developed an assessment of polysemous word knowledge and administered this test with 107 Spanish-English bilingual students who had a mean age of 12.6 years old. It is well-documented that polysemy often occurs through metaphorical transference, i.e., when the meaning of a word acquires a broadened and extended meaning yet typically remains classifiable in the dictionary under the same general lemma (Zanker, 2016). Logan and Kieffer (2017) refer to the target items as either; a casual, every day sense of a word, e.g., ‘the puppy **followed** the children’, or as a more academic sense of a word e.g., ‘I **followed** the author’s argument’. While there are several conceptualisations of polysemy (see Vicente, 2017), the assessment used here is fundamentally examining knowledge of the literal sense of a word (termed casual, everyday) and the related but metaphoric sense of a word (termed academic). For the purpose of consistency, the author’s terms will be used here, however it is acknowledged that this is a test of literal and metaphoric word knowledge. Their findings show that the average scores of the more academic sense of the words was lower than the average scores of the casual sense of the words. Thus, indicating that polysemy is a potential area of weakness for EAL learners. Additionally, they found that reading comprehension is uniquely predicted by the ability to identify the academic meanings of familiar words. These findings highlight the importance of knowing and understanding the more abstract sense of a word, however their study does not gauge whether this is specific to second-language learners; there are no polysemous word norm lists therefore it is difficult to identify an average or expected outcome but more feasibly, the participants were not compared to monolingual controls which could give some indication as to whether polysemy is a source of difficulty for second-language learners relative to EL1 learners or whether it is a challenging area of vocabulary knowledge for all children.

Due to the limited studies examining polysemy with children learning English as a second or additional language, particularly in comparison to their EL1 peers, there is a need to explore this avenue of research further. This chapter seeks to extend the work of Logan and Kieffer (2017) by comparing EAL and EL1 children's polysemous word knowledge with the aim of identifying whether polysemy is a challenging aspect of vocabulary knowledge for all children or whether EAL children find this particularly difficult.

4.1.4 Language Context

The final aspect important to the study of vocabulary knowledge that this chapter will discuss is in relation to the language environment. Hart and Risley's (1995) influential findings emphasised the importance of language input on language acquisition in monolingual children, identifying that children with low levels of language input were estimated to hear 30 million fewer words than children with a rich language input. A follow-up study revealed a Matthew effect (Stanovich, 1986) in that the vocabulary gap between the two groups of children had indeed widened (Hart & Risley, 2003). Similarly, studies have examined how bilingual input influences language acquisition and vocabulary development (Gathercole & Thomas, 2009; Hoff et al., 2012; Thordardottir, 2011). Though taken from different bilingual landscapes, these studies collectively suggest that vocabulary outcomes are directly related to the level of exposure received in the assessment language. The quantity of input that bilingual learners receive is naturally divided between two languages; unsurprisingly then, bilingual children tend to have a smaller vocabulary size in each of their languages when compared to age-matched monolingual peers (Oller et al., 2007). Research is limited, however, in terms of bilingual children's vocabulary depth. Kieffer and Lesaux (2012) examined various aspects of vocabulary depth and found that the monolingual children outperformed the bilingual children though this was not to the magnitude expected, with the bilingual learners performing better than anticipated. Because of this, they proposed that the vocabulary depth of bilingual learners could potentially be enhanced through the cognitive and linguistic advantages of being bilingual. Although the research considering a bilingual advantage, particularly the mechanisms underpinning this, is inconsistent (see Bialystok, Barac, Blaye, & Poulin-Dubois, 2010). The idea supporting their proposal is that being bilingual enables a deeper understanding of how words work despite a limited vocabulary breadth. Although children's language exposure was not explicitly examined in this study, this could offer further insight into the vocabulary depth of bilingual learners.

While language environments are an important consideration for all learners, this aspect of the chapter focuses specifically on the frequency and use of L1/L2 by the EAL children. In line with a usage-based approach to language acquisition, i.e., that a learner's linguistic system is built upon concrete utterances and usage events (see Tomasello, 2003), it is argued that experience with using language is a key factor in explaining language knowledge and comprehension. As such it is of interest to explore the frequency and quantity of English language used outside school for the EAL children and whether this impacts the vocabulary outcomes discussed in this chapter. It is important to note that this is the EAL children's English use and not an in-depth measure of the home language environment and/or language exposure. While the nature and aetiology of variation and diversity found in EAL learners' language *input* will not be examined, the study assessed L1/L2 language use and as such aims to shed light on L1/L2 language use and its concurrent impact on aspects of vocabulary depth among the EAL learners.

In consideration of the literature presented in this chapter, it is postulated that knowledge of MWPs, WAs and PWs will differ between EL1 children, who have systematic exposure only to English, and EAL children who have varying degrees of experience in their L1 and English.

4.1.5 Chapter 4 Research Questions

The aim of this chapter is to investigate how EAL children perform on measures of MWP knowledge, WAs and PW knowledge and how their performance compares to that of EL1 children. Accordingly, this chapter asks the following research questions:

1. Do EAL and EL1 children differ in their performance on a) a receptive measure of multi-word phrase knowledge, b) a measure of word association and c) a measure of polysemous word knowledge?

2. Does performance on these measures of vocabulary differ by age for the EAL and EL1 children?

3. How does single word vocabulary knowledge (receptive and expressive) relate to measures of multi-word phrase knowledge, word associations and polysemous word knowledge?

4. Does the proportion of English spoken outside of school affect performance on these vocabulary measures for the EAL children?

4.2 Method

4.2.1 Participants

This chapter will present data collected from three time points. At t1, 110 children were recruited from two year groups – year 2 (Y2) and year 4 (Y4). The same children were assessed again at t2 (n=104) and t3 (n=98); details of the participants and timepoints can be found in Table 4.1.

Table 4. 1
Participant and time point information

	t1		t2		t3	
	Younger (Y2)	Older (Y4)	Younger (Y3)	Older (Y5)	Younger (Y4)	Older (Y6)
n	49	61	47	57	43	55
% EAL	53.1%	55.7%	53.2%	56.1%	48.8%	54.5%
Age	85.16 (3.75)	109.11 (4.09)	95.09 (3.24)	118.88 (3.86)	105.02 (3.31)	128.67 (4.56)

4.2.2 Design

The purpose of this chapter is to examine and compare the vocabulary knowledge of EL1 and EAL children and as such a between-groups design is employed.

4.2.3 Materials

Five assessments of vocabulary knowledge will be discussed in this chapter. Table 4.2 outlines the measures and time points that the chapter explores and includes the published and computed reliability coefficients.

Table 4. 2
Vocabulary measure details

Test	Reliability (α)	Timepoint	Participants
Receptive Vocabulary	.88	t1	All participants
Expressive Vocabulary	.91	t1	All participants
MWP	.82	t2	All participants
WA	.71	t3	All participants
PWK	.80	t3	Y6 only

Note: Cronbach's alpha based on raw data

4.2.3.1 Receptive vocabulary

The British Picture Vocabulary Scale (Dunn et al., 1997) was administered to assess receptive vocabulary. In this test, children were shown four pictures and the researcher read aloud a single word. Children were instructed to point to the corresponding picture or to say aloud the appropriate picture number as labelled. The test was discontinued when eight or more incorrect responses were given within one set.

4.2.3.2 Expressive vocabulary

The *Vocabulary* subtest from the *Wechsler Abbreviated Scales of Intelligence* (WASI; Wechsler, 1999) was used as a measure of expressive vocabulary knowledge. Children were required to orally provide a definition of the words that were presented to them by the researcher. Words were presented in oral and written format simultaneously. As discussed in Chapter 2, the scoring system was modified in an attempt to capture a more fine-grained understanding of children's vocabulary knowledge.

4.2.3.3 Multi-word phrase knowledge

A bespoke task of multi-word phrase knowledge was employed to assess the receptive knowledge of multi-word units. Riches, Letts, Awad, Dabrowska and Ramsey (in preparation) developed the original measure and have deposited their testing materials in the Open Science Framework (https://osf.io/u5kqm/) under the first author's name. The measure was originally developed to be used with Key Stage 1 children, therefore it was adapted for this study in an effort to reduce possible ceiling effects for use with the older children. An items analysis was conducted on the 45 items that were included in the final analyses carried out by Riches et al. (in prep); items with a percentage of over 85% correct were removed. The task was reduced to 36 items, which have been grouped in this study into three distinct categories; *binomials* (i.e. when words are frequently used together in a way that sounds correct, e.g. fish and chips), *collocations* (the collocations were further divided by word class groupings - verb + noun collocations (e.g. make the bed), verb + adjective collocations (e.g. go crazy), adjective + noun collocations (e.g. hard worker)) and *similes* (e.g. as quiet as a mouse). The MWP task was delivered as a language detective task in which the children were to play the role of detective in deciding which sentence “sounded right”. To complete the task, the children were presented with two items at a time; one frequently used MWP and one distractor phrase (e.g., as good as gold vs as good as diamonds). The distractors were designed to sound plausible and semantically similar. The researcher presented the items by saying both the correct phrase and the distractor phrase out loud (in a fixed random counterbalanced order) whilst pointing to the corresponding picture. All children were given three practice trials. The children were asked to select the phrase that they thought to be correct – they could do this orally or by pointing to the appropriate picture. See Section 2.9.3.1 for further details of the task construction.

4.2.3.4 Word associations

The *Word Associations* subtest of the *Clinical Evaluations of Language Fundamentals – Fourth Edition* (CELF-4; Semel, Wiig & Secord, 2003) was used to assess children’s ability to name items belonging to prescribed semantic groups within a 60-second time limit. The three groups included; animals, foods and jobs. Though the task was delivered and scored as per the CELF-4 manual giving an overall raw score for number of items correct, an additional novel scoring system was created (see Chapter 2, Section 2.9.4.3 for a detailed explanation) to gain further information about how the items were semantically organised. In brief, items were scored according to the semantic relatedness of neighbouring items and a percentage score of semantically organised items was derived. This scoring system extended the understanding of word associations by examining not only the quantity of correct words offered by participants but also the extent to which the words are structured semantically. The animal category was the only category to be analysed in this way due to the fact that this was the only category in which the assumptions made by the researcher were minimised and grouping reasons were thought to be more easily identifiable, i.e., words tended to be grouped together in ways such as, animals that fly or animals that typically live in specific climates, thus it was clearer to determine semantic links than the reasons underpinning why jobs or food may have been grouped together.

4.2.3.5 Polysemous word knowledge

Polysemous word knowledge was assessed using a Polysemous Word Test (Logan & Kieffer, 2017) and is available by permission of the authors on a permanent digital archive (https://archive.nyu.edu/handle/2451/37858). The researcher read aloud 34 individual sentences, after each sentence the child was required to select the meaning of a specific word (written in bold) from the sentence from a selection of five options. Though there are 34 sentences in the task, there are 17 words that need defining, each of which are presented in two different contexts; either in a casual, every day context or in a metaphoric, academic context. For example, one word that the children encountered was *weight*; it is presented in a casual context as *the oranges increased the* ***weight*** *of his backpack* and in the academic sense as *the* ***weight*** *of his evidence changed my decision*. Children were asked to identify the target word's meaning from five options; consisting of the target meaning and four distractor options. For further details of the task see Section 2.9.4.2.

4.2.3.6 Language questionnaire

The language exposure questionnaire was developed by the researcher and was administered individually with the EAL children (see Appendix 4 for the full questionnaire). At t1, detailed questionnaires were sent to parents (see Appendix 5), however less than half were returned to the researcher, therefore the children completed questionnaires with the researcher at t2 to enable comparable data concerning the language use of all EAL participants. Two items from the questionnaire will be discussed in this chapter; the first is a question relating to language use (L1/English) with family members and the second is the item examining the frequency of L1 and English use in the home. 5 of the Punjabi speakers spoke/understood another language in addition to Punjabi and English (4= Urdu, 1= Arabic) according to the consent forms filled in by the parents prior to data collection at t1. However, when administering the language exposure questionnaire with the children, they did not list their third language as a language they could speak. For this reason, only Punjabi was included for those potentially multilingual children in the following analyses. It is acknowledged that the following analyses may not accurately capture the complete language use of these children. The items were combined to create a *proportion of English use* variable; for language use with family members, children were asked a series of questions about who they speak with and in what language, with rating scale responses. Scales were: (with parents/with siblings/with other family) "Only English =1", “Mostly English = 2”. “Equal English and L1 = 3”, “Mostly L1 = 4”, Only L1 = 5”. In line with Paradis (2011), rating scale responses were totalled (i.e., max of 5 for each family member (parent/sibling/other family) and divided by the highest total possible number (i.e., 15) and a proportion of L1 use was derived. Scores were multiplied by 100 to give a percentage and then taken from 100 to obtain a percentage of English use (e.g., a child who spoke only L1 with parents = 5, mostly English with siblings = 2, only L1 with other family = 5, their total score = 12. The total score divided by the highest possible score, 12/15 = 0.8. Then x100 to calculate L1 use percent =80 (%), to obtain English use percent, 100 – 80 = 20%). For the second item, frequency of English use, scales were “Never = 1, Sometimes = 2, Most of the time = 3, All of the time = 4. Rating scale responses were again totalled, divided by the highest total possible number (i.e., 4), and a proportion of English use in the home was derived. The quantity of English used with family members and the frequency of English used in the home were then combined and averaged to generate the *proportion of English use* variable.

4.2.4 Procedure

The tasks outlined above were administered as part of a larger battery of tests given at each time point. The focus of this chapter on vocabulary knowledge necessitates only the inclusion of the selected vocabulary measures and the questionnaire items explained above. Testing sessions took place in the child’s school with a consistent test order for all participants.

4.3 Results

Prior to considering the results relating to the above research questions, the impact of background variables and control variables (NVIQ) will be examined.

4.3.1 Background and Control Variables

The data presented in this chapter was collected at t1, t2 and t3. Because the distance between t1 → t2 and also t2 → t3 was not precisely the same number of months for all participants (see Chapter 2), the mean age (in months) at t2 and t3 was compared for the two language groups. As presented in Chapter 3, no age group differences between the EAL and the EL1 children were found at t1. T-tests were run again and like t1, no language group differences emerged for age at t2, $t(102) = .44$, $p = .658$, $d = 0.08$, or t3, $t(96) = .43$, $p = .667$, $d = 0.08$.

As discussed in Chapter 3 (see section 3.3.2.3), NVIQ as assessed at t1 revealed statistically significant differences between the EAL and EL1 children. Tt t3, NVIQ was assessed again using a different measure, though like t1 this was in the form of a matrices task. An independent t-test of the t3 NVIQ scores showed that the EAL children and the EL1 children did not reach statistically significant group differences, $t(96) = 1.517$, $p = .13$, $d = 0.31$. Correlations were run between t3 NVIQ and all t1, t2 and t3 variables and are shown in Appendix 7. Because many of the correlations between NVIQ and the vocabulary measures discussed in this chapter were statistically significant for both groups of children, NVIQ was considered as a covariate in the ANOVA analyses that were to be run. However, in all cases, NVIQ as a covariate violated the assumption of linearity for both language groups and as such an ANCOVA was deemed an unsuitable analysis. For this reason and because the t3 NVIQ scores did not reveal statistically significant differences between the language groups, NVIQ was not controlled for in the following analyses.

4.3.2 Group Differences on the Vocabulary Tasks

To address questions 1 and 2, the mean raw scores of the t2 and t3 vocabulary tasks were examined. Language group differences (RQ1) and year group differences (RQ2) of each of the vocabulary depth measures will be presented in this section beginning with multi-word phrase knowledge. Mean raw scores of all vocabulary tasks discussed in this chapter can be found in Table 4.3. Scrutiny of the data revealed that the MWP variables were negatively skewed for the older children (-1.29). This is thought to be a consequence of the older children approaching ceiling on this task.

Table 4. 3
Mean scores and standard deviations of all vocabulary measures

	Younger Children			Older Children		
Measure	EAL	EL1	Effect Size (95% CIs)[1]	EAL	EL1	EffectSize (95% CIs)[1]
MWP total	22.96 (5.18)	28.59 (3.25)	1.30 [0.65, 1.91]	28.69 (5.03)	31.96 (3.23)	0.77 [0.21, 1.29]
Binomials	8.96 (2.03)	10.00 (1.58)	0.57 [-0.02, 1.15]	10.19 (1.91)	11.00 (1.26)	0.50 [-0.04, 1.02]
Collocations	7.00 (2.21)	8.91 (1.69)	0.97 [0.35, 1.56]	9.53 (2.33)	10.68 (1.41)	0.60 [0.04, 1.11]
Similes	7.04 (1.94)	9.68 (1.04)	1.70 [0.99, 2.33]	8.97 (1.94)	10.24 (1.54)	0.76 [0.17, 1.25]
Word associations total	32.71 (8.32)	39.23 (9.82)	0.72 [0.12, 1.31]	40.20 (8.91)	47.28 (8.47)	0.81 [0.26, 1.36]
% semantically organised	63.33 (24.45)	71.32 (15.50)	0.39 [-0.20, 0.96]	65.87 (16.31)	76.36 (14.34)	0.68 [0.13, 1.22]
Polysemous word knowledge total	-	-	-	20.20 (5.88)	22.32 (4.48)	0.41 [-0.13, 0.93]
Casual word items only	-	-	-	12.87 (2.73)	13.52 (2.00)	0.27 [-0.26, 0.79]
Academic word items only	-	-	-	7.37 (3.79)	9.08 (3.15)	0.49 [-0.05, 1.01]
Receptive vocabulary	77.54 (14.61)	98.96 (15.60)	1.42 [0.78, 2.04]	90.79 (16.63)	120.63 (16.95)	1.78 [1.14, 2.4]
Expressive vocabulary	11.29 (4.37)	14.98 (5.15)	0.78 [0.19, 1.36]	15.96 (6.48)	25.70 (6.47)	1.50 [0.89, 2.10]

Note: [1] *Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]; MWP – multi-word phrase knowledge

4.3.2.1 Multi-word Phrase Knowledge

The EL1 children outperformed the EAL children on the MWP task overall and for each sub-category in both year groups, with small to large effect sizes (d = 0.50 – 1.70; see Table 4.3), however, the confidence intervals (of Cohen's d) demonstrate that the effect sizes for the binomial task in Y2 and Y4 may not be reliable given that the confidence intervals pass through zero. This therefore suggests that there is no statistically significant difference between the language groups for this task. As noted in section 4.3.2, multi-word phrase knowledge was found to be non-normally distributed, therefore both non-parametric and parametric analyses were run to determine whether the differences in MWP scores are statistically significant. Further to the distributions being non-normally distributed, the distributions were not similarly shaped for the EAL children and the EL1 children in Y3 and Y5 as assessed by visual inspections of histograms.

Figure 4.1 also demonstrates the difference in variance found in the two groups. Accordingly, the results of the non-parametric test are presented first, followed by the parametric tests. A Kruskal-Wallis H test revealed that mean MWP scores were statistically significantly different between groups, H (1) = 13.916, p < .001. Additionally, a repeated-measures analysis of variance (ANOVA) was conducted with one within-subjects factor (the MWP categories) with three levels (binomials, collocations and similes) and two between-subjects factors (Language Group and Year Group) with two levels for each (EAL/EL1 and Y3/Y5). This analysis revealed a robust effect of language group with moderate-large effect sizes F(1, 100) = 26.01, p < .001, d = 0.8 (95% CI for Cohen's d: 0.44, 1.25), and of year group F(1, 100) = 27.16, p <. 001, d = 0.9 (95% CI for Cohen's d: 0.52, 1.33]. The confidence intervals of Cohen's d, for language group and year group, are relatively narrow and do not pass through zero. This suggests that the effect size estimates are relatively reliable and gives further confidence to the suggestion that there is a statistical difference between groups for MWPs overall, as indicated in the p values. There was no statistically significant Language Group x Year Group interaction F(1, 100) = 1.86, p = .176, illustrating that year group status has a relatively similar effect regardless of language group status and vice versa. Both the non-parametric and parametric tests revealed statistically significantly differences between the EAL and the EL1 children's MWP scores overall. Planned comparisons were run to examine the differences between the language groups overall and the year groups overall for each category of the MWP task. Non-parametric and parametric tests were run for each category, however, similar to the MWP task overall, both sets of analyses revealed the same statistically significant findings, therefore only the parametric results are reported for the individual categories. Independent t-tests, with Bonferroni correction, revealed that EL1 children had statistically significantly higher scores than their EAL peers for each category with small to nearing-large effect sizes; binomials $t(102) = 2.47$, $p = .015$, $d = 0.49$ (95% CI for Cohen's d: 0.09, 0.88), collocations $t(102) = 9.07$, $p = .002$, $d = 0.64$ (95% CI for Cohen's d: 0.24, 1.03), and similes $t(102) = 4.86$, $p < .001$, $d = 0.98$ (95% CI for Cohen's d: 0.55, 1.37). The effect sizes and confidence intervals demonstrate that the similes task presents the greatest language group differences of the three tasks. Similarly, the older children scored significantly higher than the younger children in each category; binomials $t(102) = 3.13$, $p = .002$, $d = 0.56$ (95% CI for Cohen's d: 0.21, 1.00), collocations $t(102) = 5.15$, $p < .001$, $d = 1.02$ (95% CI for Cohen's d: 0.60, 1.42), and similes $t(102) = 3.08$, $p = .003$, $d = 0.60$ (95% CI for Cohen's d: 0.20, 0.99). For the year group analyses, the effect sizes and confidence intervals demonstrate a clear effect of year group for the collocations task.

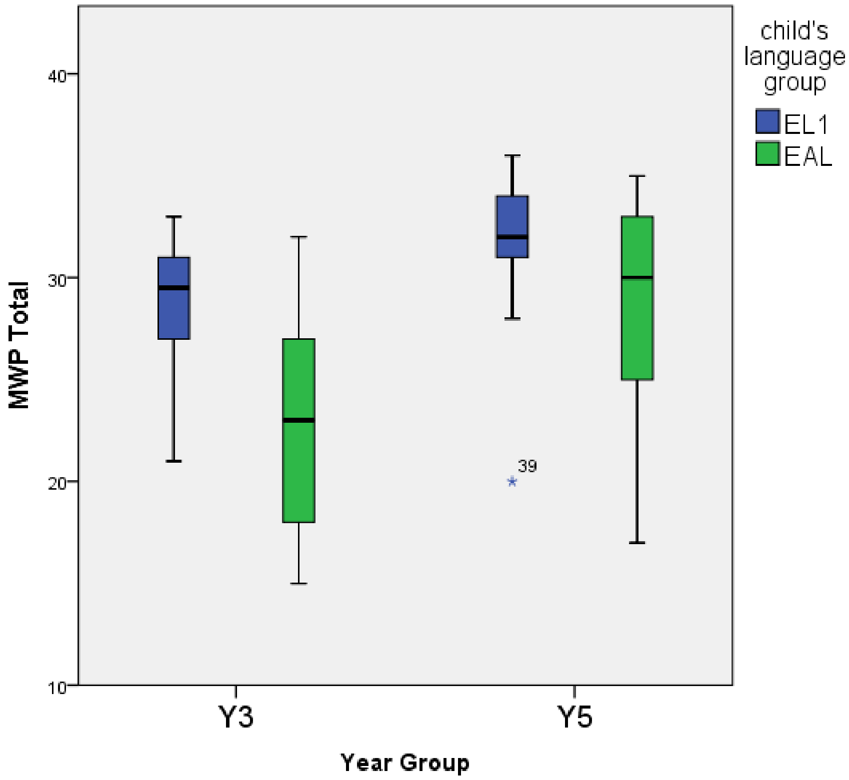

Figure 4. 1: Box plots showing EAL and EL1 children's mean raw scores on the MWP task with 95% confidence intervals.

4.3.2.2 Word Associations

The word associations task met the assumptions of the relevant parametric assessment requirements and as such ANOVAs were carried out to examine the language and year group differences for the WA task. The analysis revealed a statistically significant effect of language group F (1, 97) = 14.04, p < .001, d = 0.66 (95% CI for Cohen's d: 0.26, 1.07), with an EL1 advantage, an effect of year group F(1, 97) = 19.35, p < .001, d = 0.78 (95% CI for Cohen's d: 0.34, 1.19), with the older children outperforming the younger children, and no interaction effect F(1, 97) = 0.24, p = .876. While the dichotomous p values suggest that there are statistical differences, the magnitude of these differences are only moderate as indicated by the effect sizes. Figure 4.2 displays the raw scores for the word associations task overall.

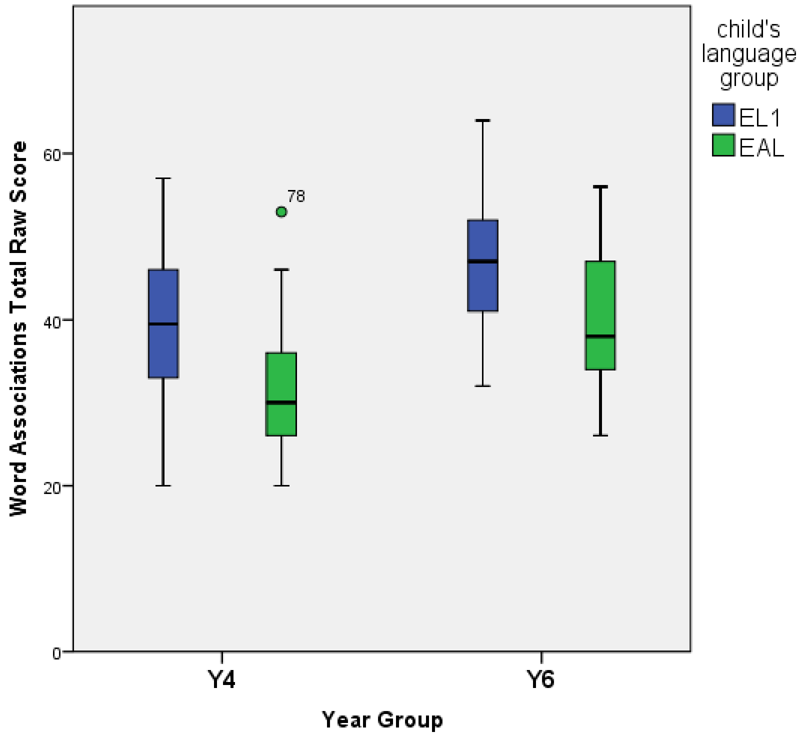

Figure 4. 2: Box plots showing EAL and EL1 children's mean raw scores on the WA task with 95% confidence intervals

Planned t-tests were run to examine the language groups differences by sub-category. Bonferroni correction for multiple comparisons was applied revealing a significant difference for the Animals category, $t(96) = 4.20$, $p < .001$, $d = 0.85$ (95% CI for Cohen's d: 0.43, 1.26), and Foods category, $t(96) = 2.54$, $p = .013$, $d = 0.51$ (95% CI for Cohen's d: 0.11, 0.92),both with an EL1 advantage, but a statistically significant difference did not emerge for the Jobs category, $t(96) = 0.91$, $p = .364$, $d = 0.19$ (95% CI for Cohen's d: (-0.21, 0.58). The size of the effect is moderate for the Animals category and small for the Food category demonstrating variation in language group difference by category.

Furthermore, language and year group differences were examined for the extent to which children's answers were semantically organised. See Chapter 2 (Section 2.10.4.3) for a detailed explanation of how semantic organisation was calculated and for an explanation of the reasons why this was only calculated for the animal category (see Section 4.2.3.4 for a brief summary). One-way ANOVAs were run to examine language group differences for the percentage of semantically organised responses. The whole sample analysis revealed that EL1 children have statistically significantly higher scores relative to the EAL children for their percentage of semantically organised responses, $F(1, 96) = 6.59$, $p = .012$, $d = 0.52$ (95% CI for Cohen's d: 0.11, 0.92). When examined by year group, no statistically significant difference emerged between the EAL and the EL1 children in the younger group (Y4) $F(1, 42) = 1.66$, $p = .206$, $d = 0.39$ (95% CI for Cohen's d: -0.21, 0.99), but for the older group (Y6), there was a statistically significant difference with an EL1 advantage, $F(1, 54) = 6.29$, $p = .015$, $d = 0.68$ (95% CI for Cohen's d: 0.13, 1.22). A one-way ANOVA examined year group differences for the percentage of semantic organisation though no statistically significant year group differences emerged for the whole sample $F(1,97) = 0.39$, $p =.387$, $d = 0.17$, the EL1 children $F(1, 46) = 1.34$, $p =.252$, $d = 0.34$ (95% CI for Cohen's d: -0.24, 0.91), or the EAL children $F(1, 50) = 0.20$, $p =.659$, $d = 0.12$ (95% CI for Cohen's d: -0.43, 0.68).

4.3.2.3 Polysemous Word Knowledge

The polysemous word knowledge task was carried out at t3 with the Y6 children only. Again, the relevant assumptions were checked and the PWK task was deemed appropriate for a repeated-measures ANOVA to be run. Word type was the within-subjects factor, consisting of two levels; casual and academic, language group was the between-subjects factor with two levels, EAL/EL1. This analysis revealed no statistically significant effect of language group $F(1, 53) = 2.75$, $p = .103$, $d = 0.44$ (95% CI for Cohen's d: -0.08, 0.99). However, as the raw scores indicate (see Table 4.3) the EL1 children do have higher scores than the EAL children on the PWK task overall, and for both the academic word items and the casual word items separately. Additionally, although the confidence intervals do pass through zero, this is only for a very short distance. Given that the most likely effect size is at the midpoint of the intervals (Kalinowski, 2014), the confidence intervals demonstrate some level of EL1 advantage. The Bonferroni adjustment was applied and planned comparisons were run to examine this further. The results revealed no statistically significant difference between the two language groups overall, $t(53) = 1.48$, $p = .145$, $d = 0.44$, for the casual word items $t(53) = .99$, $p = .324$, $d = 0.27$ (95% CI for Cohen's d: -0.26, 0.80), or for the academic word items $t(53) = 1.80$, $p = .078$, $d =$

0.49 (95% CI for Cohen's *d*: -0.05, 1.02), though the academic word items are approaching statistical significance with the EL1 children outperforming the EAL children. This is also demonstrated in the confidence intervals where the lower limit only very narrowly passes through zero.

4.3.3 Correlations

To address the third research question, correlations between single-word vocabulary knowledge and the additional measures of vocabulary depth were examined. Preliminary analyses showed that there were no outliers, however, not all variables were normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$). The non-normally distributed variables included the multi-word phrase task and the expressive vocabulary task. For this reason, non-parametric analyses (Spearman's rank order correlations) were run alongside the parametric analyses (Pearson's correlations). Both correlation analyses revealed the same relationships and as such only Pearson's correlations are reported here. As can be seen in Table 4.4, the t1 single-word vocabulary measures correlate statistically significantly with the t2 and t3 measures of vocabulary depth for both the EL1 and the EAL children.

Table 4. 4
Pearson's correlations between single-word vocabulary knowledge and measures of vocabulary depth

	1	2	3	4	5
1. t1 Expressive Vocabulary		.722***	.646***	.605***	.697***
2. t1 Receptive Vocabulary	.581***		.709***	.613***	.733***
3. t2 MWP Total	.483***	.674***		.516***	.755***
4. t3 WA Total	.597***	.478***	.543***		.602**
5. t3 PWK Total	.728***	.619***	.508*	.304	

Note: EL1 above the diagonal, EAL below; t1, n = 110; t2, n = 104; t3, n = 98; t3 PWK- Y6 only, n =54; *** $p < .001$, ** $p = .001$, * $p = .005$

4.3.4 English Language Use

Question 4 considers the extent to which EAL children use English language outside the classroom and whether this has an influence on vocabulary depth outcomes. As outlined in section 4.2.3, a “proportion of English use” variable was computed from the child language questionnaire and is a composite score of frequency and quantity of spoken English outside of school. Scores ranged from 9 to 87 (%), with a mean of 56.13, a standard deviation of 17.31 and a median of 58.33. A dichotomous variable was computed using the median as the cut-off; and thus, children were grouped as having a lower proportion of English use (those with scores equal to or below the median, n = 25) or a higher proportion of English use (those with scores above the median, n = 26). This allowed the final question in this section to be tentatively approached, examining English language use and English vocabulary knowledge. The two groups – lower/higher proportion of English use (which will be referred to as LEU or HEU hereafter) did not differ by age, $t(49) = 0.32$, $p = .753$, $d = 0.08$.

4.3.4.1 Language use and multi-word phrase knowledge

To examine the group differences of MWP knowledge outcomes between the EAL children with LEU or HEU, a repeated-measures analysis of variance (ANOVA) was carried out, with the MWP categories as the within-subjects factor, with three levels (binomials, collocations and similes) and English language use as the between-subjects factor with two levels (LEU/HEU). This analysis revealed a robust effect of English language use $F(1, 48) = 5.79$, $p = .020$, d = 0.69 (95% CI for Cohen's d: 0.11, 1.25), with HEU children outperforming LEU children. Planned comparisons were run, with Bonferroni correction for multiple comparisons, to examine the English language use group differences for each category of the MWP task. Results revealed a statistically significant difference between the two groups for the binomials t(48) = 2.417, $p = .020$, $d = 0.69$ (95% CI for Cohen's d: 0.11, 1.25) and the collocations $t(48) = 2.03$, $p = .045$, $d = 0.57$ (95% CI for Cohen's d: 0.01, 1.13) with a HEU advantage, but not for the similes category $t(48) = 1.61$, $p = .115$, $d = 0.46$ (95% CI for Cohen's d: -0.11, 1.01), the relatively small effect size (Plonsky & Oswald, 2014) with confidence intervals that pass through zero further explain the limited effect of language use on simile knowledge. Overall, the results show that those with a higher percentage of spoken English have higher levels of MWP knowledge.

4.3.4.2 Language use and word associations

To examine the group differences between EAL children with LEU or HEU on the WA task, an independent samples t-test was run. The analysis revealed no statistically significant effect of English language use and a small effect size, $t(49) = -.96$, $p = .344$, $d = 0.32$ (95% CI for Cohen's d: -0.29, 0.82).

4.3.4.3 Language use and polysemous word knowledge

To examine the proportion of English use group differences on the PWK task a repeated-measures analysis of variance (ANOVA) was conducted with one within-subjects factor (the PWK categories) with two levels (casual/academic) and one between-subjects factors (English language use) with two levels (LEU/HEU). This analysis revealed no effect of language group $F(1, 28) = 1.4$, $p = .240$, $d = 0.41$ (95% CI for Cohen's d: -0.30, 1.16).

4.4 Discussion

This chapter aimed to investigate aspects of vocabulary depth in a sample of EAL and EL1 children. Vocabulary depth was measured using a multi-word phrase knowledge task, a word association task and a polysemous word knowledge task. It was predicted that EL1 children would outperform EAL children on all measures and that the association between the measures of vocabulary depth and measures of single word vocabulary knowledge would have a stronger relationship for the EL1 children than the EAL children. Additionally, the percentage of spoken English used outside school was examined and a number of analyses explored whether the frequency of spoken English influences vocabulary depth among EAL children.

4.4.2 Discussion of Language and Age Group Differences

The group differences will be discussed in relation to the individual vocabulary depth tasks employed within this chapter, beginning with multi-word phrase knowledge.

4.4.2.1 Multi-word phrase knowledge

For the MWP task, analyses revealed that the EL1 children had better knowledge of MWPs than the EAL children; this is consistent with previous findings that have demonstrated EAL children to have weaker single-word vocabulary knowledge (e.g., Burgoyne, Kelly, Whiteley & Spooner, 2009) and MWP knowledge (e.g., Smith & Murphy, 2015) than their monolingual English-speaking peers. It is well established that vocabulary knowledge is more complex than knowing the definitions of individual words (Stahl & Nagy, 2006) and in line with this, the overarching findings indicate that beyond single-word vocabulary knowledge, MWPs are an area of weakness for EAL children.

Additionally, and largely as expected, there was an effect of year group with the older children obtaining higher scores than the younger children. No interaction effect was found in the repeated measures ANOVA, highlighting that language group differences emerge in both Y3 and Y5 and that year group differences follow a similar pattern for EAL and EL1 children. While it is a positive finding that the Y5 EAL children outperform the Y3 EAL children, the differences between language groups still emerge for the older children, indicating that MWP knowledge may be an enduring area of vulnerability for EAL children. Cameron and Besser (2004) found that EAL children at KS2 had a higher number of errors in their use of formulaic phrases in their writing as compared to EL1 children (Cameron & Besser, 2004); the current study provides evidence that the differences in writing skills at the end of KS2 may be underpinned by EAL children's limited spoken language skills. This study thereby adds to current knowledge by demonstrating that language group differences occur on a task of multi-word phrase knowledge at the receptive level and therefore may not be limited to discrepancies in productive writing skills.

Somewhat encouragingly, the effect sizes were smaller for the older year group and could therefore be indicative of the gap in performance decreasing, which is consistent with previous research examining single-word vocabulary knowledge among young EAL learners (e.g., Mahon & Crutchley, 2006). However, it is important to bear in mind that the year group differences discussed in this chapter in relation to the MWP task are cross-sectional and as such are subject to the limitations associated with this. Overall the results relating to the MWP task replicate previous findings (e.g. Smith & Murphy, 2015) in that EAL learners demonstrate lower levels of multi-word phrase knowledge than their EL1 peers and this chapter further identifies that group differences also emerge at the receptive level.

4.4.2.2 Word association

The word association task was employed in this study to explore children's links between lexical items. In line with the network perspective, this study took the view that the number of links between and among lexical items would provide an indication of how well word items are known (Aitcheson, 2012; Haastrup & Henriksen, 2000; Meara, 2009). The prediction was that EL1 children would have stronger links between words and would therefore fare better on the word association task. The analyses indeed revealed that the EL1 children outperformed the EAL children, providing evidence that EAL children have weaker links between words than their EL1 peers. This finding was also noted in the semantic organisation of the responses; EAL children scored statistically significantly lower than their EL1 peers as calculated by the percentage of semantically linked responses. However, this was only true for the older year group and not the younger year group. A possible implication is that of a Matthew effect; the gap between language groups is greater for the older children than the younger children in relation to this network building skill. Given that EAL children have repeatedly been found to have weak English language skills, and that the building of networks characterises depth of knowledge, this is an important finding that warrants further exploration, though again, it is important to note the cross-sectional nature of these findings. The educational implication is that EAL children may benefit from the explicit teaching of word relations. Furthermore, the theoretical implication worth exploring is whether a reciprocal relation between vocabulary depth - operationalised by word association tasks - and reading comprehension exists.

Despite the language group differences found for the word association task, the relatively high standard deviations for the semantic organisation of responses indicates that individual responses vary widely from the mean, within both language groups. This supports the argument that native speakers are not homogeneous in their response behaviour (e.g., Fitzpatrick, 2007; Nissen & Henriksen, 2006) and as such there may not be a gold-standard of response behaviour that second language learners should strive to emulate in terms of the storage and production of the semantic links made between words. A more comprehensive set of tasks, including tasks in which children are required to give a range of responses - beyond lists of nouns – could provide further insight into the links that are made between words for EAL and EL1 learners. Furthermore, the association task used in this study requires the task to be carried out under time constraints, thus placing emphasis on retrieval and access skills; while such skills have been found to play a role in the association of words stored in the mental lexicon (Newman & German, 2002; Storkel & Morisette, 2002), a comprehensive set of tasks would enable researchers to tease apart the various skills that underpin the different task formats from existing word association skills.

A further finding that was of particular interest was the relationship between the number of animals listed in the animal category, that is, the raw score for this category, and the percentage of responses that were sub-semantically linked, i.e., all responses were animals but the number that were sub categorised in a semantically clear format e.g., animals belonging to the cat family; this analysis revealed a non-linear relationship between the two variables. In other words, the volume of words that children were able to produce in sixty seconds was not related to the number of those words that were sub-semantically related, suggesting that knowledge of words does not necessarily equate to an organised semantic network. However, further research employing a variety of assessments is warranted before any claims can be made regarding this relationship. The examination of sub-semantic associations was a technique employed by the researcher and as such there are a number of limitations to be considered; firstly, the researcher made assumptions of participants' knowledge of animals when calculating the scores, e.g., 'snake' followed by 'alligator' would have been considered semantically related for several reasons, i.e., they typically live in similar climates, they are both reptiles. However, it was not possible to know with any certainty that a child had made a link between the two responses at all. Thus, the use of a more rigorous and comprehensive test battery of word associations is called for in future research. Though, in summary, the results suggest that EAL children have weaker semantic links between words than their EL1 counterparts.

4.4.2.3 Polysemous word knowledge

The polysemous word knowledge analyses revealed that language groups had comparable knowledge of polysemous words. There were no statistically significant differences between EAL and EL1 children on the task overall or independently when examined by the casual sense of the word items or the academic sense of the word items. Neither language group were approaching ceiling on the task and, in line with Logan and Kieffer (2017), all children found the academic sense of the words more challenging than the casual sense of the words. Thus, suggesting that polysemy is a difficult aspect of vocabulary knowledge for all children and not just EAL children. As Nagy and Townsend (2012) proposed, academic language involves learning to be flexible with existing vocabulary knowledge; the results of this study suggest that children are yet to master this skill - their understanding of the more abstract, metaphorical sense of the words' meanings is relatively weak, although there is some evidence that it is emerging.

One methodological issue that is worth revisiting is the fact that the children that completed this task (Year 6 children only) were, on average 10.7 years old (SD = 0.38), which is approximately 2 years younger than the EAL children in the original study from which the task was taken (Logan & Kieffer, 2017). The task was developed in a rigorous manner and there were many stipulations that permitted or prevented words to be included in the final version of the task; one of which being that the items needed to be words that students would encounter in an everyday casual context, and, on examining the test items, it was deemed appropriate by the researcher that the task would be suitable for children in Year 6 to complete. However, it was held in mind that the Year 6 children may have less experience with the abstract sense of the words than the children in the original study. Nonetheless, the raw scores of the children in this study are in fact comparable to the raw scores of the children in the original study and as such the task is deemed appropriate for use with this age group.

In terms of the language group outcomes and despite the fact that there were no statistically significant differences between language groups, the raw scores indicate that the EL1 children achieved higher scores than the EAL children on both the casual word items and the academic word items. Furthermore, the effect sizes indicate that the magnitude of the language group differences was greater for the academic word items than the casual word items, which may be indicative of a weakness in understanding the academic senses of words for EAL children. Given the effect size of the language group differences for the academic items (d = 0.49) and the relatively small sample size (n=55; Y6 only task), a lack of statistical power may be a contributing factor for why statistically significant group differences were not found for these items.

In considering why EAL learners may have weaker knowledge of the academic senses of words and in line with the proposal put forward by Kieffer and Lesaux (2012), it is possible that EAL learners have less experience with and exposure to the academic meaning of words outside school as compared to their EL1 counterparts, and as such may have more difficulty with the abstract meaning of the words than the casual meanings. To understand whether polysemy continues to be a challenge for EAL and EL1 children, it would be of educational value to examine the trajectory of polysemous word knowledge beyond the primary school years. Additionally, it is argued that an emphasis on the importance of knowing the different meanings of words could be beneficial to all children, though this remains to be empirically examined.

The findings presented in this study provided no evidence of a bilingual advantage in the polysemous word knowledge task. The theoretical premise being that EAL children frequently use different words to refer to the same concept (L1 and L2 vocabulary) and use different syntactical structures to express the same meanings (Nagy & Anderson, 1995) therefore it was considered that this cognitive skill may extend to a task where such flexibility is needed. While a number of reasons are possible for why this was not the case, it is argued that the cognitive advantages of bilingualism tend to present themselves in children who have strong L1 and L2 proficiencies (Bialystok & Barac, 2012; Brom et al., 2017; Crivello et al., 2016) and as such the children in this study may not have reached a stage of proficiency in either their L1 or L2, or both, from which they would benefit from such advantages. A follow-up study with older participants and a more homogenous EAL sample may enable such questions to be addressed further.

The results of this task demonstrate that all children find the abstract, academic meanings of words more challenging than their everyday meanings. Given that children need to understand academic vocabulary in order to succeed in their school career, it is proposed that future research should aim to examine the effectiveness of explicitly teaching polysemous words for both EAL and EL1 children.

4.4.1 Discussion of the Correlations

The results demonstrate that the measures of vocabulary depth correlate well with the measures of single-word vocabulary for both EAL and EL1 children (see Table 4.4). These results are in line with previous research (e.g., Vermeer, 2001) and support the idea that vocabulary breadth and vocabulary depth are not necessarily at either end of a continuum (Henriksen, 1999). It is argued that depth of word knowledge and its relationship with vocabulary size can be situated within the Lexical Legacy Hypothesis (Nation, 2017) in that words are seldom provided as individual word lists, instead they are often encountered in meaningful contexts and as such there are variations in how well words are known and indeed which words are known. Within this sample, a statistically significant relationship exists between single-word receptive and expressive vocabulary knowledge and measures of vocabulary depth. Though significant for both EAL and EL1 children, the strength of association was greater for the EL1 children for all correlations with the exception of expressive vocabulary and polysemous word knowledge. These findings support Nurweni and Read's (1999) study where correlations between vocabulary breadth and depth were stronger for the children with a higher language proficiency. Interestingly, the measure of expressive vocabulary included in this study was administered using a fine-grained scoring system which aimed to capture more variance in the answers provided. As such, the expressive vocabulary measure may not be examining vocabulary breadth in the strictest sense, potentially explaining the strength of association found between expressive vocabulary and polysemous word knowledge. Overall the correlations support the idea that vocabulary breadth and vocabulary depth are not polarised constructs and provides evidence that this is true for EL1 and EAL children.

4.4.3 Discussion of English Language Use

EAL children were grouped according to the proportion of their use of spoken English and consequently, two groups were created; those with higher levels of English use and those with lower levels of English use. The results suggest that those with a higher proportion of spoken English outperform those with a lower proportion of spoken English in their performance on the MWP task. In line with the pattern-finding aspect of the usage-based approach to language acquisition (Tomasello, 2003), this finding suggests that children who use the language more frequently with others may be better equipped at performing statistically based distribution analyses on commonly co-occurring sequences of words. Similarly, Durrant and Schmitt (2010) found a learning effect among adult L2 learners of English for collocational knowledge and subsequently they argue that a lack of exposure to the L2 accounts for differences in L2 collocational processing. Though this differs from the current study in that ‘exposure’ was not measured per se, it is plausible that the children using English more frequently were speaking with others and thus were also being exposed to English (in conversation) more frequently. Consistent with the usage-based approach then, the children with higher English use, if this can be thought of potentially as a proxy for exposure, may have a higher number of learning opportunities.

While this finding emerged for the MWP task, no group differences between children that spoke English more or less frequently emerged for the WA task or the PWK task. One possible explanation for this is that while words associations and polysemous word knowledge will depend on the extent to which words have been encountered, they depend less on exposure to specific co-occurrence of word sequences, i.e., knowing that *black and white* is more appropriate than *white and black* will depend more on exposure to that specific word sequence than knowing that *snakes* and *alligators* may be semantically linked for example. However, given that the questions examined language use and not language exposure, and that they were relatively crude, the findings are in no way comprehensive and were employed only as an indication of language experience.

Furthermore, although language use at home is important to consider in the context of English (L2) acquisition, it is also important to consider in terms of L1 maintenance. The economic, social, cultural, and linguistic benefits to maintaining L1s are uncontested and the discussion of which are beyond the scope of this thesis. However, in the researcher's experience teachers and parents alike are offered inconsistent advice regarding 'optimal' exposure to and frequency of the L1 and L2 (English) in the home. In this study, having higher proportions of spoken English did not equate to having higher levels of polysemous word knowledge or word associations in English which emphasises that the use and knowledge of the L1 should not be underestimated as a factor in EAL language and literacy development. Clearly, there are other factors that were not measured here that would be useful when examining L1/L2 use and L2 outcomes - to name but a few: the quantity and quality of English input, parents' and children's L1/L2 proficiency, language and literacy practices in the home, L1 literacy. Though the questionnaire items used in this study allowed us to tentatively approach this line of enquiry, a more extensive understanding of each participant's language profile would enable a more rigorous understanding of the relationship between L1/L2 use and L2 outcomes. The relatively arbitrary cut off point in which determined the two groups as high or low frequency of English users did not capture the diversity of children's language use and as such a more detailed exploration of the home language environment would enable more complex analyses. While the questionnaire only allowed for a basic indication of children's language use outside the school environment and the findings have been interpreted with this in mind, the analyses revealed that the EAL children who spoke English more frequently had higher levels of MWP knowledge than the EAL children who spoke English less frequently, though this needs further exploration.

4.5 Summary

The measures of vocabulary examined in this chapter tap into the dimension of vocabulary known as *vocabulary depth*. This chapter took the view that examining features of a learner's whole lexicon may be more insightful to understanding the vocabulary knowledge of learners than examining the features that are only characteristic of single word knowledge (Meara & Wolter, 2004). As demonstrated in the three tasks employed in this chapter, there are many ways in which a word can be known and ultimately *vocabulary depth* itself is thought to be multi-dimensional in nature. Overall, it is argued that the findings of this chapter demonstrate that vocabulary depth is weaker for EAL children than it is for EL1 children. Firstly, knowledge of MWPs, operationalised as knowledge of commonly co-occurring word sequences, was greater for EL1 children than the EAL children. The language questionnaire indicated that this may be related to the extent to which English is used outside the school environment, though a more in-depth examination is needed. Secondly, the number of word associations children were able to produce was found to be weaker for the EAL children than the EL1 children and while the semantic organisation of the individual responses varied widely for both the EAL and EL1 children, EL1 children were found to semantically organise their responses more than EAL children. And finally, polysemous word knowledge was found to be a challenging aspect of vocabulary depth for all children, though the raw scores indicate that this may be a heightened challenge for the EAL children. In line with The Lexical Quality Hypothesis (Perfetti & Hart, 2002; Perfetti, 2007), it is argued that the findings presented in this chapter demonstrate that EAL children have lower quality lexical representations than their EL1 peers. The measures of vocabulary depth employed in this chapter provide evidence that EAL children have weaker knowledge of formulaic sequences than EL1 children, the links that they have between words are not as well-formed as EL1 children's, and that the understanding of the more abstract sense of a word is weak for both groups of children. With the findings of this chapter in mind, it is argued that examining vocabulary depth is important because words are more than just a simple, linear connection between form and meaning and that further research is needed to explore the trajectory of these skills and how they relate to literacy outcomes and academic achievement more broadly.

Chapter 5 – Morphological Awareness

5.1 Introduction

The rising number of children learning EAL in the UK and the current gaps in our understanding of their reading development prompts calls for more nuanced investigations of reading comprehension for this group of learners. This chapter examines whether EAL children demonstrate a specific weakness in morphological awareness; morphological awareness has been found to contribute to passage-level reading comprehension, across a range of ages, over and above other well-documented reading-related skills such as phonological awareness and vocabulary knowledge (Carlisle, 2000; Carlisle & Fleming, 2003; Deacon & Kirby, 2004; Deacon, Kieffer, & Laroche, 2014; Foorman et al., 2012; Kieffer & Box, 2013; Kieffer & Lesaux, 2008; Nagy et al., 2006; Singson et al., 2000; To, Tighe, & Binder, 2016). Morphology has gained increased research attention in recent years, with meta-analyses (Bowers, Kirby, & Deacon, 2010; Goodwin & Ahn, 2010, 2013) and narrative reviews (Carlisle, 2010; Reed, 2008) examining morphology-related interventions and their effect on language and literacy achievements for various groups of learners. However, these studies highlight that very little research has examined the morphological awareness of children learning EAL, particularly in the UK.

The English language has a relatively simple morphology and an irregular orthography due to the lack of consistency between spoken and written words in the representation of sounds (Verhoeven & Perfetti, 2011). Thus, the writing system is morphophonemic in its nature, that is, words are spelled according to their sound (phonemes) and their meaning (morphemes) (Venezky, 1970). For example, the word *jumped* is spelled with the suffix *-ed* rather than *jumpt*; The *-ed* carries meaning as a past tense marker, i.e., an inflected morpheme. Thus, morphemes, such as root words and affixes, are the smallest phonological units of a word that carry semantic information and/or have a grammatical function. Morphological awareness, then, is the attentiveness to the morphemic structure of words and subsumes the ability to consciously manipulate a word's structure in order to convey different meanings (Carlisle, 1995, p. 194;

Kuo & Anderson, 2006). There are three main types of morphemes in English; *compound morphemes* whereby two stems are combined together to create a new word, (e.g., *sawdust* or *childproof*), *inflectional morphemes* that maintain the meaning of the stem but change the tense (e.g., *walk* to *walked)* or quantity (e.g., *book* to *books),* and *derivational morphemes* that may change the meaning of the word (e.g., *happy* to *unhappy*) or the syntactic class of a word (e.g., *stupid* to *stupidity)* which often brings about considerable change in the meaning unto itself (Marlsen-Wilson, 2007). Unlike compounding, inflectional and derivational morphology require an understanding of suffixes and how to appropriately attach these to root words in order to change their meaning and thus it is derivational and inflectional morphology that will be explored in further detail in this chapter. Research suggests that young children tend to have an understanding of how inflectional morphemes attach to words (such as *-ed* for past tense verbs and *-s* for plural words), but have less success with the understanding of derivational morphemes, but older children, as they begin to encounter an increasing number of multimorphemic words (Anglin, 1993), develop a growing awareness of both inflectional and derivational morphemes (Berninger et al., 2010; Deacon & Kirby, 2004; Nagy et al., 2006; Singson, Mahony, & Mann, 2000; Verhoeven & Perfetti, 2011).

The role of morphological awareness in reading comprehension has received relatively little attention in theories of reading acquisition. In part, this may stem from the fact that reading acquisition research tends to focus on younger children and as such morphologically complex words are not yet of importance and are thus neglected from conceptualisations of the reading process. However, more recently, the dual-pathway conceptualisation has gained attention (Rastle, 2018; Taylor, Rastle, & Davis, 2013) in suggesting that there is a shift from a “spelling-to-sound-to-meaning” pathway to a direct “spelling-to-meaning” pathway as reading develops. It is argued that the understanding of morphemes underpins this shift, that is, morphological information provides regularity in the mapping of how words are spelled and what they mean. Supporting this view comes evidence from research with skilled adult readers that suggests that morphological awareness facilitates rapid word recognition (Amenta & Crepaldi, 2012; Rastle & Davis, 2008). This is line with the lexical quality hypothesis, in that well-specified associations between morphemes and related morphologically complex words enables rapid word recognition and meaning retrieval (Perfetti, 2007), which in turn may reduce the cognitive load during reading comprehension, enabling mental processes to be used for higher-level skills, such as comprehension monitoring. Further research demonstrates, however, that children may not utilise morphological knowledge in a way that facilitates rapid word recognition despite demonstrating knowledge of morphemes (Beyersmann, Castles, & Coltheart, 2012; Dawson, Rastle, & Ricketts, 2017). These findings suggest that, as learners develop, morphology plays an increasingly important role in reading; this is potentially through its regularity in mapping spelling to meaning and thus allowing quick access to lexical representations during reading. However, further research is needed to identify the point in development at which readers make use of this morphological knowledge when engaged with a written text, or whether this skill could in fact be explicitly taught.

There is some inconsistency in the literature concerning the dimensionality of morphological knowledge; some researchers have identified morphological knowledge as a unidimensional construct in that a variety of morphology measures fit best as a single latent variable (Muse, 2005; Nagy, Berninger, Abbott, Vaughan, & Vermeulen, 2003) whereas other researchers have found morphological knowledge to be a multi-dimensional construct in that different measures of morphology contribute differently to a variety of literacy outcomes (Berninger, Abbott, Nagy, & Carlisle, 2010; Goodwin, Gilbert, Cho, & Kearns, 2014). Further, Goodwin, Petscher, Carlisle and Mitchell (2015) proposed that morphological knowledge consists of a ‘general factor’ which is thought to involve knowledge of meaningful units within words, but beyond this ‘general factor’ it is proposed that there are also specific skills that develop independently and that can be applied in different ways, thus supporting a range of literacy tasks. For example, an understanding of morphological structure may enable a learner to work out the meaning of *active* through understanding the meaning and syntactic role of the suffix ‘ive’ i.e., the ‘general factor’, however beyond this, a learner may utilise this knowledge of morphemes to identify that the suffix ‘ive’ in *active* is pronounced differently to the ‘ive’ in a single morpheme such as *chive*. This is an example of morphological knowledge being used in a way to support pronunciation, i.e., a different skill to the facilitation of meaning. In accordance with Goodwin et al. (2015), this chapter takes the view that knowledge of morphemes may assist reading in its facilitation of accessing word meanings, but that it may also play a role in literacy skills beyond this, e.g., enabling correct pronunciation or spelling.

In a study examining morphological awareness and its relation to reading comprehension among typically developing monolingual English-speaking children, Carlisle (2000) found that morphological awareness, as indexed by derivational tasks, predicted reading comprehension to a greater extent for the 10-11-year-old children than the 8-9-year-old children. This supports the idea that the knowledge and role of morphological awareness in reading comprehension changes over time, with morphological knowledge becoming progressively more important as children get older. In line with this, morphological knowledge is thought to be acquired implicitly through language learning and repeated exposure to morphemes across different contexts (Goodwin et al., 2014). This further supports the finding that a stronger predictive relationship emerged for the older children. Older children have inherently had more experience with a variety of words than younger children, through having more time and thus a longer period of exposure to words. But additionally, older children become skilled readers and thus read more complex texts that include a greater number of morphologically complex words.

In addition to the developmental observations, Carlisle (2000) reports that all children found the morphology task particularly difficult when the derived word they were asked to produce consisted of a different phoneme to the example, e.g., *deep/depth,* which is in line with previous research (Carlisle, 1988; Champion, 1997; Leong, 1989; Tyler & Nagy, 1989). In other words, when phonological representations remained intact children were better able to produce the correct derived form. It is possible then, that a reliance on phonological skills together with an insufficient understanding of morphological knowledge could lead to incorrect word formations, for example, the correct derived form of "create" would involve a morphophonemic change to "*creation*" rather than a phonologically unchanged morphological shift to "*createment*". Knowing the correct suffix requires morphological knowledge however the overlap of vocabulary and morphological knowledge cannot be overlooked. It seems appropriate to assume that children that have the word *creation* in their mental lexicon would be less likely to produce an incorrect derivative like *createment*, though this needs further research. This further supports the notion that morphological knowledge is acquired through repeated exposure – children need to have adequate exposure to written and spoken language to begin to rapidly and correctly identify morphemes. To examine morphological awareness systematically, it is thus important to include a variety of morphologically complex words within such tasks, including the use of words with regular and irregular morphemes, to further unpick children's morphological knowledge and understanding.

Moving beyond research with EL1-only samples of children, the relationship between English morphology and reading comprehension has been explored among Spanish-speaking language minority learners (EAL) in the U.S. (e.g., Box & Kieffer, 2013; Kieffer & Lesaux, 2008). Kieffer and Lesaux (2008) examined the relationship between morphology and reading comprehension among Spanish-speaking EAL children in fourth grade (9-10 years old) and again in fifth grade (10-11 years old); and, as observed in studies discussed earlier, the relationship between morphology and reading comprehension was found to strengthen between fourth and fifth grade, i.e., evidence of morphology's role changing with development. Moreover, Box and Kieffer (2013) compared EAL and EL1 children and identified that morphological awareness uniquely contributed to reading comprehension for both EAL and EL1 children alike, in sixth grade (11-12 years old). Both studies thereby demonstrate that morphological awareness plays an important role in the reading comprehension of EAL learners. Furthermore, Box and Kieffer (2013) report that the EAL children had lower raw scores than the EL1 children on the morphology task (indexed by derivational morphology) as well as lower levels of reading comprehension and vocabulary knowledge. Given that morphological knowledge is thought to develop implicitly through repeated exposure to morphemes, it is thought that children learning EAL – who have less exposure to English than EL1 children - may have lower levels of morphological knowledge and, by the same token that skilled adult readers use morphological knowledge to facilitate rapid word identification more than adolescents or children (e.g., Dawson, Rastle & Ricketts, 2017), EL1 children may be more efficient at utilising morphological knowledge during reading than EAL children, though this has not been empirically examined here.

Extending the EAL and EL1 group comparisons, it is also of importance to identify potential differences within heterogenous EAL populations, where first languages (L1s) differ considerably in terms of their morphological system. This may play a role in EAL learners' morphological knowledge in English; differences in L1 morphology may account for differences in language outcomes of the L2 (e.g., Silva & Clahsen, 2008). Shared morphological features, or lack thereof, in L1s and English may facilitate or hinder the use of morphological awareness in reading comprehension in English. Kieffer and Lesaux (2012) examined the predictive relationship of English morphology and English reading comprehension among sixth-grade EAL pupils with either Spanish, Vietnamese or Filipino as their L1 alongside EL1 children. The sample included 323 monolingual English-speaking children, 499 Spanish-speaking EAL children, 48 Vietnamese-speaking EAL children, and 82 Filipino-speaking EAL children. They found that morphological awareness made a direct, unique contribution to reading comprehension across all four language groups and that the magnitude of this relationship was similar. Accordingly, the authors tentatively suggest that the importance of morphological awareness for reading development generalises across language groups. Their findings add to a growing body of research examining learners of different L1s and the importance of morphological knowledge to reading in English, including Arabic speakers (Saiegh-Haddad & Geva, 2008), Chinese speakers (Ruan, Georgiou, Song, Li, & Shu, 2018), French speakers (Deacon, Wade-Woolley, & Kirby, 2007) and Spanish speakers (Kieffer & Lesaux, 2008; Ramirez, Chen, Geva, & Kiefer, 2010).

In line with this body of research and given that there is a sizeable sub-sample of EAL children, in the current study that speak Punjabi relative to the number of children speaking the remaining 16 languages, there was some ruminations over conducting a sub-set of analyses among this group. The two languages (Punjabi and English) are phonologically quite different, with Punjabi making greater use of nasalised vowels but having fewer consonant clusters and diphthongs/triphthongs than English (Mahmood, Hussain & Mahmood, 2011). In addition, Punjabi has a much richer inflectional morphology relative to English (Gill, Lehal & Joshi, 2009). Within language group analyses could add to the body of knowledge concerning cross-linguistic transfer (i.e., does knowledge of Punjabi transfer to or influence knowledge of English) specifically in relation to morphological awareness. However, when broken down into year groups there were, in fact, 10 Punjabi speakers in Y3 and 14 in Y5, all of whom were not literate in their L1 (with literacy potentially affecting the extent of morphological awareness). Additionally, morphological awareness was only examined in English due to a lack of age-appropriate measures that could also be administered by a non-native speaker of Punjabi. In line with previous findings, it is acknowledged that EAL children's L1 could influence their morphological awareness in English and analyses on linguistically neat (homogenous) samples would be helpful to examine this further. However, given that morphology was being assessed only in the L2 and that more than half the EAL sample spoke languages other than Punjabi, a decision was made not to conduct further analyses on this specific group of learners.

In consideration of the notion that morphological knowledge is a result of exposure (Goodwin et al., 2015), it is thought that EL1 children in the UK may be better able to manipulate the morphemic structure of real words (in English) than EAL children, however it is less clear how EAL and EL1 children would compare on a morphology task that included nonsense words. The inclusion of nonsense words would attempt to control for confounding factors such as existing phonological awareness and vocabulary knowledge, allowing for the manipulation of morphological awareness to be independently examined, and thus potentially strengthening the interpretation of the findings and the validity of the measure. The majority of studies discussed in this chapter have not employed an extensive morphology test battery which may potentially be limiting the existing understanding of morphological knowledge, particularly in terms of language group (EAL/EL1) differences.

Extending this and thinking of ways in which to tease apart children's knowledge of morphemes from other extraneous variable, it is of importance to consider the demands of different task types. Paradis (2010) investigated the knowledge of English verb morphology for monolingual English-speaking children and bilingual French-English speaking children in Canada (mean age 6;10) and examined the effect of task type. While the results found that monolingual children outperformed the bilingual children on both task types, the bilinguals' scores were closer to that of the monolinguals for the judgement task. Paradis argued that bilingual children may be more efficient at reflecting on their knowledge of correct morphological structures than at producing them. The inclusion of different task types then, would provide information regarding EAL children's morphological awareness - both, their understanding at a receptive level and their use and manipulation of morphological structures at an expressive level.

It remains unclear whether English morphological awareness is an underlying source of reading comprehension difficulties for EAL children in the UK. Since current research demonstrates that morphological awareness is associated with reading comprehension outcomes and that children with EAL have lower levels of reading comprehension in comparison to their EL1 peers, the morphological awareness of EAL and EL1 children will be examined.

5.1.1 Chapter 5 Research Questions

Specifically, this chapter asks:

1. How do EAL and EL1 children compare on measures of morphological awareness, within and across year groups?

2. Do any differences emerge in relation to i) task demands (production/judgement task) ii) morphology type (inflectional/derivational) iii) the use of real and nonsense words (word type) and iv) the morphophonemic structure of the items (morphological/ morphophonemic)?

3. How does the predictive relationship between morphological awareness and reading comprehension compare for EAL and EL1 children?

5.2 Method

5.2.1 Participants

This chapter will present the morphological data collected at time 2. At t2, children were in Year 3 (average age: 7;9) and Year 5 (average age: 9;9). In order to answer RQ3, data collected at t1 and t3 will also be used, though it is the role of the t2 morphology data that is of particular interest in this chapter. Details of the participants and time points can be found in Table 5.1.

Table 5. 1
Participant and time point information

	t1		t2		t3	
	Younger (Y2)	Older (Y4)	Younger (Y3)	Older (Y5)	Younger (Y4)	Older (Y6)
n	49	61	47	57	43	55
% EAL	53.1%	55.7%	53.2%	56.1%	48.8%	54.5%
Age	85.16 (3.75)	109.11 (4.09)	95.00 (3.24)	118.88 (3.86)	105.02 (3.31)	128.67 (4.56)

5.2.2 Design

A between-group design was employed to examine how the EAL and EL1 children compared on measures of morphological awareness. Additionally, the predictive relationship between t2 morphological awareness and t3 reading comprehension was examined and compared for the two language groups.

5.2.3 Materials

5.2.3.1 Tests and procedure

At t2 all children completed three morphology tasks taken from a comprehensive morphological awareness assessment battery. T1 and t3 involved a large battery of tests, but for the purpose of the questions addressed in this chapter the tests administered at t1 and t3 will not be discussed at length (see section 2.10 for details of the assessments employed at t1 and t3). At t2, each of the morphology tasks was administered individually and was conducted in a quiet space in the children's schools. Time constraints dictated a selection of the most relevant tests from the morphology assessment battery; inflectional morphology was assessed using one analogy task and derivational morphology was assessed using both an analogy task and a judgement task. The decision to include two derivational tasks as opposed to two inflectional tasks was based upon the age of the participants in the study; inflectional morphemes were thought to be a well-established aspect of children's implicit knowledge by Y3 and Y5 and thus examining derivational morphology in further detail may provide richer data in terms of task type differences and possibly EAL and EL1 differences. Both year groups completed the same items. Information detailing the development of the tests is from an unpublished study and thus a description of each task will proceed here.

5.2.3.2 Time 2 inflectional morphology

Three classes of inflections are included in the analogy task; singular present tense, singular past tense and plural nouns. Half of the items are real words and half of the items are nonsense words, with an equal number of each across the three categories. Furthermore, half of the items in each category involve regular transformations and half involve irregular forms. The AoA for all real word items is less than 6 years 6 months (Kuperman, Stadthagen-Gonzalez & Brysbaert, 2012) and the items were delivered in a fixed random order.

Children were presented with a pair of words and were required to decompose the morphological relationship between the words in order to complete the pattern. For example, *toy: toys:: car: ___ (cars).* Three practice items and 24 test items were visually and orally presented to each child individually by the researcher and children were required to give an oral response. Each test item was delivered with a real-word example. Half of the items required children to produce the same inflected form as the example – morphophonemic items., i.e., children could solve through an understanding of the morphological change or the phonological change (e.g., *lake: lakes::lemon: <u>lemons)</u>* and half required children to produce a different inflected form, i.e., could only be solved with a morphological understanding (e.g., *child:*

children:: beach: <u>beaches)</u>. Each correct answer was given a score of 1. For the nonsense items a score of 1 was given to any suffix that produced the same morphological function, thus irregular suffixes were acceptable e.g., *hop: hopped:: trun: "trunned*" or "*tran*" would be given a score of 1. This task gives a maximum total of 24 points. Reliability, computed using Cronbach's α = .70. Reliability was computed using the full t2 sample for all morphology tasks.

5.2.3.3 Time 2 derivational morphology

Test items assessed five morphological transformations: noun-to-noun, noun-to-adjective, adjective-to-noun, verb-to-adjective and verb-to-noun. As with the inflection words, all real word stems had an AoA that was less than 6 years; 6 months (Kuperman et al., 2012).

In the analogy task children were presented with three practice items and 20 test items; the task was administered as described for the inflection analogy task. Again, the items were equally divided into real words and nonsense words as well as being comprised of an equal number of items that were either phonologically transparent or that required a phonological change. Each correct answer was given a score of 1 with a maximum score of 20 points. Reliability for this task is .81 (Cronbach's α).

In the judgement task three practice items and 20 test items were verbally and orally presented to each child individually. The stem-word for each test item was presented together with an indicator of its word class (e.g., *to*, *the*, *it is*). Children were asked to complete a sentence by selecting the most appropriate word from a choice of three variations of the stem word. For example, "To farm. I want to be a farmer / farmist / farming." Each test item offered the same three categories of variations; the correct form / an incorrect answer formed using a suffix that was syntactically appropriate but incongruent with the initial word class / an inflected form. Children were given a syntactic cue towards the correct form but have little semantic information available for support. The task allows for a maximum score of 20, and reliability was computed to be .74 (Cronbach's α).

5.2.3.4 Time 1 and Time 3 Measures

To address RQ3, a number of the t1 and t3 measures were also included in this chapter. This includes: t1 reading comprehension as assessed by the York Assessment of Reading Comprehension (YARC; Snowling et al., 2009), t1 word reading as assessed by the Diagnostic Test of Word Reading Proficiency (DTWRP; Forum for Research into Language and Literacy, 2012), a t1 oral language composite consisting of receptive vocabulary knowledge as assessed by the British Picture Vocabulary Scale (BPVS; Dunn et al., 1997), expressive vocabulary as assessed by the *Wechsler Abbreviated Scales of Intelligence* (WASI; Wechsler, 1999), expressive grammar and listening comprehension as assessed by Clinical Evaluation of Language Fundamentals (CELF-4; Semel, Wiig & Secord, 2003). Details of the measures can be found in Chapter 2, section 2.10, and details of the oral language composite can be found in Chapter 6, section 6.3.9.

5.3 Results

5.3.1 Year and Language Group Differences

Table 5.2 presents the mean scores (% correct) and standard deviations of each morphology task by year group and language group. Effect sizes (Cohen's *d*) and their confidence intervals are included. For the confidence intervals that pass through zero, the effect sizes reveal moderate differences between the two language groups (*d* = 0.60 – 0.67).

Table 5. 2
Morphology tasks: Mean percentage correct scores and standard deviations

	Year 3			Year 5		
Measure	EAL	EL1	Effect Size (95% CIs)[1]	EAL	EL1	Effect Size (95% CIs)[1]
Morphology Total	51.00 (15.05)	59.52 (11.77)	0.63 [0.03, 1.21]	63.62 (14.08)	69.06 (16.06)	0.36 [-0.17, 0.89]
Inflections Production	60.17 (14.74)	65.91 (13.09)	0.41 [-0.17, 0.99]	67.97 (14.45)	76.50 (13.81)	0.60 [0.06, 1.13]
Derivations Production	42.20 (21.70)	55.00 (15.89)	0.67 [0.07, 1.25]	56.41 (17.10)	61.40 (21.96)	0.25 [-0.27, 0.78]
Derivations Judgement	48.80 (17.10)	56.36 (14.90)	0.47 [-0.11, 1.05]	65.63 (18.57)	67.80 (18.15)	0.12 [-0.41, 0.64]

Note: [1] Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

5.3.2 Task Demands

To examine the overall effects of year group and language group for each morphology task, three separate factorial ANOVAs were conducted. For the inflection production task (IPT), the analysis revealed an effect of year with a Y5 advantage $F(1, 100) = 10.87$, $p = .001$, $d = 0.61$ (95% CI for Cohen's d: 0.22, 1.01), an effect of language group with an EL1 advantage $F(1, 100) = 6.55$, $p = .012$, $d = 0.48$ (95% CI for Cohen's d: 0.08, 0.87), and no interaction effect $F(1, 100) = 0.25$, $p = .618$. The effect sizes and confidence intervals demonstrate that the effect of year and language group are small-moderate. The derivation production task (DPT) revealed an effect of year with a Y5 advantage $F(1, 100) = 7.28$, $p = .008$., $d = 0.53$ (95% CI for Cohen's d: 0.13, 0.92), an effect of language group with an EL1 advantage $F(1, 100) = 5.43$, $p = .022$, $d = 0.41$ (95% CI for Cohen's d: 0.02, 0.80, and no interaction effect $F(1, 100) = 1.04$, $p = .309$. The derivation judgement task (DJT) found an effect of year with a Y5 advantage, $F(1, 100) = 16.84$, $p < .001$, $d = 0.82$ (95% CI for Cohen's d: 0.41, 1.22), no effect of language group $F(1, 100) = 2.00$, $p = .160$, $d = 0.22$ (95% CI for Cohen's d: -0.16, 0.61) and no interaction effect

$F(1, 100) = .61$, $p = .436$. In terms of task demands, the above results reveal that language group differences emerge for the production tasks only, however, the effect sizes are relatively small.

5.3.3 Morphology Type

To examine the role of morphology type (how children compare on inflectional vs derivational morphology), two within-groups repeated measures ANOVAs were carried out. The results reveal a statistically significant difference between the IPT and the DPT with an inflectional advantage for both language groups; EAL: $F(1, 56) = 58.46$, $p < .001$, $d = 1.41$ (95% CI for Cohen's d: 1.01, 1.83, EL1: $F(1, 46) = 39.50$, $p < .001$, $d = 1.48$ (95% CI for Cohen's d: 1.03, 1.95). In line with the adjusted field-specific benchmarks for within-group analyses, i.e., .6 being small, 1.0 being moderate and 1.4 being large (Larson-Hall & Plonsky, 2015) the large effect sizes indicate the clear difference between performance on the inflectional and derivational tasks for all children.

5.3.4 Word Type

Table 5.3 presents the mean scores (% correct) and effect sizes for the real and nonsense word items within each year group. The effect sizes show that the language group differences within each year group are relatively small. Furthermore, many confidence intervals pass through zero indicating that there may not be an effect of language group at all. There are, however, a couple of exceptions; one of which is for the inflection production task. For the real words there is a medium effect of language group in Y3 and a small effect of language group in Y5, both with an EL1 advantage. Although the confidence intervals do not pass through zero, the lower limit is not indicative of an effect. Similarly, there is a small-moderate effect of language group for the non-words on the inflection production task in Y5, also with an EL1 advantage.

Table 5. 3

Real and nonsense words: Mean percentage correct scores and standard deviations

	Year 3			Year 5		
Measure	EAL	EL1	Effect Size (95% CIs)[1]	EAL	EL1	Effect Size (95% CIs)[1]
Real Words: Inflection Production	57.00 (15.34)	67.80 (14.16)	0.73 [0.13, 1.32]	69.01 (16.56)	76.33 (16.61)	0.44 [-0.09, 1.00]
Non-Words: Inflection Production	63.33 (16.49)	64.02 (15.51)	0.04 [-0.53, 0.62]	66.93 (15.48)	76.67 (14.23)	0.66 [0.11, 1.19]
Real Words: Derivation Production	39.20 (17.54)	46.36 (15.60)	0.43 [-0.15, 1.01]	58.13 (17.12)	61.20 (17.64)	0.18 [-0.28, 0.77]
Non-Words: Derivation Production	45.20 (63.64)	63.64 (19.65)	0.39 [-0.20, 0.96]	54.69 (23.14)	61.60 (30.91)	0.25 [-0.27, 0.78]
Real Words: Derivation Judgement	52.00 (20.62)	59.09 (17.70)	0.37 [-0.21, 0.94]	71.88 (17.31)	76.00 (21.98)	0.21 [-0.31, 0.74]
Non-Words: Derivation Judgement	45.60 (18.05)	53.64 (14.32)	0.49 [-0.09, 1.07]	60.00 (22.58)	59.60 (19.25)	0.02 [-0.54, 0.50]

Note: [1] Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

To understand how language and year groups differed when examined by real/nonsense words, a mixed ANOVA examined the interaction between word type (real/nonsense words), language group and year group. For the IPT there was no interaction effect of language group and word type $F(1, 100) = 2.07$, $p = .153$, no interaction effect of year group and word type $F(1, 100) = 0.65$, $p = .424$, but there was a three-way interaction effect of word type, language group and year group $F(1, 100) = 5.49$, $p = .021$. This will be followed up with further analyses following the DPT mixed ANOVA. Contrary to the IPT, for the DPT there was no interaction of language group and word type $F(1, 100) = 3.11$, $p = .081$, there was an interaction effect of year and word type $F(1, 100) = 9.43$, $p = .003$, and no three-way interaction effect $F(1, 100) = 0.75$, $p = .388$.

Similarly, the DJT revealed no interaction of language group and word type $F(1, 100) = .27$, $p = .606$, an interaction effect of year group and word type $F(1, 100) = 5.63$, $p = .020$, and no three-way interaction effect $F(1, 100) = 0.62$, $p = .431$.

To understand the differences that emerged from the mixed ANOVAs, real-word items and nonsense-word items were analysed within each language group and year group using a two-way repeated measures ANOVA with Bonferroni correction. The differences found in this analysis explain the three-way interaction for the IPT; for Y3 EAL children there is a significant difference between real and nonsense words with a nonsense word advantage $F(1, 24) = 6.85$, $p = .015$, however for all other groups (Y5 EAL, Y3 EL1 and Y5 EL1) there is not. Further planned comparisons show that Y5 EAL children do significantly better than Y3 EAL children on real words $F(1, 56) = 7.87$, $p = .007$, but have comparable nonsense word scores $F(1, 56) = 0.71$, $p = .402$. Whereas Y5 EL1 children outperform Y3 EL1 children on the real word items $F(1, 46) = 3.54$, $p = .066$., and the nonsense word items $F(1, 46) = 8.50$, $p = .006$.

Additional noteworthy results of the repeated measures ANOVA demonstrate that the Y3 EL1 children differed significantly on the DPT task, with a nonsense word advantage $F(1, 21) = 26.32$, $p < .001$. And, both the Y5 EAL and Y5 EL1 children differed significantly on the DJT, with a real-word advantage; $F(1, 31) = 17.30$, $p < .001$., $F(1, 24) = 17.21$, $p < .001$., respectively.

5.3.5 Morphophonemic Structure

Table 5.4 presents the mean scores (% correct) of the items analysed by their morphophonemic structure, i.e., whether items are solved with an understanding of the morphological change, which are often irregular morphemes, (MA; e.g., skip: skipped:: think: *thought)* or through an understanding of the morphological and/or phonological change (MPA; e.g., spend: spent:: bend: *bent* – that is, children may be completing the task following the phonological pattern of the example given without explicitly understanding the morphological change). The morphophonemic structure is determined in relation to the example items given in the task, i.e., if bend:*bent* followed walk:walked, this would be considered an MA change, but because it follows spend:spent, this is considered an MPA change. That is, this MA/MPA categorisation is based on the opportunity afforded by the example items to imitate (or not) their phonological relationship. This is in line with the guidance provided by Cain and James (2014) for administering and scoring the test items.

Table 5. 4
Morphological (MA)/morpho-phonological (MPA) structure of real-word items: Mean percentage correct scores and standard deviations

	Year 3			Year 5		
Measure	EAL	EL1	Effect Size (95% CIs)[1]	EAL	EL1	Effect Size[1]
MA: Inflection Production	43.33 (18.63)	50.76 (18.88)	0.39 [-0.18, 0.97]	55.21 (22.17)	67.33 (22.81)	0.54 [0.01, 1.07]
MPA: Inflection Production	70.67 (24.66)	84.85 (15.35)	0.84 [0.09, 1.27]	82.81 (18.68)	85.33 (16.89)	0.14 [-0.38, 0.66]
MA: Derivation Production	20.80 (20.40)	24.55 (21.32)	0.18 [-0.40, 0.75]	35.63 (23.13)	40.80 (18.69)	0.25 [-0.28, 0.77]
MPA: Derivation Production	57.60 (29.05)	68.18 (21.08)	0.42 [-0.17, 1.00]	80.63 (21.84)	81.60 (25.11)	0.04 [-0.48, 0.56]

Note: [1] Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

Mixed ANOVAs were carried out to understand if there is an interaction between the morphophonemic structure (within-subjects) of the items and language group/year group (between-subjects) for each morphology production task.

For the IPT, there was no interaction effect of language group and morphophonemic structure $F(1, 100) = 0.08$, $p = .773$, no interaction effect of year group and morphophonemic structure $F(1, 100) = 2.59$, $p = .111$, and no three-way interaction effect of morphophonemic structure, language group and year group $F(1, 100) = 2.77$, $p = .099$. The same pattern emerged for the derivation production task; no interaction effect of language group and morphophonemic structure $F(1, 100) = 0.05$, $p = .827$, no interaction effect of year group and morphophonemic structure $F(1, 100) = 2.00$, $p = .656$, and no three-way interaction effect of morphophonemic structure, language group and year group $F(1, 100) = 0.85$, $p = .360$.

Both EAL and EL1 children have higher scores on the MPA items in comparison to the MA items. These differences were examined further within each language group, collapsing data across year groups, using a two-way repeated measures ANOVA. Again, Bonferroni correction was applied. The same pattern emerges for both language groups; for the IPT there is a significant difference between MA items and MPA items, with an MPA advantage; EAL: $F(1, 56) = 58.27$, $p < .001$; MA = 50.00 (21.36), MPA = 77.49 (22.16). EL1: $F\ (1, 46) = 60.62$, $p < .001$; MA = 59.57 (22.45), MPA = 85.11 (16.01). Likewise, for the DPT, there is a clear MPA advantage; EAL $F(1, 56) = 93.88$, $p < .001$, MA = 29.12 (23.01), MPA 70.53 (27.54). EL1: $F(1, 46) = 110.94$, $p < .001$, MA = 33.19 (21.38), MPA = 75.32 (24.03). When examined within year groups (e.g. Y3 EAL) the same pattern of statistically significant MA/MPA differences emerge. The results demonstrate that all children are more able to complete the items that require a morphophonemic change relative to items that require a purely morphological change, regardless of year or language group.

5.3.6 Morphological Awareness as a Predictor of Reading Comprehension

To address the final research question, a hierarchical linear regression was carried out. In Chapter 6, a number of longitudinal regressions were carried and details of data preparation, decisions made prior to analysis including assumption checking, can be found in section 6.3. For the purpose of this chapter, the additional checks that were carried out included the examination of linearity between t2 morphology (this was the total score, i.e., the IPT, DPT and DJT total) and t3 reading comprehension (raw scores); a scatterplot displaying the t2 morphology total score against the t3 reading comprehension measure was visually inspected for both language groups. The EL1 children had a stronger linear relationship ($R^2 = 0.4$)

between the two variables than the EAL children ($R^2 = 0.2$). The scatterplots can be found in Appendix 8. Pearson's correlations between t2 morphological awareness and t3 reading comprehension were examined prior to the regression and can be found in Table 5.4. The results revealed a statistically significant relationship between morphological awareness and reading comprehension for the EL1 children and a relationship approaching significance for the EAL children.

Table 5. 5
Pearson's correlations between t2 morphological awareness and t3 reading comprehension

	EAL (n=47)	EL1 (n=57)
Pearson's correlation	.262	.474
P	.066	.001

The regression model in this chapter included, at step 1: age, t1 reading comprehension, t1 word reading, t1 oral language composite and at step 2: morphological awareness (for a discussion of the oral language composite variable see Section 6.3). The regression was carried out separately for the two language groups to examine the unique predictive relationship between morphological awareness and reading comprehension and how this compares for the two language groups. Table 5.6 presents the R^2 change and standardised beta values of the regression and shows that morphological awareness predicts a unique proportion of variance in reading comprehension for the EAL children but not the EL1 children.

Table 5. 6
Hierarchical regressions predicting reading comprehension at time 3

	EL1		EAL	
	β	ΔR²	β	ΔR²
Step 1:		.656**		.520**
Age				
t1 Reading comprehension				
t1 Word Reading Composite				
t1 Oral Language Composite				
Step 2:	.183	.007	.435	.062*
t2 Morphological Awareness				

Note: **p* < .05 ***p* < .01

5.4 Discussion

This chapter aimed to assess the morphological knowledge of typically developing children learning English as an additional language and monolingual English-speaking children in the UK. The overarching interest in reading comprehension and how this compares for the two language groups (EAL/EL1) has led to a more in-depth examination of the skills that underpin and facilitate this. Because morphological knowledge has been found to predict variance in reading comprehension (Deacon & Kirby, 2004), this chapter explored how EAL and EL1 children compare on measures of morphological awareness, using a number of tasks to examine the ways in which morphological knowledge may differ. The results revealed that EAL children in Year 3 and Year 5 have lower levels of morphological awareness overall than aged matched EL1 children and that morphological awareness explained additional variance in the prediction of reading comprehension for the EAL children but not the EL1 children. Further findings suggest that the language group differences do not emerge for every analysis, the implications of which will be presented here.

The initial analysis revealed that the Year 5 children outperformed the Year 3 children on all three tasks; the inflection production task (IPT), the derivation production task (DPT), and the derivation judgement task (DJT). Given that morphological knowledge is thought to be acquired implicitly in an accumulative manner (Goodwin et al., 2015) and that older children have more exposure and experience with morphologically complex words, this finding was much as anticipated. The language group differences revealed that the EL1 children outperformed the EAL children on the IPT and the DPT but not the DPJ. Because there has been little research examining language group differences on a comprehensive morphological awareness test battery, it was less clear how the two language groups would compare. In line with the idea of increasing exposure equating to increasing knowledge, it was thought that the EL1 children would have a more advanced awareness of morphological structures than EAL children. While this was the case for both production tasks, the judgement task did not yield significant language group differences, and in fact EAL children performed relatively well on the judgement task, particularly the older year group. On examining the mean percentage correct scores (see Table 5.2), it is clear that the EAL children perform better on the DJT than they do on the DPT, and this is in fact true for both age groups. This is in line with previous research (e.g., Paradis, 2010) and thus supports the view that EAL children are less efficient at producing their knowledge of morphological structures (as required in the DPT task) than they are at reflecting on their knowledge of them (as required in the DPJ task).

Further analyses expanded on the role of morphology type. The previous analysis revealed that the EL1 children outperformed the EAL children on both production tasks, regardless of whether these were inflectional morphemes or derivational morphemes. To examine this in further depth, within-group analyses were conducted and they revealed a significant difference between inflectional morphological awareness and derivational morphological awareness with an inflection word advantage, and this was true for both language groups. These findings are in keeping with previous research examining typically developing EL1 readers and support the idea that derived words are harder to learn than inflected words (Carlisle, 1995). This is thought to be in part due to the fact that derived words have less predictable morphological changes than inflected words (Marslen-Wilson, 2001) but also that there are simply far more derived words than there are inflected words. Realisation-based approaches to the psycholinguistic study of morphology (e.g., Stump, 2001) suggest that derived word forms may have individual representations stored in the lexicon whereas inflected words may be processed as a feature-form pairing and as such do not have individual entries stored in the lexicon. In light of this theory, it is possible that for both language groups, inflected words may be easier to produce due to the following of a rule-based understanding, as opposed to producing derived words that are possibly stored as individual entries in the lexicon. Though other interpretations may also be plausible, the results nonetheless concur that EAL children, like EL1 children, have weaker derivational morphological knowledge than inflectional morphological knowledge.

In an attempt to examine the knowledge of morphological structures, beyond the potentially confounding overlap with vocabulary knowledge and phonological awareness, a number of analyses explored language group differences on the task items based on whether the words were real words or nonsense words. For the IPT, there was an EL1 advantage for the real words but not the nonsense words. This finding is in line with the idea that morphological knowledge is acquired through repeated exposure to words, in that EL1 children, who have experience with only one language and thus inherently have more experience with English than EAL children, should have greater knowledge of the real word (familiar) items, but maybe not the non-word (unfamiliar) items. Supporting this interpretation was the three-way interaction between language group, year group and word type (real/nonsense) that was observed; the EAL children in both year groups were significantly better at the nonsense words than the real words and no significant difference between Y3 and Y5 nonsense word scores were observed, whereas for the real word items, the Y5 EAL children outperformed the Y3 EAL children, thus implying that there may be a developmental change across these ages for EAL children's knowledge of real word inflected morphemes, i.e., increasing exposure to words equates to greater real word knowledge. It is also plausible then that EAL children have an awareness of the morphological structure of words (i.e., they demonstrated a relatively successful production of nonsense words) but that their limited vocabulary knowledge prevents them from producing the correct inflected form (i.e., less successful production of real words). While this seems like an acceptable interpretation, the DPT revealed contradictory results; for the nonsense word items the EL1 children had significantly better scores than the EAL children but for the real words the two language groups had comparable scores. On the one hand this result may suggest that knowledge of derived words is comparable for the two language groups, i.e., real word scores were not significantly different, but on the other hand, the nonsense-word difference may suggest that EL1 children in fact have a better knowledge of derivational morphemes when vocabulary knowledge cannot play a role. It is of note that all children had lower scores on the derived real words than the derived nonsense words. However, a possible caveat concerning the interpretation of the results is that there is wider scope to obtain a correct answer on the nonsense word task, e.g., *trunned* or *tran* were acceptable derived forms of the nonsense word *trun*, it is possible that through guessing or through copying the sound pattern of the example pair, children were better able to produce an answer for the nonsense-word items than for the real word items where vocabulary knowledge was required. Taken together the real and nonsense word analyses are somewhat complex to interpret. It is possible that because the inflected words are perhaps more familiar, the EL1 children may be better equipped to give the correct real-word answers, and because the derived words were possibly less familiar the EL1 children were less equipped to give the correct real-word answers, yet some understanding and experience with derived morphemes enabled the EL1 children to be more successful than the EAL children for the derived nonsense-word items. Given the dearth of research examining morphological awareness among EAL populations, particularly with the use of nonsense word items, this is a tentative interpretation of the results and further research is warranted to understand and compare the nature of morphological knowledge for both groups of learners.

Before examining the predictive relationship between morphological awareness and reading comprehension, one final element of the morphology task was examined; this was to assess language groups differences on whether an answer required a phonologically different morpheme to the example given or whether the phonology remained intact, e.g., the example pair *write/writer* with the test item *work* (requiring the answer *worker*) follows the same phonological pattern, whereas the example pair *guard/guardian* with the test item *art* (requiring the answer *artist*) does not follow the same phonological pattern. As such, language group differences were examined by items requiring a morphophonological change (e.g., the *worker* example) and items requiring a 'purely' morphological change (e.g., the *artist* example). In many cases, this corresponded with the knowledge of regular and irregular morphemes. However, this is not exclusively so. For example, the items bend:bent follows an irregular pattern, but because this was preceded with the practice items send:sent, this was considered an MPA item. That is, children may have simply followed the phonological pattern of the example items or they may have understood the morphological relationship underpinning this pattern. It was thought that this analysis may provide further information relating to the idea that children may have been guessing answers through copying the sound pattern of the example pair. Largely, the results demonstrated that language group differences were not underpinned by the morpho(-phonemic) structure of the items presented in the task; language group differences emerged based on the morphology type and not the morphophonemic structure of the items, i.e., the inflection task revealed language groups differences regardless of whether the items were morpho-phonologically (the sound pattern could be imitated) or morphologically (the sound pattern could not be imitated) changed. Likewise, derivation task differences emerged regardless of the morpho(-phonemic) structure of the items. That said, the effect sizes demonstrate large variability in the magnitude of language group differences across morphology type and structure (see the effect sizes reported in Table 5.4). Thus, the idea that children's correct responses may have been based on an imitation of the phonological structure seems less likely. Language group differences seem to be less related to the morphophonemic structure of the words and more concerned with the morphology type. Inflected words generated greater language group differences with an EL1 advantage whereas derived words seemed to be a challenge for all children.

The final research question examined whether morphological awareness explained unique variance in the prediction of reading comprehension and how this compared for the EAL and EL1 children. The results of the regressions (see Table 5.4) showed that morphological awareness explains a statistically significant 6% of unique variance in reading comprehension above and beyond word reading and oral language skills for the EAL children, but for the EL1 children the contribution of morphological awareness explained an insignificant < 1% of the variance. The results are in line with previous research that finds a unique contribution of

English morphological awareness to reading in English for EAL learners (Deacon et al., 2007; Kieffer & Box, 2013; Kieffer & Lesaux, 2008; Ramirez et al., 2010; Ruan, Georgiou, Song, Li, & Shu, 2018; Saiegh-Haddad & Geva, 2008) but the lack of significance for the EL1 children is inconsistent with previous research examining this relationship (e.g., Carlisle, 2000; Deacon & Kirby, 2004; Ku & Anderson, 2003; Nagy et al., 2006). It is important to note, however, the way in which this study differed to previous studies; firstly, this research included inflected and derived morphemes, production and judgement tasks and real and nonsense words. The inclusion of a variety of task features tap into the different aspects of morphological knowledge and as such a more comprehensive examination of morphological awareness was included in this chapter. Secondly, the regression model controlled for previous reading comprehension, word reading skills and oral language skills, therefore the variance explained by morphological awareness in this chapter is over and above the broad components of the SVR (Gough & Tunmer, 1986). Interestingly, there was a significant relationship between morphological awareness and reading comprehension for the EL1 children, however when other variables were accounted for in the regression model, morphological awareness ceased to make a unique contribution, suggesting that the variance in morphological awareness was explained by word reading and/or oral language skills for the EL1 children. For the EAL children on the other hand, the relationship between morphological awareness and reading comprehension did not reach statistical significance, yet when entered into the regression model, morphological awareness did predict unique variance in reading comprehension. Thus, suggesting that the relationship between morphological awareness and reading comprehension for EAL children is not explained through word reading skills or existing oral language abilities. One explanation of this finding is that morphological awareness involves an integrative process of understanding semantic, phonological, and syntactic information (Ku & Anderson, 2006; Nagy, 2007). Considering that the oral language composite used in the regression model was comprised of vocabulary knowledge, listening comprehension skills and grammatical knowledge, it is perhaps less surprising that morphological awareness did not make a unique contribution for the EL1 children. However, for EAL children who have weaker oral language skills, it is possible that morphological awareness may play an important role in their reading comprehension in a way that is not mirrored in EL1 children.

Previous research has established that morphology plays an increasingly important role with development and as such the children in this study who were in Year 3 (age 7-8) and Year 5 (age 9-10) at the time of completing the morphology tasks may not yet have acquired a level of morphological knowledge (particularly knowledge of derivational morphemes), that facilitates reading comprehension. This may explain the limited predictive role of morphological awareness for EL1 children.

As per the requirements of the National Curriculum in England, children are explicitly taught to understand the uses of suffixes and prefixes; starting in Year 1 with ‘Regular plural noun suffixes –s or –es’ (DfE, 2013, p. 75) to more complex concepts in Year 5 such as ‘Converting nouns or adjectives into verbs using suffixes [for example,–ate;–ise; –ify]’ (DfE, 2013, p. 78). As such, the children in this study will have received explicit teaching of inflected and derived morphemes at various time points in their school career. The results of this study demonstrate that all children are better able to manipulate and produce words involving an inflectional change relative to the words involving a derivational change. These findings are in line with the idea that derived words are thought to be harder to learn (as discussed above) and that more complex derived words are not explicitly taught until Year 5. That is, all children are likely to have had less repeated exposures to derived words relative to inflected words as well as less explicit teaching of some of the derived words found in this study. Given that EAL and EL1 children receive the same explicit teaching of aspects of morphological awareness in school, the language group differences observed within this sample may be underpinned by other factors such as language exposure or L1 and L2 proficiency. This calls for the exploration of morphological awareness and reading comprehension among EAL and EL1 learners, perhaps beyond the primary school years.

This study has several limitations that should be considered in relation to the findings. Firstly, though the sample size was adequate for the analyses, a larger sample size would enable greater precision and power in determining some of the group differences, particularly concerning some of the in-depth examinations, e.g., real words and non-words by morpheme type. Equally, while the collection of data from two age groups has its strengths, interpretation of some of the whole group analyses may be more compelling if data was collected from one age group, i.e., morphology is thought to play a varying role in reading with time and as such results of different age groups are expected to be different. Where relevant, age was controlled for, e.g., within-year analyses and in the regression, however this break-down of the sample or added variable in the analysis further reduces the power.

The second limitation concerns the range of L1s found among the EAL participants. Because there was a large number of languages, examining differences by L1 was not feasible. Given that there are a large number of Punjabi speakers in the sample, Punjabi-only and "remaining L1s" could have been examined, though it was thought that the analyses would not have provided any meaningful results considering the varying morphological structures of the remaining L1s. Additionally, it was possible to examine broad EAL group differences based on the writing system of the L1s, i.e., whether the L1 has a Roman alphabetic script or not. However, given that a large percentage of the EAL sample are of Pakistani heritage and Punjabi speakers it was also thought that this analysis would be limited; that is, Pakistani speakers of Punjabi typically use the Shahmukhī script (known as an Abjad writing system); this has a grapheme-phoneme correspondence for consonants, and vowel sounds are depicted by diacritics (signs attached to the consonants to denote vowel sounds), so although it is not a Roman alphabetic script, the writing system is similar in the way that it represents language in written form, (i.e., the Shahmukhī script is not logographic) and thus there is no strong theoretical or practical reason to think that the participants would differ in terms of their morphological awareness in English based solely on a broad L1 writing system division, i.e., examining participants by writing systems does not necessarily tap into how the morphological rules of the various languages are represented. Furthermore, the analyses would not necessarily provide any meaningful results considering that a majority of the EAL children in this study are not literate in their L1, thus the writing system is likely to have little to no influence.

Despite the limitations, this chapter adds to the research in several important ways. The results show that EAL children in the UK have a weakness relative to EL1 children in their knowledge of morphemes, and secondly morphological awareness is related to reading comprehension for both groups of learners, though this relationship is significant for EAL children when controlling for word reading and oral language abilities. Given that children are increasingly exposed to complex multimorphemic words, children's ability to dissect words using morphological knowledge is another route by which children could infer the pronunciation and meanings of words, thus contributing to the comprehension of written texts. This chapter explored morphological knowledge in a level of detail that allowed for extraneous variables, including task type and existing vocabulary knowledge to be taken into account. Together the findings of this chapter support the small but growing body of research that highlights the importance of morphological awareness to reading outcomes and extends this by providing evidence that this is also the case for EAL children in the UK.

Chapter 6 – The Longitudinal Predictors of Reading Comprehension in EAL and EL1 Children

6.1 Introduction

The ultimate goal of reading is to take meaning from written text. From an educational perspective, this skill is crucial for accessing all areas of the curriculum. Reading comprehension is underpinned by both decoding and oral language skills, as conceptualised by the Simple View of Reading (Gough & Tunmer, 1986); it is acknowledged that both skills are needed but that neither skill is sufficient independently. Further empirical studies postulate that each component of the SVR is supported by different cognitive skills, i.e., phonological awareness and letter knowledge are believed to underpin decoding (e.g. Hulme, Bowyer-Crane, Carroll, Duff & Snowling, 2012; Muter, Hulme, Snowling & Stevenson, 2004) while vocabulary and grammatical knowledge underpin oral language skills (e.g. Oakhill, Cain & Bryant, 2003; Oakhill & Cain, 2012; Ricketts, Nation & Bishop, 2007). Though the two components are weighted with equal importance, the relative value of these skills is thought to change over time (Vellutino, Tunmer, Jaccard, & Chen, 2007), i.e., as children become competent decoders, their oral language skills become more predictive of reading comprehension.

Given that the components identified in the SVR framework have received considerable support in the literature (Lervåg, Hulme & Melby-Lervåg, 2017; Muter, Hulme, Snowling & Stevenson, 2004) the aim of this chapter is to examine how these skills develop in children learning EAL relative to EL1 children. It is also of interest to examine whether these skills are predictive of reading comprehension longitudinally, and how this compares for the two language groups (EAL/EL1). As discussed in chapter 1, when entering into the UK education system, many children learning EAL are faced with the simultaneous task of acquiring language proficiency and literacy skills in their second language (English). International research studies typically report that second language learners (L2) have lower scores on measures of reading comprehension as compared to native speaking (L1) peers (see Melby-Lervåg & Lervåg, 2014 for a meta-analysis of studies comparing first and second language learners). This chapter will present some of the key findings from previous research that has examined the comprehension profiles of EAL and EL1 learners. Additionally, the trajectories of language and literacy development found among second language learners will be discussed.

A growing body of research examining L2 children's reading comprehension has established a relatively consistent pattern of findings. The pattern of findings typical for L2 learners suggest that L2 comprehension difficulties are not a consequence of poor word decoding skills – performance in these skills are often within or above the age-expected range (Geva & Yaghoub Zadeh, 2006; Mancilla-Martinez & Lesaux, 2010) and tend to develop at a similar rate to L1 readers' decoding skills (Verhoeven, 2000). Their comprehension difficulties have been found to stem from delays in oral language skills, specifically vocabulary knowledge (Melby-Lervåg & Lervåg, 2014). Broadly speaking, L2 children have comparable comprehension profiles to L1 children with comprehension difficulties (Lesaux, Geva, Koda, Siegel & Shanahan, 2008; Hutchinson et al., 2003), commonly referred to as poor comprehenders, i.e., learners with sufficient decoding skills but limited reading and language comprehension skills (Nation & Norbury, 2005; Nation & Snowling, 2004). However, the cause of comprehension weaknesses is likely to differ between these populations, i.e., poor comprehenders' difficulties are more likely explained by an underlying developmental language impairment (Snowling & Hulme, 2011) rather than limited language experience, as is likely the case for many EAL learners.

While word decoding skills and vocabulary knowledge have consistently been found to predict reading comprehension, accounting for between 45-85% of the variance, (Adolf, Catts, & Little, 2006; Tilstra, McMaster, Van de Broek, Kendeou, & Rapp, 2009), research comparing L1 and L2 children report mixed findings in terms of the extent to which these skills explain unique variance in reading comprehension outcomes. A number of studies have found that oral language skills are more important for L2 readers as compared to L1 readers (Babayiğit, 2014; Droop & Verhoeven, 2003; Geva & Farnia, 2012; Lervåg & Aukrust, 2010), whereas other studies have found no differences between the two language groups (Babayiğit, 2015; Lesaux, Lipka, & Siegel, 2006; Verhoeven & Van Leeuwe, 2012).

In a longitudinal study examining the applicability of the SVR framework to L2 learners, Verhoeven and Van Leeuwe (2012) found that for both groups of learners (L1 and L2 learners of Dutch) reading comprehension was highly dependent on oral language abilities, particularly as word decoding skills became more automated, and, as identified in L1 research, their findings suggest that the relative importance of the components of the SVR changed over time for the L2 learners. That is, when L2 learners were able to decode words efficiently, reading comprehension became more constrained by their listening comprehension skills. Moreover, they found that the reciprocity of the relationship between listening comprehension and reading comprehension was stronger for the L1 Dutch speakers as compared to the L2 Dutch speakers. This may be indicative of a difference between L1 and L2 children concerning the relationship between spoken and written comprehension. However, this study employed only a measure of listening comprehension to assess the language comprehension component of the SVR. Given that L2 learners begin literacy instruction from a disadvantaged position in terms of their vocabulary knowledge and language proficiency (Mahon & Crutchley, 2006) it is of importance to examine the development and growth of oral language skills using a wider range of language measures.

The National Early Literacy Panel (2008) define oral language as the ability to comprehend spoken language. As with reading comprehension, language comprehension is not a one-dimensional construct; it involves a range of skills, such as receptive and expressive vocabulary knowledge, knowledge of morphemes, grammatical and syntactic knowledge, knowledge of narrative structures and conceptual knowledge (Beck, Perfetti, & McKeown, 1982; Bishop & Adams, 1990; Bowey, 1986; Perfetti, 1985; Roth, Speece, & Cooper, 2002). Oral language skills have been found to affect reading comprehension directly, e.g. through the understanding of word meanings, and indirectly through other literacy-related skills e.g., phonological awareness (NICHD, 2000). In a recent meta-analysis examining the comprehension difficulties of L1 children considered to be poor comprehenders, the children with poor comprehension had impaired oral language skills; though this finding is not surprising, the meta-analysis established that oral language deficits were not as severe as impairments in reading comprehension

(Spencer & Wagner, 2018). Consequently, the authors argue that the oral language impairment of poor comprehenders is not sufficient to explain the impairment in reading comprehension. Considering that EAL children typically have comparable profiles to poor comprehenders, it is of interest to examine the extent of the oral language and reading comprehension differences between EAL and EL1 children.

Furthermore, in a separate meta-analysis also conducted by Spencer & Wagner (2017), the nature of comprehension problems for L2 learners with poor reading comprehension was examined. As with the meta-analysis of L1 children, the authors report that L2 poor comprehender children had deficits in oral language, though again, the magnitude of this deficit was not as acute as the deficit in reading comprehension. While there are a number of plausible explanations for this, it is argued that the vocabulary that children encounter in written text is often more complex than vocabulary items used in spoken language. As a consequence, it is possible that gaps in vocabulary knowledge between L1 and L2 children present themselves to a greater extent in measures of reading comprehension than in measures of oral language. In a similar vein, L2 learners with relatively well-developed oral language proficiency in their L2 have been reported to demonstrate lower levels of L2 vocabulary knowledge as compared to L1 speakers (see Murphy, 2014 for a discussion). Together the findings demonstrate that vocabulary and reading comprehension tend to be specific areas of difficulty for L2 learners. One aim of this chapter, therefore, is to better understand the underlying nature of oral language and reading comprehension differences between EAL and EL1 children in the UK.

One way of establishing a better understanding of reading comprehension among EAL learners is to examine the development of the skills that underpin this phenomenon, and to examine how this compares for EAL and EL1 children. As identified above, vocabulary knowledge is a critical variable for successful reading and reading comprehension attainment. A relatively consistent finding in the literature is that EAL children tend to have lower scores than EL1 children on measures of vocabulary knowledge, across a range of ages (Bialystok, Luk, Peets, & Yang, 2010; Burgoyne, Whiteley & Hutchinson, 2011; Hutchinson, Whiteley, Smith &

Connors, 2003; Lesaux, Crosson, Kieffer & Pierce, 2010). Other studies propose that it can take between five to seven years for EAL children to achieve native-like vocabulary skills (Cummins, 2000, 2009; Paradis, 2007) with some suggestion that EAL children make rapid gains in their L2 oral language in their early school experiences but slower progress in mastering native-like language skills further into the school years (Saunders & O'Brien, 2006), though there are few studies that examine the trajectory of L2 language skills longitudinally.

Research examining the trajectories of reading development for L1 and L2 language learners has yielded mixed results. A number of studies have reported that the difference between L1 and L2 learners' reading comprehension decreases over time but remain significant (see Droop & Verhoeven, 2003; Verhoeven, 2010; Verhoeven & Leeuwe, 2012), however this has not been consistently reported. In a longitudinal study examining the growth trajectories of reading comprehension from grade 7 to grade 9 for low-achieving native Dutch students and low-achieving students learning Dutch as an additional language, Trapman, van Gelderen, van Schooten and Hulstijn (2017) report that while the L2 students started at a lower level of reading comprehension than their L1 peers, their growth rates were significantly quicker and indeed by the third and final time point, language group differences were no longer present. In a further study, offering a different growth pattern again, the developmental trajectories of EAL and EL1 children were reported in a longitudinal study examining reading skills from kindergarten through to grade 5 in the U.S. Kieffer (2008) found that the two groups diverged over time with an EL1 advantage, resulting in large language group differences. However, this was only true for the children who entered school with limited English proficiency. The EAL children with proficient English had similar trajectories to the native speakers. Thus, suggesting that EAL children with limited proficiency in the majority language (i.e., English in this case) at school entry are at greater risk for reading difficulties further into their school career.

While these studies appear to provide inconsistent findings, it is important to note the ways in which the studies differ. Students in the study conducted by Trapman et al., (2017) were examined from grade 7 to grade 9. These children are older than the children in the Kieffer

(2008) study and given that the relative importance of the two broad components of the SVR are thought to change over time, the comparison of the findings becomes more complex. Additionally, the native Dutch children whom the L2 learners were compared to were considered to be low-achievers. While they were included in the study based on the school records that no children were suffering from a diagnosed learning or behavioural disorder, it is possible that there may be undiagnosed underlying causes of difficulty experienced by these children e.g., underlying language impairments which may contribute to a slow growth in their language development. Further explanations for the differences found in the studies include the fact that different measures were used to assess comprehension and relating to this but also an important factor independently is that the minority and majority languages spoken by the children were not the same. Thus, it is difficult to determine the specific reasons that the L2 learners should demonstrate such different trajectories.

On one hand, L2 learners as compared to L1 learners may experience a slower trajectory of reading skills. This is in line with the phenomenon known as the Matthew effect, i.e., poor readers become caught in a cycle of poor reading skills leading to poor reading habits which in turn provides fewer opportunities for children to acquire and consolidate knowledge of new lexical items, thus leading to stagnation or possibly a decrease in reading ability over time (Stanovich, 1986). The empirical evidence to support this effect is, however, somewhat inconclusive (e.g., Bast & Reitsma, 1998; Parrila, Aunola, Leskinen, Nurmi, & Kirby, 2005). On the other hand, and in support of a rapid trajectory of reading skills for L2 learners, it is plausible that because initial skills in reading comprehension are lower than that of their L1 peers, there is in fact more opportunity for growth.

A longitudinal study conducted by Halle, Hair, Wandner, McNamara and Chien (2012) examined the trajectories of EAL and EL1 children's reading skills spanning from kindergarten through to grade 8; the length of this study enables further insight into the rates of growth over time. The authors report that the children with EAL had lower reading attainment in kindergarten (ages 5–6) than the EL1 children, however, like Kieffer (2008), their findings were dependent on English proficiency. The EAL children who were proficient in English at school entry showed comparable attainment in their reading skills and displayed steeper growth trajectories relative to their EL1 peers from kindergarten to eighth grade (ages 13–14). The EAL children who were not proficient by grade 1 had large achievement gaps on a measure of reading in comparison to the EL1 children; the gap narrowed but remained over time. The implications of which are positive and concerning in equal measure; those with good English language proficiency may experience academic advantages of having EAL while those with poor English language proficiency may experience consistent difficulties.

The findings of international research provide some insight into the development of reading comprehension among EAL learners, however it is unclear whether the findings translate to the UK context where educational policies and the socio-political landscape differs. Specifically, teaching policies and practices differ in the extent to which children are able to use their L1 in schools. That is, there is typically a more phased integration process in North America, with education programmes such as Content and Language Integrated Learning (CLIL; Byram, Nichols, & Stevens, 2001; de Jong & Howard, 2009) and the use of two-way immersion programmes (Christian, 2016). Nonetheless, in a cross-sectional examination of national assessment data in the UK, Strand, Malmberg and Hall (2015) report that the reading gap between EAL and EL1 children narrows but remains significant by the end of KS2. By KS4, however, the gap is reported to have been eliminated. The authors further noted that there is considerable variation in academic attainment among children with EAL indicating that research examining individual differences is warranted. While the findings are somewhat informative and provide an indication of development, it is important to note the cross-sectional nature of the study. Additionally, the findings are reported from national assessments and as such do not allow for a more nuanced examination of the skills underpinning reading outcomes. Ultimately, the rate at which reading and language comprehension skills develop for EAL children in the UK is not well documented.

An added layer of complexity relating to reading development of EAL children relative to EL1 children stems from the fact that EAL children inherently experience more variation in their language environment than EL1 children (Grüter & Paradis, 2014), and this has the potential to impact the rate at which language skills develop. Research with EL1 children consistently reports that variations in language environments, e.g., the amount and quality of language input, influences the rate of language development (Ambridge, Kidd, Rowland, & Theakston, 2015; Hart & Risley, 1995; Hoff, 2006; Lieven, 2010). In a recent study examining the language growth of EL1 children and Spanish-speaking-EAL children in the U.S., Ribot, Hoff and Burridge, (2018) report that the EAL children lagged 6 months to 1 year behind their EL1 peers in English vocabulary growth. The study examined children early in their development, from 2.5 years to 5 years. Of particular interest is that the size of the lag was related to the amount of English use in the home; note that this is English use by the EAL children themselves and not English exposure. The EAL children who spoke English less than they heard it developed their L2 expressive language skills at a slower rate than the children whose English output (use) was greater than their input. Thus, supporting the idea that language use contributes to the development of language skills. In the field of second language acquisition, a theory has been proposed emphasising the importance of using language. According to this output hypothesis, the production of speech is part of the process of acquiring a language, and as such input alone does not result in the same level of language proficiency as does the combination of input and output together (Swain, 1985, 1993, 2005). In line with this, several studies examining Spanish–English EAL children in the U.S. have found that measures of English use are a stronger correlate of language skill than measures of language exposure (Bedore et al., 2012; Hammer et al., 2012). In terms of understanding the language and reading growth of EAL children in the UK, it is therefore of interest to consider English use as an additional variable.

Research consistently demonstrates that as L2 readers are confronted with the challenging task of learning to read in a language that is not their L1 language, they often fall behind in reading comprehension (Melby-Lervåg & Lervåg, 2014). This chapter aims to capture a more detailed understanding of the skills that are predictive of reading comprehension and to determine the extent to which these skills converge or diverge over time for EAL and EL1 children in a UK context.

6.1.1 Chapter 6 Research Questions

Specifically, the following research questions will be addressed:

1. How do EAL and EL1 children compare on measures of reading comprehension at each time point?

2. To what extent do EAL and EL1 children show similar patterns of growth in their language and literacy skills from t1 to t3?

3a. Do the longitudinal predictors of reading comprehension differ depending on children's language group? (EAL/EL1)

3b. Within the EAL sample, do the longitudinal predictors of reading comprehension differ depending on English language use?

6.2 Method

6.2.1 Participants

To examine the predictors of reading comprehension and patterns of growth, this chapter will present data collected at time 1 and time 3. Details of the participants and time points can be found in Table 6.1.

Table 6. 1
Participant and time point information

	t1		t3	
	Younger (Y2)	Older (Y4)	Younger (Y4)	Older (Y6)
n	49	61	43	55
% EAL	53.1%	55.7%	48.8%	54.5%
Age	85.16 (3.75)	109.11 (4.09)	105.02 (3.31)	128.67 (4.56)

6.2.2 Design

A between-group design was employed to examine how the pattern of change compares for the EAL and EL1 children looking specifically at the oral language and reading comprehension measures. Additionally, the predictive relationship between t1 variables and t3 reading comprehension was examined and compared among the two language groups.

6.2.3 Materials

Assessments of word reading, oral language and reading comprehension were administered at t1 and t3. The age ranges of the assessments were carefully considered prior to t1 data collection with the aim of employing the same assessments at t1 and t3. This has enabled an examination of the pattern of growth of the raw scores. The description of the measures used at t3 can be found in Chapter 2, see Section 2.10.4. Details of the assessments can be found in Table 6.2. There are methodological reasons why the pattern of development cannot be quantified for listening comprehension and reading comprehension and this is explained below.

Table 6. 2
Language and reading measures used at t1 and t3

Construct	Measure
Word Reading	DTWRP
Expressive Vocabulary	WASI definitions
Receptive Vocabulary	BPVS
Expressive Grammar	CELF formulated sentences
Listening Comprehension	CELF understanding spoken paragraphs
Reading Comprehension	YARC reading comprehension

Note: DTWRP – Diagnostic Test of Word Reading Processes; WASI – Wechsler Abbreviated Scale of Intelligence; BPVS – British Picture Vocabulary Scale; CELF – Clinical Evaluation of Language Fundamentals; YARC – York Assessment of Reading Comprehension

6.2.3.4 Listening comprehension and reading comprehension

Listening comprehension and reading comprehension could not be analysed in the same way as the other language measures due to two methodological decisions that were made prior to data collection (see Chapter 2, Section 2.9.1.1 for a full discussion). Firstly, because the standardised scores were not normed on EAL children it was thought that the use of raw scores would enable clearer language group (EAL/EL1) comparisons. However, the change in listening and reading comprehension raw scores from t1 to t3 is not useful in any meaningful way as children read/heard (measure dependent) different passages at each time point. This would inevitably be a confounding variable as the degree of difficulty becomes more complex on a number of levels, e.g., syntactic structure, word length, frequency of lexical items etc. Consequently, the pattern of change for both comprehension measures is difficult to examine.

The second reason, and not independent of the first reason, to enable year group comparisons at each time point it was decided that children would read/hear three passages rather than two. This would enable the use of a mutual passage to be read by all children thus allowing for cross-sectional analyses. As such, for the YARC, a Y2 child would read passages 1, 2 and 3 regardless of ability and a Y4 child would read passages 3, 4 and 5. For the reading comprehension measure, and in spite of the decisions described above, the standardised scores have also been calculated, allowing for the general pattern of EAL and EL1 group means from t1 to t3 to be observed. Examining the standardised scores was done to enable some indication of development, however the results will be interpreted cautiously given that the standardised scores were not normed with EAL populations. All children read the appropriate passage for their age category, for example all Y2 children were given the opportunity to read Passage 2. It was therefore possible to calculate the standardised scores by following the manual and determining whether each child would have gone up or down a passage.

Unfortunately, it was not possible to calculate the listening comprehension standardised scores. This is because the administration of the task was not adhered to as per the CELF-4 manual. Rather than children hearing the three passages aligned with their age group, e.g., the three passages aimed at 7-8-year-olds, children read passages across age groups. For example, at t1 when the older children were in Y4, they heard one passage from three different age categories, e.g. one passage from the 5-6 paragraphs, one from the 7-8 paragraphs and one from the 9-10 paragraphs. This allowed for language and year group differences to be observed using the raw scores. However, the standardised scores could not be calculated because the standardised scores in the manual were computed based on the three passages within an age group. Furthermore, at t3 when the children were in Y6, given their age, different passages were administered from t1, i.e., they now heard one passage from the 7-8 paragraphs, one from the 9-10 paragraphs and one from the 11-12 paragraphs. Therefore, as discussed above, the total raw scores from t1 to t3 are not directly comparable given the different passages heard.

In sum, it was not possible to calculate the growth in reading comprehension and listening comprehension in the same way that it was for the other measures due to a number of methodological reasons, namely the fact that different passages were read at different time points.

6.3 Results

Means and standard deviations of the reading comprehension scores at t1 and t3 are reported in Table 6.3 for the younger children and in Table 6.4 for the older children. For both age groups, there are large language group differences with an EL1 advantage as reported by the effect sizes (Cohen's *d*). There is some variation in the effect sizes depending on the score type, i.e., raw score/standardised score, though all effect sizes can be considered medium to large (Plonsky & Oswald, 2014).

Table 6. 3
Reading comprehension scores of the younger children at t1 and t3

	t1			t3		
	EAL	EL1	Effect Size (95% CIs)[1]	EAL	EL1	Effect Size (95% CIs)[1]
Raw scores	8.73 (5.86)	14.61 (6.14)	0.98 [0.38, 1.57]	8.38 (3.74)	12.45 (4.75)	0.95 [0.31, 1.58]
Mutual passage	2.08 (2.10)	4.22 (2.45)	0.94 [0.34, 1.53]	1.48 (1.47)	2.91 (1.74)	0.89 [0.25, 1.51]
Standardised scores	95.00 (15.06)	107.48 (14.48)	0.84 [0.25, 1.43]	94.19 (9.46)	101.50 (9.92)	0.75 [0.13, 1.37]

Note: [1] Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

Table 6. 4
Reading comprehension scores of the older children at t1 and t3

	t1			t3		
	EAL	EL1	Effect Size (95% CIs)[1]	EAL	EL1	Effect Size (95% CIs)[1]
Raw scores	7.26 (4.23)	14.52 (5.45)	1.49 [0.93. 2.08]	4.70 (3.04)	9.04 (3.54)	1.32 [0.73, 7.91]
Mutual passage	3.09 (1.94)	6.07 (1.73)	1.62 [1.02, 2.19]	1.93 (1.29)	4.56 (1.69)	1.75 [1.14, 2.39]
Standardised scores	89.82 (10.66)	105.67 (11.37)	1.44 [0.87, 2.01]	87.27 (10.82)	101.88 (13.20)	1.21 [0.64, 1.80]

Note: [1] Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

To answer question 2, t1 and t3 language and literacy variables were examined. A percentage was calculated to report the extent to which scores increased from t1 to t3. This information can be found in Table 6.5 (younger children) and Table 6.6 (older children). The percentages were calculated separately for the EAL and EL1 children. Following this, an independent samples t-test was carried out to examine the difference between EAL and EL1 children's percentage difference from t1 to t3. Percentages were calculated rather than raw score differences so that development across variables could be understood with more clarity. For example, for the EL1 children's expressive vocabulary there is a 10-point increase from t1 to t3, and for their receptive vocabulary there is a 14-point increase. Given the different scoring systems of the measures, it is difficult to directly compare improvement across measures. In percentage terms this in fact equates to a 63.9% increase for expressive vocabulary and a 12.6% increase for receptive vocabulary. Included in these analyses are t1-t3 total word reading, expressive vocabulary, receptive vocabulary and expressive grammar. Time 1 and time 3 reading and listening comprehension scores are reported in Tables 6.5 and 6.6 for information purposes only. As discussed above, calculating a mean % difference score for these two measures would not yield meaningful results given the fact that different passages were read/heard.

Table 6. 5

t1 to t3 percentage increase in the younger cohort; and language group differences in percentage increase

	EAL			EL1			language group differences in % increase	
	t1	t3	Mean % difference	t1	t3	Mean % difference	*t*	Effect Size (95% CIs)[3]
Total Word Reading	46.31 (18.23)	68.57 (8.93)	74.98 (90.12)	51.13 (19.74)	64.82 (14.91)	31.34 (30.47)	2.11*	0.65 [0.03, 1.25]
Expressive Vocabulary[1]	11.29 (4.37)	17.64 (4.60)	47.99 (49.24)	14.98 (5.15)	24.09 (10.33)	63.87 (46.60)	1.07	0.33 [-0.27, 0.93]
Receptive Vocabulary[1]	77.54 (14.61)	95.33 (14.76)	25.59 (19.46)	98.96 (15.60)	112.41 (16.44)	12.58 (6.81)	2.90**	0.89 [0.27, 1.52]
Expressive Grammar[1]	20.58 (7.70)	31.00 (6.60)	67.68 (85.70)	28.04 (9.98)	37.86 (8.74)	40.19 (40.83)	1.33	0.41 [-0.19, 1.01]
Listening Comprehension[1]	8.58 (2.62)	10.71 (2.15)	-	10.00 (2.52)	11.91 (1.82)	-	-	-
Reading Comprehension[2]	95.00 (15.06)	94.19 (9.46)	-	107.48 (14.48)	101.50 (9.92)	-	-	-

Note: * $p < .05$ ** $p < .01$; [1] raw scores; [2] standardised scores [3] Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

Table 6. 6

t1 to t3 percentage increase in the older cohort; and language group differences in percentage increase

	EAL			EL1			% diff language group differences	
	t1	t3	Mean % difference	t1	t3	Mean % difference	*t*	Effect Size (95% CIs)[3]
Total Word Reading	63.94 (16.52)	77.60 (7.51)	20.01 (22.74)	68.22 (19.51)	77.36 (13.52)	17.35 (32.52)	.357	0.09 [-0.44, 0.63]
Expressive Vocabulary[1]	15.96 (6.48)	25.50 (7.91)	65.70 (59.50)	25.70 (6.47)	32.08 (9.97)	22.87 (22.64)	3.64**	0.95 [0.36, 1.47]
Receptive Vocabulary[1]	90.79 (16.63)	111.40 (18.19)	21.70 (16.31)	120.63 (16.95)	133.16 (15.36)	9.36 (7.08)	3.52**	0.98 [0.39, 1.51]
Expressive Grammar[1]	27.56 (7.48)	38.73 (6.52)	46.08 (43.00)	36.81 (8.24)	45.56 (5.70)	29.55 (41.66)	1.44	0.39 [-0.15, 0.92]
Listening Comprehension[1]	10.06 (2.86)	9.93 (2.63)	-	12.30 (2.07)	11.88 (1.81)	-	-	-
Reading Comprehension[2]	89.82 (10.66)	87.27 (10.82)	-	105.67 (11.37)	101.88 (13.20)	-	-	-

Note: * $p < .05$ ** $p < .01$; [1] raw scores; [2] standardised scores [3] Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

As can be seen in Figure 6.1 and Figure 6.2, EAL children have a greater increase in receptive vocabulary than the EL1 children from t1 to t3 and this is a statistically significant difference for both the younger children, $t(41) = 2.90$, $p = .008$, $d = 0.89$ (95% confidence intervals of Cohen's d: 0.27, 1.52), and the older children $t(53) = -3.52$, $p = .001$, $d = 0.98$ (95% confidence intervals of Cohen's d: 0.39, 1.51).

For the younger children, there is a bigger increase in expressive vocabulary for the EAL children than the EL1 children though this does not reach statistical significance, $t(41) = -2.95$, $p = .114$, $d = 0.33$ (95% confidence intervals of Cohen's d: -0.27, 0.93). For the older children the same pattern is observed though this does reach statistical significance and, in line with Larson-Hall and Plonsky's (2015) benchmarks for between-group analyses in L2 research, reveals a relatively large effect size, $t(53) = -3.52$, $p = .001$, $d = 0.95$ (95% confidence intervals of Cohen's d: 0.36, 1.47).

Similarly, the increase in expressive grammar was greater for the EAL children than the EL1 children in both the younger year group $t(41) = -1.33$, $p = .193$, $d = 0.41$ (95% confidence intervals of Cohen's d: -0.19, 1.01), and the older year group $t(53) = -1.44$, $p = 1.56$, $d = 0.39$ (95% confidence intervals of Cohen's d: -0.15, 0.92), though this does not reach statistical significance for either year group. The confidence intervals (of Cohen's d) in both cohorts further demonstrate this.

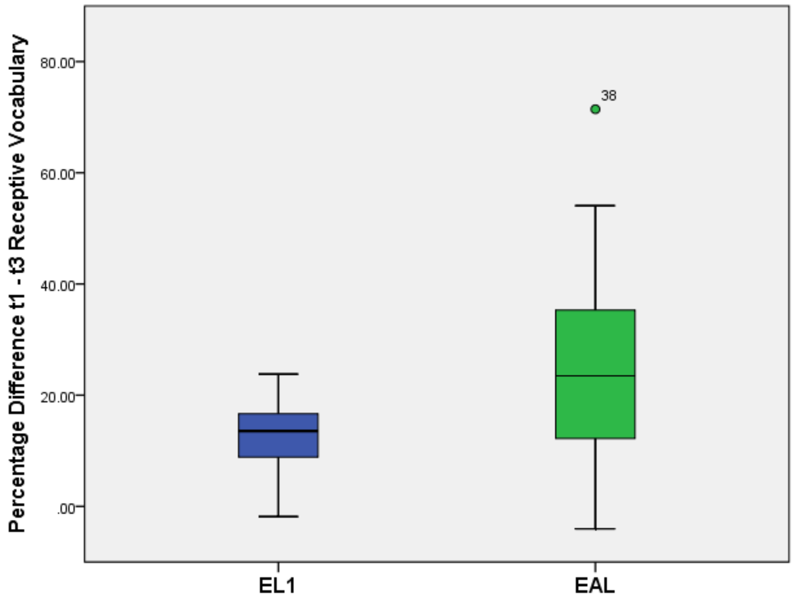

Figure 6. 1: Younger children's receptive vocabulary percentage difference from t1 to t3

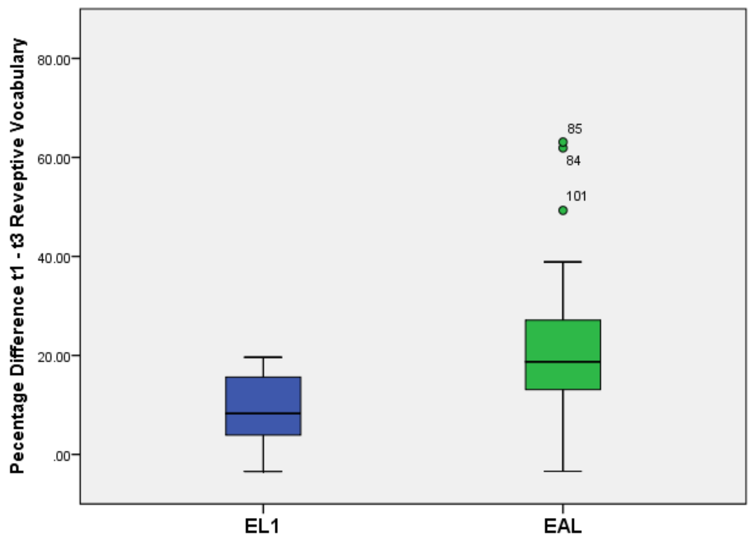

Figure 6. 2: Older children's receptive vocabulary percentage difference from t1 to t3

Although the standardised scores were not normed with an EAL sample, Figure 6.3 is included to give an indication of how both language groups perform and compare on the reading comprehension measure over time. Boxplots to the left display the t1 standardised scores and boxplots to the right display the t3 standardised scores.

As can be seen in Figure 6.3, there is large variability in the standardised reading comprehension scores for both the EL1 and the EAL children at both time points. At time 1 the box plots show that the median scores are higher for the EL1 children than the EAL children in both year groups. The same pattern can be seen at t3, though the median scores are lower at t3 in comparison to t1 for the EL1 children.

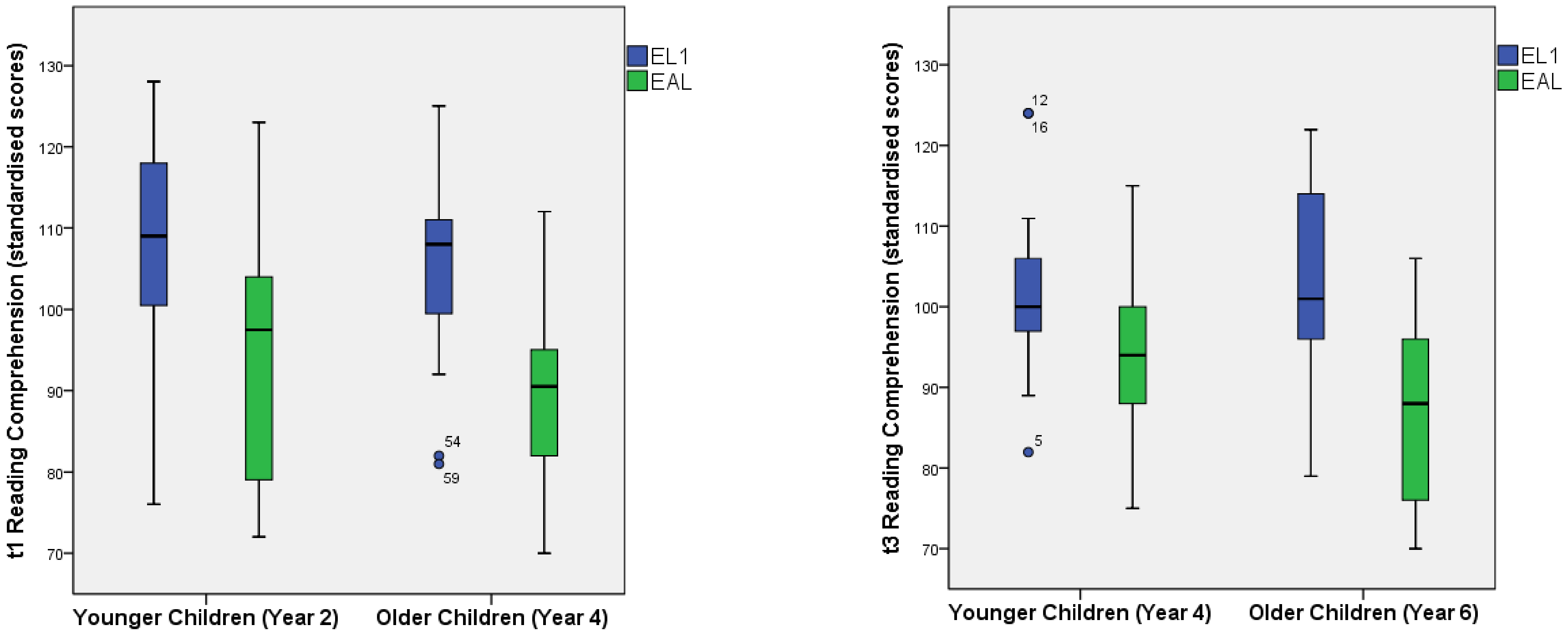

Figure 6. 3: t1 (left) and t3 (right) standardised reading comprehension scores (ab

Before examining the predictors of reading comprehension, this chapter explored the language group differences of the non-verbal measure. At t1, analyses revealed a statistically significant difference between EAL and EL1 children on the matrices task of non-verbal ability as assessed by the *Wechsler Nonverbal Scale of Ability* (Wechsler & Naglieri, 2006); this was an unexpected finding and as such non-verbal differences were examined again at t3. Like t1, a matrices task was administered, though the task was taken this time from the Wechsler Abbreviated Scale of Intelligence–Second Edition (WASI-II; Wechsler, 2011 - see Section 2.10.4 for an overview of why a different task was administered). The results, presented in Table 6.7, revealed no statistical difference between the language groups in either year group, though this is approaching significance for the younger year group. That said, the confidence intervals (of Cohen's *d*) demonstrate that the small-moderate effect size reported in Table 6.7 is unlikely to be reliable given that the lower limit passes through zero. This suggests that there is no effect of language group on t3 non-verbal ability.

Table 6. 7
t3 non-verbal ability scores

	Mean (s.d.)	*d* [1]	*F*	*p*
Year 4 (*n* = 43)		0.56 [-0.05, 1.17]	3.41	.072
EAL (*n* = 21)	11.76 (4.04)			
EL1 (*n* = 22)	14.18 (4.53)			
Year 6 (*n* = 55)		0.17 [-0.36, 0.70]	.391	.534
EAL (*n* = 30)	15.07 (4.43)			
EL1 (*n* = 25)	15.72 (3.04)			

[1] Cohen's *d* with 95% Confidence Intervals [Lower Limit, Upper Limit]

The third question asks whether the predictors of reading comprehension differ by language group. Prior to running the regression analyses, longitudinal partial correlations between t1 predictors and t3 reading comprehension outcomes, controlling for age, were examined and are presented in Table 6.8. Raw scores were used for all variables. To increase the power of the analyses the data were collapsed across year groups and age was controlled for in the correlations. The results demonstrate that there is a statistically significant relationship between all the t1 variables and t3 reading comprehension when controlling for age, for both language groups.

Table 6. 8
Pearson's partial correlations between t1 predictor variables and t3 reading comprehension, controlling for age; EL1 (above diagonal; n = 47) and EAL children (below diagonal; n= 51)

	1	2	3	4	5	6
1. t3 Reading Comprehension		.471**	.564**	.695**	.642**	.383**
2. t1 Total Word Reading	.302*		.358*	3.96**	.536**	.080
3. t1 Expressive Vocabulary	.392**	.321*		.451**	.542**	.315*
4. t1 Receptive Vocabulary	.485**	.342*	.447**		.772**	.446**
5. t1 Expressive Grammar	.479**	.606**	.548**	.481**		.438**
6. t1 Listening Comprehension	.510**	.359**	.383**	.459**	.487**	

Note: * p < .05, ** p < .01; raw scores used for all variables

Before carrying out the regression analyses, composite variables were created in order to reduce the number of variables, increasing the power of the analyses and controlling for Type I error (Serlin & Mailloux, 1999). The distribution of the data was acceptable for all variables and the associations between the original variables (t1 word reading and t1 language variables) and t3 reading comprehension were similar, thus allowing for the creation of the composites. The two composites that were created are theoretically meaningful in that they are motivated by the SVR framework; a word reading composite was created as well as an oral language composite. The word reading composite consists of non-word reading, exception word reading and regular word reading and the oral language composite consists of expressive vocabulary, receptive vocabulary, listening comprehension and expressive grammar. The two composites were created using simple averaging; the original variables (found in Table 6.8) were converted into z-scores, preserving the distribution of the raw scores and allowing for an equal contribution of all variables.

In consideration of the sample size and the number of variables to be included, a simple linear regression was conducted. An additional number of assumptions were checked prior to running the regression; to assess linearity, scatterplots displaying the t1 variables against t3 reading comprehension were visually inspected indicating a linear relationship between the variables. To assess for multicollinearity, the correlations between the predictor variables were assessed, and while there was some correlation between the word reading composite and oral language composite; the variance inflation factor (VIF) had a value lower than 4 (2.21) and was thus deemed to be acceptable for inclusion in the model (O'Brien, 2007). Additionally, to check for homoscedasticity, the distribution of the residuals was observed and was found to be equally distributed. Thus, the relevant assumptions were met allowing for the regression to be carried out. In order to examine whether language group status is uniquely related to reading comprehension, language group (EAL/EL1) was included in the model. Furthermore, the auto-regressive effect of t1 reading comprehension was also included. While there is some argument to suggest that abilities cannot predict themselves, t1 reading comprehension was included in the regression model due to the fact that reading comprehension as a construct changes over time i.e., different processes contribute to reading comprehension at different points in development and as such was thought to be warranted as a predictor.

Thus, the regression model consisted of: age, t1 reading comprehension, t1 word reading composite, t1 oral language composite and language group status. The model accounted for a statistically significant 68% of the variance in t3 reading comprehension, F = (5,92) 38.94, p <.001, R^2 = .679. Results revealed that age β = -.529, p <.001, t1 reading comprehension β = .454, p <.001, and t1 oral language β = .424, p =.001, were statistically significant predictors of t3 reading comprehension. Word reading was not a statistically significant predictor, β = -.040,

p =.652, nor was language group status β = -.034, p =.663, indicating that the relation between the key predictors and reading comprehension were similar for the two language groups.

To examine whether English use is uniquely related to reading comprehension for the EAL children, a separate regression analysis was conducted with the *proportion of English use* variable as a predictor in the model. The *proportion of English use* variable includes the quantity and frequency of English used in the home (see Chapter 4, Section 4.2.3.6 for a discussion of how this variable was calculated). As discussed above for the full sample regression, the relevant assumptions were checked prior to running the analysis, however it is important to note that in this analysis there are only 51 participants and as such the results need to be interpreted cautiously. As can be seen in Table 6.9, the *proportion of English use* variable did not explain unique variance in t3 reading comprehension, thus, the relation between the t1 key predictors and t3 reading comprehension does not differ by use of English in the home.

Table 6. 9
Linear regression model including the language use variable predicting t3 reading comprehension for the EAL children

	β	p
Age	-.521	.002
T1 Reading Comprehension	.395	.018
T1 word reading composite	-.153	.323
T1 oral language composite	.354	.062
Language use	.046	.677

6.2 Discussion

This chapter aimed to investigate the predictors of reading comprehension as guided by the Simple View of Reading framework (Gough & Tunmer, 1986) in a sample of typically developing monolingual English-speaking children and children learning English as an additional language in the UK. A longitudinal design was employed allowing for earlier reading comprehension to be included as an auto-regressive predictor in the regression model as well as word reading and oral language skills. The results revealed that while oral language gains were greater for the EAL children, reading comprehension was consistently weaker and language group status (EAL/EL1) did not add significantly to the prediction of reading comprehension overall. The discussion will elaborate on these key findings and will be discussed in line with the research questions set out at the beginning of the chapter (see Section 6.1.1) and in relation to previous findings of EAL language and reading outcomes.

The study replicated others (e.g., Babayagit, 2014; Burgoyne, Kelly, Whiteley & Spooner, 2009) in finding that EAL children had statistically significantly lower levels of reading comprehension as compared to age-matched EL1 peers. Moreover, this chapter demonstrated that these significant language group differences were apparent in Year 2 and Year 4, and persisted into Y4 and the final year of primary school, Year 6. This study therefore provides data to show that reading comprehension disparities between EAL and EL1 children may not be eliminated by the time children are preparing for the transition into high school, which is indeed a cause for concern given the increasing expectations of independent study.

On a more positive note, the growth of oral language skills, which included receptive vocabulary, expressive vocabulary and expressive grammar was greater for the EAL children than the EL1 children. This is thought of as a positive finding in that there was no evidence of the so-called Matthew effects (Stanovich, 1986), i.e., the poor did not appear to be getting poorer in terms of their language skills. However, despite the gains and in line with previous findings (e.g., Droop & Verhoeven, 2003; Lesaux & Koda, 2006) significant language group (EAL/EL1) differences did remain at t3 for the measures of oral language and reading comprehension. While the gap appears to be closing between the two language groups, the study does not identify when, if at all, differences cease to exist. To understand the language and literacy profiles of EAL learners, further research exploring the development of reading comprehension into adolescence is needed.

This chapter also presented the language group differences of the non-verbal measure that was administered at t3. The results of this particular task were presented here due to the fact that at t1, analyses revealed a statistically significant language group difference. The t1 finding was inconsistent with previous research and as such was a surprising result. Given that non-verbal ability is thought to be fairly stable over time, non-verbal ability was initially to be assessed at t1 only, however, because of the unexpected findings a decision was made to assess non-verbal ability again at t3. Furthermore, a decision was made to administer a different task to the *Wechsler Nonverbal Scale of Ability* (WNV; Wechsler & Naglieri, 2006) that was employed at t1. The reason for this was that the WNV manual guidelines encourage the task to be administered with minimal verbal input. While this is entirely understandable given the nature of the task, it was through the researcher's observation that this may have in fact been a source of confusion for the children, particularly the EAL children who may have been less familiar with testing formats. Therefore, at t3 the matrices task taken from Wechsler Abbreviated Scale of Intelligence - Second Edition was instead administered. A matrix reasoning task was employed at both time points however the administration guidelines of the WASI-II allowed the researcher to verbally explain the task. The lack of language group differences found at t3 could be due to the change in task, or more specifically the administration guidelines, or it could be due to a developmental change in non-verbal scores. This is difficult to determine because of the change in task, however, it highlights that assumptions should not be made of EAL learners' development based on findings in EL1 literature. For the older year group, the EAL and EL1 children performed comparably on the task whereas the EL1 children in the younger year group outperformed the EAL children, although not statistically significantly. The development of non-verbal ability for EAL learners warrant further examination and the implications of which will be discussed in Chapter 7.

Following the examination of the language group differences in terms of reading outcomes and patterns of growth, the predictors of reading comprehension were explored. To investigate whether key predictors of reading comprehension (as determined by the SVR) differed by language group (EAL/EL1), a regression analysis was carried out and language group was included as the final variable in the model. Along with age and t1 reading comprehension, oral language was found to be a significant predictor of reading comprehension but language group was not. Thus, suggesting that the predictors of reading comprehension are similar for both

EAL and EL1 children. While this indeed seems to be the case, another interpretation is plausible; individual differences in oral language skills may explain the language group differences in reading comprehension outcomes. That is, since the distribution of children's reading comprehension scores (see Figure 4) revealed a considerable amount of variance for both language groups with a large amount of overlap between the two, it is possible that reading comprehension varies as a function of children's level of oral language skill rather than language group per se. This is in line with previous findings that demonstrate that differing degrees of language proficiency equate to different trajectories of reading skills (e.g., Halle et al., 2012; Kieffer 2008; Van den Bosch et al., 2018). There were EL1 children with below average reading comprehension and EAL children with above average reading comprehension. This pattern was also true for the measures of oral language, supporting the above interpretation and highlighting the complexity of understanding EAL learners' reading attainment. Due to the relatively small sample size of this study when divided into language and year groups it was not possible to examine children's development across the distribution of language and/or reading comprehension performance, however this is something to consider for future research.

In terms of predicting reading comprehension for the EAL children, a second simple linear regression was conducted; this regression involved only the EAL children and the 'English use' variable was included in the model. 'English use' is a composite variable, consisting of the frequency of English spoken outside school and the amount of English spoken with family members. (A summary of how this variable was calculated can be found in section 4.2.3.6). The results of the regression revealed that 'English use' did not add to the prediction of reading comprehension for the EAL children, thus suggesting that 'English use' does not explain any additional variance in reading outcomes in English for EAL children. While this may be the case, this is in contrast to the output hypothesis and to previous findings (Bedore et al., 2012; Swain, 2005). Accordingly, it is important to note the methodological shortcomings of examining "English use". Firstly, through dichotomising this continuous variable, information concerning the distribution of the scores is lost and as such the varying degrees of "English use" are not considered or incorporated into the analysis. When considered as a continuous variable however, “English use” was not statistically significantly correlated with reading comprehension and consequently it was not appropriate to include this in further analyses, e.g., mediation analyses. There are a number of reasons that may explain why the language exposure questionnaire items did not correlate with reading outcomes, which further addresses the methodological limitations of the “English use” findings. The language exposure questionnaire was not extensive – it involved only a few simple questions which did not enable a nuanced understanding of the ways in which language is used in the home. Additionally, the questionnaire data was collected from the children themselves, although the children understood the questions and were able to respond promptly, this does not circumvent questions of reliability. Ultimately, the predicted relationship between language use and children’s reading outcomes did not emerge in these data, however in consideration of the limitations, it is likely that a more thorough examination of the home language environment would be better able to capture the complexity of the relationship between language use and reading outcomes among EAL children.

As identified in the whole sample regression model, language group was not a significant predictor of reading comprehension, which was taken to indicate that the key predictors of reading comprehension were similar for both language groups. However. the subsequent regression analysis examined the predictors of reading comprehension for the EAL children; this regression included the “English use” variable, altering the final predictor entered into the model, (i.e., language group). While a similar pattern emerged for the whole sample and the EAL children independently, the oral language composite did not reach statistical significance in predicting reading comprehension for the EAL children (as it did in the whole sample), which could be indicative of language group differences in terms of predicting reading comprehension. However, given the sample size when including only the EAL children, and the fact that the oral language composite was approaching significance, the view that the predictors of reading comprehension were similar for the two language groups remains.

Taken together, the findings presented in this chapter add to the research literature in two important ways; firstly, the data shows that the gap between EAL and EL1 children, in terms of their language and literacy skills, is narrowing but not completely eradicated by the final year of primary school. Secondly, the prediction of reading comprehension is shown to be similar for the EAL and EL1 children. There are several features of this chapter, however, that limit the conclusions that can be drawn about the development and prediction of reading comprehension for EAL learners. Firstly, the analyses did not account for English language proficiency. Previous research has shown that EAL learners with varying degrees of English proficiency show different trajectories of development (e.g., Halle et al., 2012; Kieffer, 2008). Considering the large variances found on the reading comprehension task for both EAL and EL1 children, future research could make use of quantile regressions to examine whether differences emerge based on ability level rather than language group, which may be more helpful in determining reading comprehension problems than the comparison of EAL and EL1 children alone. Further limitations relate to the sample size and appropriateness of the tasks used. A larger sample size would allow for additional and more sophisticated analyses to be carried out, such as quantile regressions, allowing for a more detailed examination of individual differences, or growth curve modelling for examining the trajectories of growth. Furthermore, questions regarding the cultural sensitivity of the measures for use with EAL children as well as the use of standardised scores are warranted and will be considered in the general discussion chapter that follows.

Despite the shortcomings, the present findings contribute to a more nuanced view of the processes that underpin reading comprehension for EAL children in the UK. While the growth of oral language skills is greater for the EAL children, the EL1 children continue to outperform the EAL children into Y6. Oral language, measured using tasks of grammatical knowledge, listening comprehension ability and vocabulary knowledge, is important for reading comprehension for both EAL and EL1 children. Although this chapter did not empirically examine the usefulness of oral language interventions, the findings highlight the importance of oral language skills and therefore an emphasis on oral language skills within the primary school years may be particularly helpful for EAL children. Future research should look to examine development for an extended period of time, with a particular focus on EAL language and literacy development beyond the primary school years.

Chapter 7 – General discussion

The research reported in this thesis aimed to examine the skills that underpin reading comprehension and how these skills compare and develop for children learning EAL and monolingual English-speaking children in the UK. Employing a sequential design, several research questions were addressed. First, the reading profiles of EAL and EL1 children in school years 2 and 4 were examined cross-sectionally with the view to ascertaining whether EAL and EL1 children differ in their language and literacy skills in line with research reported in previous literature. The inclusion of two different age groups allowed for a cross-sectional understanding of how the language and literacy skills of both language groups may manifest developmentally. Second, the nature of vocabulary depth was explored; three specific components of vocabulary depth were examined, and the EAL/EL1 differences were analysed. Third, children's knowledge of morphemes was explored, specifically to examine how the two language groups compared, and also to assess morphology's role in reading comprehension outcomes. Fourth, the growth of language skills from t1 to t3 were examined and again language group differences of the growth trajectories were investigated. Finally, in a series of regression analyses the contribution of t1 language and literacy skills were examined as predictors of t3 reading comprehension outcomes. This chapter will draw together the key findings of the research and will discuss these in relation to previous findings as well as considering the theoretical and educational implications.

7.1 Summary of key findings

7.1.1 Reading Profiles of EAL and EL1 Children and Underpinning Skills

The predicted reading profile of EAL learners, namely adequate decoding skills and weak language skills, emerged in the data set both at t1 when children were in Year 2 and Year 4, and at t3 when children were in Year 4 and Year 6, supporting and replicating previous UK based findings (e.g., Babayigit, 2014; Burgoyne, Kelly, Whiteley & Spooner, 2009; Burgoyne, Whiteley & Hutchinson, 2011, 2013; Hutchinson, Whiteley, Smith & Connors, 2003).

Additionally, the t1 cross-sectional data demonstrated that, concurrently, oral language was a significant predictor of reading comprehension for all children in both year groups.

On further examination of the language skills at t1, the Y2 EAL children demonstrated statistically significantly weaker receptive vocabulary knowledge relative to the Y2 EL1 children. However, the two groups did not differ significantly on any other measures of language knowledge (i.e., expressive vocabulary, expressive grammar, listening comprehension, morphological awareness). In view of the raw scores, the EAL children did have lower raw scores than the EL1 children on all of the above measures, though the differences did not reach statistical significance. Additionally, when examining the t3 raw scores of the younger cohort and the t1 raw scores of the older cohort (i.e., when both cohorts were in Y4), the younger EAL cohort have higher raw scores than the older EAL cohort, suggesting that the younger EAL cohort may be stronger overall in terms of their language skills (see Tables 6.5 and 6.6), possibly explaining the lack of significant language differences between the EAL and EL1 children in Y2. Considering that the oral language composite (made up of the measures listed above, plus receptive vocabulary) was significantly predictive of reading comprehension for the Y2 EAL children and that their reading comprehension was weak relative to the EL1 children's, the study demonstrates that vocabulary size, i.e., receptive vocabulary, is potentially a key driver of reading comprehension disparities in Year 2. This is in line with previous research that maintains that the weaker vocabulary skills of EAL children places significant constraints on their comprehension (Burgoyne et al., 2009; Burgoyne, Whiteley & Hutchinson, 2011; Stuart, 2004).

EAL children inherently have less exposure to English than EL1 children given that they speak two languages; studies that have measured the distribution of bilingual children's exposure to each of their languages report that language development correlates to the degree of exposure within that language (De Houwer, 2011; Pearson, Fernandez, Lewedeg, & Oller, 1997; Thordardottir, 2011). With this, and in line with frequency-lag and usage-based approaches to language (Gollan, Montoya, Cera, & Sandoval, 2008; Tomasello, 2003), it is unsurprising that young children who encounter two languages in their daily lives (i.e., EAL children) have lower levels of vocabulary knowledge relative to EL1 children. However, they are only assessed in one of their two languages (English) and are compared to age-matched monolingual speakers of the target language. The t1 findings that were somewhat concerning, however, were the significant differences found between language groups on all language measures for the older cohort (with the exception of the morphological awareness task). That is, following several years of formal schooling (children in the study had attended their current school for a minimum of two academic years prior to t1), language disparities between EAL and EL1 children were of a considerably high magnitude, and were observed for a greater number of language measures than that of the younger cohort. It is difficult to determine whether the older EAL children are a particularly weak cohort or whether the younger EAL children are a particularly strong cohort, although comparing each cohort's Y4 data, the results indicate the latter. Nonetheless, the findings suggest that EAL children's weak language skills relative to their EL1 peers' may not be a short-lived experience.

That said, later longitudinal analyses demonstrated that EAL children had significantly larger growth in their vocabulary and grammar outcomes from t1 to t3 than the EL1 children (both children from Y2 → Y4, and Y4 → Y6) indicating that the gap between the two groups is not widening over time, as could have been inferred from the cross-sectional data. Previous research has yielded inconsistent findings in terms of language-minority learners' vocabulary growth relative to monolingual children. For example, Lervåg and Aukrust's (2010) study found that Norwegian L1 students had faster vocabulary growth over time compared to the children learning Norwegian as an additional language, and Burgoyne, Whiteley and Hutchinson (2011) demonstrate that the same rate of progress was made by EAL and EL1 learners, consequently sustaining the gap in vocabulary knowledge between learners. The study here reported different findings still. However, the lack of an observed Matthew effect (Stanovich, 1986) did not equate to the disappearance of language group differences. That is, although the EAL children demonstrated a larger degree of growth on the vocabulary measures, this was still not enough to close the language and reading comprehension gap between EAL and EL1 children by t3. The implications of which will be discussed at greater length in Section 7.3.

Beyond the support for previous studies, the t1 cross-sectional data yielded interesting findings concerning EAL and EL1 children with strong and weak comprehension skills. That is, upon closer examination of the distribution of all children's reading comprehension scores, there was considerable variation within both groups, and considerable overlap between groups, i.e., EAL and EL1 children were represented at both the low and the high ends of the distribution. A body of research, largely work with monolingual children, has explored the differences between children considered to be good and poor comprehenders (Lesaux, Lipka, & Siegel, 2006; Nation, Cocksey, Taylor, & Bishop, 2010). Consistent with this, an attempt was made to acknowledge the heterogeneity of EAL learners and as such analyses were run comparing EAL children with good and with poor comprehension (see Section 3.3.5 for details concerning the identification of good and poor comprehenders). The findings demonstrated that those with good comprehension statistically significantly outperformed those with poor comprehension on all language measures. These within-group analyses highlight the variability found within the EAL sample and echo other researchers' concerns that employing a binary EAL/non-EAL grouping to examine EAL children's academic outcomes is less sensitive in capturing the heterogeneity of individual abilities within the group (Demie & Lewis, 2017; Demie, 2018; Strand, Malmberg & Hall, 2015; Strand & Hessel, 2018).

The second notable finding concerning the identification of good and poor comprehenders was in the comparison of EAL and EL1 children with good comprehension. In spite of the language groups being arguably more aligned in terms of their reading comprehension ability, the EL1 children maintained their statistically significantly higher scores relative to the EAL children on measures of receptive vocabulary and expressive grammar. Thus, when EAL and EL1 children with comparable reading comprehension were examined, oral language weaknesses were still evident. Again, this returns to the idea of weaknesses in language, specifically vocabulary knowledge and syntactic knowledge, being the driving force behind EAL children's comprehension difficulties (Burgoyne, Whiteley & Hutchinson, 2011; Demie, 2018; Stuart, 2004). These findings must, however, be interpreted with caution. The grouping of participants as good or poor comprehenders was useful for examining within-group differences, as well as matching EAL/EL1 by abilities. However, the dichotomisation of reading comprehension – a continuous variable – means that information concerning the distribution of scores is lost. That is, the arbitrary cut off point in determining who is considered a good comprehender fails to capture the nuance of different reading profiles. Additionally, there were disproportionately more EL1 children in the good comprehender group relative to the EAL numbers, and by the same token there were in fact no EL1 children deemed as poor comprehenders. So, while it was a step in the direction of a more nuanced approach to examine and understand EAL children's language and literacy skills, future research should look to employ more systematic techniques. For example, recent L2 reading studies have employed quantile regression techniques in which the relation between key predictor variables and an outcome variable (reading comprehension) can be assessed across different points in the distribution of scores. (e.g., Mancilla-Martinez & Lesaux, 2017; Van den Bosch, Segers & Verhoeven, 2018). This enables variation in performance to be captured. Unfortunately, the sample size of the current study was not large enough to take advantage of such techniques. However, this is a technique that L2 reading researchers, particularly those examining EAL children in the UK, should consider in future research.

7.1.2 The Depth of Vocabulary Knowledge

As demonstrated in the cross-sectional data, EAL children have weaker vocabulary knowledge relative to EL1 children. This is consistent with previous research and is a well-documented finding in L2 reading research (Bialystok et al., 2009; Burgoyne et al., 2009; Hutchinson, Whiteley, Smith, & Connors, 2003; Lesaux, Crosson, Kieffer & Pierce, 2010; Lervåg & Aukrust, 2010; Melby-Lervåg and Lervåg, 2014). However, much less research has considered vocabulary knowledge beyond single-word receptive/expressive conceptualisations within the language-minority and EAL literature.

A number of tasks tapping vocabulary depth were therefore administered, this included a task of multi-word phrase (MWP) knowledge, a word associations (WA) task and a polysemous word knowledge (PWK) task. Largely, the results indicated that EAL children have a weaker knowledge of multi-word phrases and weaker lexical networks than EL1 children. Polysemous word knowledge was found to be challenging for all children, though the raw scores indicated that again EAL children achieved lower scores than the EL1 children.

The lower levels of MWP knowledge of the EAL children is in line with Smith and Murphy's (2015) study that examined the productive use of verb + noun MWPs. The current study extends the findings beyond verb + noun MWPs to varying types of MWPs including similes, collocations and binomials, suggesting that MWP knowledge is problematic for EAL children across varying categories. Furthermore, unlike the productive task utilised by Smith and Murphy (2015), the MWP task employed in this study was a receptive task, demonstrating that EAL children have a weakness at the receptive level, i.e., the ability to recognise MWPs, as well as at the productive level. Research with L2 adults has demonstrated that the presence of MWPs can negatively impact reading comprehension (Martinez & Murphy, 2011), predominantly due to the fact that MWPs have been misinterpreted. Given that EAL children have more experience of misunderstanding written or spoken English than EL1 children, it is plausible that they have a higher tolerance for incoherence, that is, they may be more inclined than EL1 children to continue reading despite having not fully understood the text, and as such unfamiliar MWPs used in texts or spoken language may also be likely to negatively impact comprehension in this way for EAL children. Further research employing comprehension tasks with MWPs situated within them is warranted to examine this empirically.

The WA task tapped into the lexical networks of the EAL and EL1 children, i.e., their representations of lexical items. The EL1 children outperformed the EAL children in that they were able to bring a greater number of items to mind within the set time frame. The 'network approach' suggests that vocabulary items find a place in a learner's mental lexicon through the process of network building, i.e., having a multitude of experiences with words (Haastrup &

Henriksen, 2000). The results of the study suggest, then, that EAL children's weaker word association skills are likely to be a result of limited experience with words relative to EL1 children.

Despite the language group differences found for the word association task as measured by the number of responses produced, a scoring system was developed to assess the extent to which the responses were semantically related (see Section 2.9.4.3 for details of the scoring system). The relatively high standard deviations found for the semantic organisation of responses indicated that individual responses vary widely from the mean, within both language groups. This supports the argument that native speakers are not homogeneous in their response behaviour (e.g., Fitzpatrick, 2007; Nissen & Henriksen, 2006) and as such, examining the comparison of EAL children to EL1 children in terms of response behaviour may be somewhat redundant, that is, beyond the number of words produced, there is not necessarily a wrong or a right way to store links between words and/or retrieve words during a word association task. Nonetheless, the EL1 children did have a higher percentage of semantically organised responses than the EAL children overall. That is, irrespective of the different types of sub-semantic links made, the EAL children were less likely to give responses that were sub-semantically linked than the EL1 children. In line with the Lexical Quality Hypothesis, this finding could be taken to suggest that EAL children have lower quality representations of words than EL1 children given their more limited associations between responses. However, the use of a more systematic assessment would enable word associations and response types to be examined in further detail.

The polysemous word knowledge task generated lower levels of group differences than the other assessments of vocabulary depth, and there were no statistically significant differences to emerge between EAL and EL1 children on the task overall or when analysed by the casual items only, or the academic items only. However, the raw scores indicated an EL1 advantage, and the language group differences for academic senses of the words were approaching significance, again with an EL1 advantage. Nagy and Townsend (2012) proposed that academic language involves learning to be flexible with existing vocabulary knowledge; the results of this study suggest that all children's understanding of the more abstract, metaphorical sense of the words' meanings is relatively weak, although there is some evidence that it is emerging. Comparing knowledge of polysemous words between EAL and EL1 speakers was thought to be of theoretical interest given the bilingual literature advocating a possible bilingual advantage on such a measure, and of empirical interest to gain a more nuanced understanding of EAL learners' vocabulary knowledge. That is, bilingual speakers frequently use different words to refer to the same concept (L1 and L2 vocabulary), and use different syntactical structures to express the same meanings, therefore this cognitive skill may extend to a task where such flexibility is required. On the other hand, EAL learners may have less experience with and exposure to the academic meaning of words outside school as compared to their EL1 counterparts and as such may have more difficulty with the abstract meaning of the words than the casual meanings. The findings of this study hint towards the latter explanation given the lower raw scores of EAL learners, though the evidence is limited. The task employed in this study was originally developed for use with participants two school years older than the children in this study (see Section 2.9.4.2 for details of the task), and while the task was deemed appropriate for use with this age group, it is possible that both EAL and EL1 children found this task challenging. More specifically, and in line with Logan and Kieffer's (2017) findings, all children found the academic sense of the words more challenging than the casual sense of the words. Further research following the development of this skill longitudinally would be both of theoretical and practical interest, and is certainly an aspect of vocabulary knowledge that warrants further attention within the EAL literature.

The vocabulary depth data was further considered in relation to children's self-report of their language use, in their L1 and their L2. Subsequently, EAL children were grouped according to the proportion of their use of spoken English and thus two groups were created; those with higher levels of English use and those with lower levels of English use (see Section 4.3.4 for details of how the questionnaire data was used to create the groups). The results suggest that those with a higher proportion of spoken English outperform those with a lower proportion of spoken English in their performance on the MWP task but not the WA task or the PWK task. In line with a usage-based approach to language acquisition (Tomasello, 2003), this finding suggests that children who use English more frequently with others may be better equipped at performing statistically based distribution analyses on commonly co-occurring sequences of words (i.e., the MWPs) in English than those who use English less frequently. Moreover, the output hypothesis proposes that the production of speech confronts learners with what they do not know—and thereby allows for further reflection of an individual's linguistic knowledge. That is, the EAL children that reported to use English more frequently have had further opportunity to receive feedback on their speech, giving them the opportunity to make sense of and update their linguistic knowledge (Swain, 1995; 2005). Given that the precise word order of MWPs is important for understanding MWPs the explanation put forward by the output hypothesis seems particularly plausible for why the MWP task should differ between children who use English more and less frequently.

The fact that no group differences emerged between the EAL children with higher and lower levels of English use for the WA task or the PWK task but it did for the MWP task could be interpreted in a number of ways. One possible explanation is that while word associations and polysemous word knowledge will depend on the extent to which words have been encountered, they depend less on exposure to specific co-occurrence of word sequences, i.e., knowing that *black and white* is more appropriate than *white and black* will depend more on exposure to that specific word sequence than the knowledge that *snakes* and *alligators* may be semantically linked for example. However, given that the questions examined language use and not language exposure, and that they were relatively crude, the findings are in no way comprehensive and were employed only as an indication of language experience. Research into EAL children's home language environment and this relationship with academic outcomes warrants further, systematic investigation. This will be discussed further in Section 7.3.

7.1.3 Knowledge of Morphemes

Morphological knowledge has been found to predict variance in reading comprehension (Deacon & Kirby, 2004), as such this thesis aimed to examine EAL children's awareness of the morphological structure of words and to assess whether this converges or diverges with EL1 children's awareness. This aspect of metalinguistic knowledge has not been studied extensively with language-minority learners, and specifically there are no studies to the researcher's knowledge examining the morphological awareness of children learning EAL in the UK.

The morphological task that was employed allowed for a number of in-depth analyses to be examined. Presented here is a discussion of the most theoretically interesting findings, for a full discussion of the morphological awareness results, see Section 5.4. The overarching language group differences that emerged revealed that the EL1 children outperformed the EAL children on both the inflection production task and derivation production task, but scores were comparable for the derivation judgement task. This is in line with previous research (e.g., Paradis, 2010) and thus suggests that EAL children are less efficient at producing their knowledge of morphological structures than they are at reflecting on their knowledge of them, that is, the judgement task was easier to complete than the production task. While this was true for all children, the difference between a receptive-level understanding and a productive-level ability was greater for the EAL children. Thus, the results indicate that EAL children's knowledge of morphemes is weaker than EL1 children's knowledge.

Further analyses examined the EAL/EL1 differences between knowledge of inflected morphemes and knowledge of derived morphemes and revealed that inflected words generated greater language group differences with an EL1 advantage than the derived words. While initially this may seem surprising, the limited difference found for the derivational task was largely explained by the fact that all children seemed to have weaker derivational knowledge than inflectional knowledge. These findings are in keeping with previous research examining typically developing EL1 readers and support the idea that derived words are harder to learn than inflected words (Carlisle, 1995). This is thought to be in part due to the fact that derived words have less predictable morphological changes than inflected words (Marslen-Wilson, 2001) but also that there are simply far more derived words than there are inflected words. Realisation-based approaches to the psycholinguistic study of morphology (e.g., Stump, 2001) suggest that derived word forms may have individual representations stored in the lexicon whereas inflected words may be processed as a feature-form pairing and as such do not have individual entries stored in the lexicon. In light of this theory, it is possible that for both language groups, inflected words may be easier to produce due to the following of a rule-based understanding, as opposed to producing derived words that are possibly stored as individual entries in the lexicon.

Additional analyses examined morphological awareness as a predictor of reading comprehension. That is, t1 reading comprehension, t1 word reading and t1 oral language were controlled for and t2 morphological awareness (total raw score) was examined as a predictor of t3 reading comprehension. The results showed that morphological awareness explained a statistically significant 6% of unique variance in reading comprehension above and beyond word reading and oral language skills for the EAL children, but for the EL1 children the contribution of morphological awareness explained an insignificant < 1% of the variance. The results are in line with previous international research that finds a unique contribution of English morphological awareness to reading in English for EAL learners (Box & Kieffer, 2013; Deacon et al., 2007; Kieffer & Lesaux, 2008; Ramirez et al., 2010; Saiegh-Haddad & Geva, 2008; Ruan et al., 2018) but the lack of significance for the EL1 children is inconsistent with previous research examining this relationship (e.g., Carlisle, 2000; Deacon & Kirby, 2004; Ku & Anderson, 2003; Nagy et al., 2006). One potential reason for this inconsistency could be that in contrast to previous studies, this study accounted for word reading skills and a comprehensive battery of language assessments in the regression analyses, i.e., the variance in morphological awareness may have been explained by word reading and oral language skills for the EL1 children. The results suggest then that for EAL children, who have weaker oral language skills, morphological awareness may play an important role in reading comprehension outcomes. Thus, the results of this study demonstrate that EAL and EL1 children may utilise different skills when engaging with written text.

Taken together, the results demonstrate that EAL children have weaker knowledge of morphemes than EL1 children, but that this information is helpful in the reading comprehension process and may allow for a further avenue in which children are able to make sense of the meaning of words, particularly those words that are multimorphemic. Further research should look to incorporate the explicit teaching of morphemes into reading research with EAL children and to evaluate its generalisability and effect on reading comprehension outcomes.

7.1.4 The Predictors of Reading Comprehension

As guided by the Simple View of Reading, decoding and linguistic comprehension are considered to be necessary components of successful reading comprehension. As such, two composites were created with the t1 data, a word reading composite and an oral language composite and were used as predictor variables in a regression model predicting t3 reading comprehension. In order to examine whether these variables were predictive of reading comprehension irrespective of language group (EAL/EL1), language group was included in the model. To increase the power of the regression, all children were included in the model (i.e., children from both year groups) rather than running separate year group regressions, and age was controlled for. Additionally, t1 reading comprehension was also included as a predictor.

The results revealed that age, t1 reading comprehension and t1 oral language were statistically significant predictors of t3 reading comprehension, whereas t1 word reading and language group status were not. Taking a comprehensive approach, and in line with Hoover and Tunmer's (2018) discussion of the SVR, this study included measures of vocabulary, grammar and listening comprehension to account for the language comprehension component of the SVR. While the study does not clarify the mechanism by which language facilitates reading comprehension, it does demonstrate that this process is relatively similar for EAL and EL1 children. That is, the fact that language group status was not a significant predictor of reading comprehension suggests that age, t1 reading comprehension and t1 oral language were statistically significantly predictive of t3 reading comprehension regardless of whether children were learning English as their only or additional language.

In terms of the finding demonstrating the limited predictive power of word reading, previous research has suggested that the relative contribution of decoding and language comprehension changes over time; i.e., decoding is the stronger predictor of reading comprehension among younger children and language comprehension becomes more predictive of reading comprehension for older children once the decoding component has been mastered (Adlof, Catts & Little, 2006; Chen & Vellutino, 1997; Foorman, Koon, Petscher, Mitchell, & Truckenmiller, 2015; Garcia & Cain, 2014; Vellutino, Tunmer, Jaccard, & Chen, 2007). While the longitudinal results aligned with this pattern, the lack of statistical significance from the t1 word reading composite as a predictor of t3 reading comprehension was somewhat surprising, i.e., while word reading was not expected to be a strong predictor of reading comprehension, it was thought that it may still be significantly predictive. However, Foorman et al. (2015) report similar findings in a cross-sectional study with adolescent participants, i.e., decoding was found to correlate with reading comprehension but not to significantly (concurrently) predict it; demonstrating the important but not significantly predictive role of decoding for older learners with adequate decoding skills. Additionally, in a longitudinal study, Adlof, Catts and Little (2006) found that fourth grade listening comprehension accounted for 45.2% of unique variance in eight grade reading comprehension while fourth grade word recognition accounted for only 2.9% of unique variance. These studies demonstrate the decrease in predictive power of the decoding component of the SVR with older participants. Although the lack of statistical significance found in this study may be somewhat surprising, previous research has demonstrated a similar pattern of results.

Additionally, while the severity of multicollinearity was not enough to cause concern, the fact that there was a correlation between the word reading composite and the oral language composite may further explain the lack of significance found for the word reading composite in this regression model. That said, it is important to note that some degree of correlation between word reading and oral language is, theoretically, not surprising or concerning. As articulated by the Lexical Quality Hypothesis, to understand a word, multiple aspects of the word must be known; this includes phonological veracity which is reciprocally linked to word reading, as well as meaning and pragmatics which are reciprocally linked to oral language knowledge. Taken together, the limited predictive power of word reading found in this study is not a cause for concern rather it demonstrates that word reading, while non-negotiable and important as a pre-requisite to reading comprehension, is less significant as a predictor further in reading development for both EAL and EL1 learners.

7.2 Strengths, Limitations and Future Directions

The research project presented within this thesis has a number of strengths that have allowed for a detailed examination of EAL and EL1 children's language and literacy skills. A particular strength is the sequential design that was employed to examine children's skills cross-sectionally and longitudinally. This design enabled data to be collected within schools, spanning from Year 2 to Year 6. There have been few research studies examining the development of EAL children's language and literacy skills in the UK, specifically through to the final year of primary school, therefore the findings presented within this thesis contribute to this gap in the research. Furthermore, the study employed a number of language measures that have not been considered or examined extensively in EAL research, namely tasks assessing morphological awareness, and aspects of vocabulary depth, specifically, multi-word phrase knowledge, polysemous word knowledge and word association skills. The inclusion of a monolingual control group allowed for comparisons, cross-sectionally and developmentally, to be made. This was particularly useful for observing the ways in which EAL children's development differed or deviated from monolingual norms. The research therefore has added to the small but growing body of EAL language and literacy research in the UK.

Nonetheless, there are a number of limitations to this research that should be noted. First, while the size of the sample was large enough for the analyses that were employed, when divided into the sub-groups, i.e., language and year groups, the size of each group was relatively small, limiting the interpretation of the results, and preventing the use of more sophisticated analysis techniques. However, the sample size was in line with previous research that has compared the language and literacy skills of EAL and EL1 children in the UK (e.g., Babayiğit, 2015; Burgoyne, Kelly, Whiteley & Spooner, 2009; Burgoyne, Whiteley & Hutchinson, 2013).

Second, the measures that were employed within the study were not normed on EAL children and as such standardised scores were not utilised in the analyses. This limited the extent to which overarching comparisons could be made between variables for the EAL and EL1 children. Additionally, this made the comparison of variables over time complex, particularly for measures of reading and listening comprehension, where different passages of text were used. Thus, the comparison of growth of listening comprehension and reading comprehension from t1 → t3 between EAL and EL1 children could not be accurately attained. Therefore, limiting the discussion that can be had concerning the trajectory of comprehension abilities. This issue has been discussed widely in the literature and among researchers, though due to the enormous scale of developing normed assessments, this is an ongoing concern for language-minority researchers. In line with this, the extent to which the measures, specifically the reading and listening comprehension measures, are culturally appropriate is not taken into account. Given that background knowledge is required for successful comprehension (Hirsch, 2003; Steffensen, Joag-Dev, & Anderson, 1979), it is unclear whether the contents of the passages in the YARC and the CELF are appropriate for use with EAL learners.

Third, EAL children's L1 skills were not assessed and were therefore not taken into account when discussing EAL children's language and literacy profiles. Research has highlighted the importance of assessing all languages that a learner speaks in order to understand their linguistic skills holistically. However, given the number of L1s spoken by the participants in this study, it was not possible to accurately assess their L1 abilities. In a similar line of argument to the previous limitation, a lack of adequate resources currently stands in the way of better practice in the holistic assessment of language-minority children's language and literacy skills (Armon-Lotem, de Jong, & Meir, 2015; Peña, 2007).

Additionally, individual-level data on students' socioeconomic status (SES) was not obtained. SES was considered using the school-level data of the number of pupils eligible for free school meals. While it is likely that EAL and EL1 children are equally represented across SES in the study given that both EAL and EL1 children were recruited in relatively equal numbers from schools of varying FSM percentages, there is a possibility that differences between the language groups may be underpinned by a combination of language group and SES. This leads into another limitation concerning the home language and literacy environment of all children, but particularly the EAL children. Much research has shown the impact of the home language environment on language skills and educational outcomes more broadly (Hart & Risley, 1995; Hoff, 2006). However, information on the home language environment was not collected in this study. While data was collected from children concerning their L1 and the amount and frequency of English/L1 use, this was not a comprehensive questionnaire. Questionnaires were sent to parents in attempt to acquire this information, however few questionnaires were returned and thus the researcher attempted to circumvent this by administering the child questionnaire. The child questionnaire allowed for very crude analyses concerning L1/L2 use, though the extent of the reliability and validity is relatively weak.

Furthermore, in relation to the home environment, it is possible that the study involved an element of sampling bias. That is, information sheets and consent forms were written only in English and were sent home from school with children (with the exception of one school in which the researcher was able to speak directly with parents – see Section 2.12 for further details). Therefore, the EAL participants that were involved in the study may not be representative of the full spectrum of EAL learners i.e., the children in the study may be from homes in which parents are able to read and comprehend English, and the EAL children whose parents have limited English language and/or literacy skills may not have had the opportunity to participate, thus leading to a sample in which children with limited English outside school are not included. That said, Cline, Crafter and Prokopiou (2014) suggest that children of parents with limited English often act as ‘language brokers’ in a variety of circumstances, and as such it is possible that children may have explained and translated the information sheets and consent forms to parents. While it would have been preferable to have provided translated versions of these materials to give to parents, the large number of languages spoken within the schools combined with the limited resources of this project, it was unfortunately not possible.

Finally, it is important to highlight that the group differences found between EAL and EL1 children represent overarching trends within the heterogenous groups. That is, both groups of learners consist of children across the distribution of language and literacy abilities and as such EAL and EL1 group differences do not fully capture the within-group differences. The important findings of the Strand and Hessel (2018) report and work by Demie (2017) demonstrates that proficiency scales are a more accurate predictor of educational outcomes than the EAL label itself and with that researchers should look to employ techniques that assess learners across different points in the distribution of scores, as discussed in Section 7.1.1.

In consideration of the strengths and limitations of this research project and of existing research findings, a number of future directions would further inform current understanding of EAL children's language and literacy skills. First, research examining EAL children's home language environment is needed. That is, an in-depth examination of EAL children's linguistic environment and how this relates to and/or predicts language outcomes, e.g., the quality and quantity of L1 and L2 (English) input in the home and how this relates to L1 and L2 language and literacy outcomes both concurrently and longitudinally. This information would be useful for both practice and policy purposes but also to advance scholarly and theoretical understandings of the relationship between language experiences and language outcomes of minority-language learners. While there are a number of practical challenges with this line of research, (e.g., understanding L1 input/examining L1 outcomes and obtaining reliable linguistic data from the home), it is an important and under-researched aspect of EAL children's language and literacy development that certainly warrants further examination, particularly in the UK context. Second, the language and literacy skills of EAL children beyond the primary school years is an area of research that has received little attention. Given the language group differences (EAL/EL1) reported in this study in the final year of primary school, the trajectory of these skills into the secondary school years warrants further examination. While Strand and

Hessel (2018) report that a comparable number of EAL and EL1 children achieved a pass mark at GCSE English (61.4% of EL1 and 61.6% of EAL) in their sample of 29,316 KS4 children (20.1 % EAL), their report did not examine the developmental trajectory of skills longitudinally, nor did it examine more fine-grained measures of language and literacy skills. Thus, it remains unclear when/if EAL children 'catch up' with EL1 children in terms of their vocabulary knowledge and reading comprehension skills.

7.3 Educational Implications

While this thesis did not focus on pedagogy or evaluating effective teaching methods, the findings have some application in terms of educational practice and policy. In terms of practical implications, the findings demonstrating that EAL children have weaker language and reading comprehension skills into Y6 indicates that this group of learners must continue to be supported in their language development. Specifically, English vocabulary knowledge of EAL learners may need further targeted pedagogical support. Studies such as Carlo et al., (2004) have demonstrated the positive impact of vocabulary training on both vocabulary knowledge and reading comprehension for EAL children in the U.S. Future research should look to examine such interventions in the UK context.

However, given that both language groups (EAL/EL1) consist of children across the distribution of language and literacy abilities, educational professionals should be cautious about grouping or targeting children based on their monolingual/bilingual status alone. That is, not all EAL children have weak language and literacy skills and not all EL1 children have strong language and literacy skills. This leads into the implication for current policy in the UK. As discussed in Section 1.1.1, the DfE Proficiency in English Scales (DfEPS) (in which schools were required to report EAL learners' proficiency in English) were introduced *and* revoked during the time-frame of this research project. Researchers have identified that the binary EAL label itself is a poor indicator of educational achievement (Demie & Strand, 2006; Hutchinson, 2018; Strand et al., 2015), furthermore, Strand and Hessel's (2018) report identifies English proficiency as the best predictor of educational attainment. In light of these findings, taken together with the research evidence from this study, i.e., EAL children have a range of reading profiles and developmental trajectories, it would be of value for schools to continue to record the English proficiency of their EAL learners. In doing so educational professionals, teachers and researchers would be better equipped to identify the EAL learners that may need additional language support. However, it is important to note, Flynn and Curdt-Christiansen (2018) found that the proficiency scales had a perceived association with migration data monitoring, therefore if policy makers were to reintroduce the proficiency scales as suggested here, the purpose of their use should be made explicitly clear to all relevant parties, including school staff, parents and children.

With global migration rising, embracing and enhancing bilingual learners' language development, in both their L1 and their L2, should be encouraged within schools. While this study did not examine EAL learners' L1 skills, other studies demonstrate how it is possible to utilise children's home languages in linguistically diverse classrooms (Cummins, 2005; Issa & Hatt, 2013). In a UK based study, Bailey and Marsden (2017) reported that teachers are not aware of how and/or why home languages could be used in the classroom. Thus, calling for policy makers to upskill EAL teaching within teacher training programmes as well as through continued professional development training of existing teaching staff. Although purely anecdotal, the EAL children in this study were visibly engaged and enthusiastic when discussing their L1 with the researcher, with comments indicating that this was not a typical conversation to be had at school. Given that the number of EAL children continues to rise, the UK educational system needs to evolve in line with this. That is, bilingualism should, as a minimum, be acknowledged and supported. And, optimistically, bilingualism should be embraced and celebrated within schools.

7.4 Conclusion

The research reported in this thesis adds to a growing body of research suggesting that children learning EAL in the UK have lower levels of vocabulary knowledge and reading comprehension relative to EL1 children, and further demonstrates that this pattern persists through to the end of the primary school years. Despite EAL children demonstrating greater levels of oral language improvement over time in comparison to EL1 children, this was not enough to eradicate the language group differences. Importantly, EAL and EL1 children were both represented across the distribution of language and literacy abilities, albeit with more EL1 children than EAL children as higher performers. Nonetheless, it is hoped that these findings will inform school-based practice in recognising that the language and literacy outcomes of children with English as an Additional Language are more complex and nuanced than the EAL label itself is able to capture.

Appendix 1: School and Parental Consent Forms and Information Sheets

THE UNIVERSITY *of York*

DEPARTMENT OF EDUCATION
Heslington, York, YO10 5DD
Direct Line: (01904) 434398
Fax: (01904) 323459
Email: claudine.bowyer-crane@york.ac.uk
Web: www.york.ac.uk/educ

Dear Sir/Madam

My name is Natalie Smith and I am a PhD student working in the Dept of Education at the University of York under the supervision of Dr Claudine Bowyer-Crane.

I am carrying out a research project exploring the skills that are important for successful reading comprehension. Very few studies in the UK have looked at the different components that underpin reading comprehension in second language learners and how these relate to the skills of monolingual children. This project will be a longitudinal design, meaning that the researcher will track children's reading development over a two year period.

This will involve an initial screening, a second phase and a final phase of testing:

Initial screening phase- a battery of tests will be carried out with children in Year 2 and Year 4 to assess a range of literacy skills. These tests will measure word reading ability, vocabulary knowledge, listening comprehension, grammatical skills, memory skills and reading comprehension.

Second phase - Year 3 and Year 5, a number of skills related to reading comprehension will be explored in more detail such as grammar and comprehension monitoring - the ability to recognise when you have not understood something.

Final phase -Children will repeat the initial measures when they are in Year 4 and Year 6. The completed assessments will contribute to a more thorough understanding of the developmental trajectory of reading skills.

At each phase, assessments will:

- Involve age appropriate tests
- Be spread over one or two assessment sessions
- Each session will last for a maximum of 30 minutes
- Involve children being withdrawn from the classroom for the assessments
- Be audio recorded so that children's responses can be analysed

Confidentiality

We would like to assure you that information from the study will be kept strictly confidential. Children's results will be identified by code number and not name and the children are free to withdraw themselves from the study at any time by contacting Natalie Smith using the details below. You are also free to withdraw your school from the research project at any time. Data will be stored in locked filing cabinets and on password protected computers. Only members of the research team will have access to this data. Any identifying information will be stored separately.

The anonymised data will be stored indefinitely and may be used in presentations, for further research or for teaching purposes but your school and the pupils in your school will not be identified. If you would rather the data was not used in this way please **do not** sign the consent form.

Please note: If we gather information that raises concerns about a child's safety or the safety of others, or about other concerns as perceived by the researcher, the researcher may pass on this information to another person.

This project has received ethical approval from the Dept of Education Ethics Committee. We hope that you will agree to your school taking part in this study. If you have any questions about the research study that you would like to ask before giving consent, please feel free to contact Natalie Smith via email (ns1084@york.ac.uk) or the Chair of the Education Ethics committee (education-research-administrator@york.ac.uk).

If you are happy to take part in the project, please complete the form below and return it to me

Thank you for taking the time to read this information,

With best wishes,

Natalie Smith (University of York)

Research Consent Form

Exploring the reading comprehension skills of monolingual children and children learning English as an additional language.

If you are happy for your school to take part in the research project, please complete and sign this form.

Name of Setting:

____

Contact Person: ______________________________ Position in setting: ___________________

Address: ____

I have read and understood the information leaflet provided to me about the research project: *Exploring the development of reading comprehension skills of monolingual children and children learning English as an additional language* and I have had the opportunity to ask questions about the project.

I give my permission for ____ to take part.

(Name of school)

Please tick each box:

☐ I have read and understood the information leaflet explaining the above research project and I have been informed about the aims and procedures involved in this research.

☐ I understand that all information collected as part of this research study will be kept confidential unless any information raises concern of a child's safety, in which case the researcher may need to pass on this information.

☐ I understand that school names and children's names will be replaced with a letter-number-code.

☐ I understand that data will be stored in locked filing cabinets and on password protected computers and only members of the research team will have access to this data.

☐ I understand that the anonymised data may be used in presentations, for further research or for teaching purposes but schools and children will not be identifiable.

☐ I understand that parents/carers and children are free to withdraw from the project at any time.

☐ I reserve the right to withdraw any child at any time throughout the research proceedings, and also to terminate the school's involvement completely should I believe this to be necessary.

_______________ ______________________________

____

Date Signature (Head teacher) Print name (Head teacher)

THE UNIVERSITY *of York*

DEPARTMENT OF EDUCATION

Heslington, York, YO10 5DD

Direct Line: (01904) 434398

Fax: (01904) 323459

Email: claudine.bowyer-crane@york.ac.uk

Web: www.york.ac.uk/educ

Parent/Carer Information Letter and Consent Form

Dear Parent(s) / Carer(s),

__________________ has allowed ______________ to participate in a research project being carried out by Natalie Smith, a PhD research student from the University of York.

This project will explore the skills that are important for successful reading comprehension and the researcher will track children's reading development over two years. We are looking at reading development in children who have English as a first language and children who speak more than one language.

We are writing to all parents of children in years 2 and 4 to ask if they are willing to allow their children to take part in this research. This will mean that your child will be tested three times over the next two years.

Test 1- I will visit the school when the children are in Year 2 and Year 4. They will complete a range of reading and language tests.

Test 2 – I will visit the school again when the children are in Year 3 and Year 5. They will complete tests of grammar and comprehension.

Test 3 –I will visit the school again when the children are in Year 4 and Year 6. The children will do the same assessments as they did for test 1.

At each phase, assessments will:

- Involve age appropriate tests
- Be spread over one or two assessment sessions
- Each session will last for a maximum of 30 minutes
- Involve children being withdrawn from the classroom for the assessments
- Be audio recorded so that children's responses can be analysed

Confidentiality

We would like to assure you that information from the study will be kept strictly confidential. Children's results will be identified by code number and not name and the children are free to withdraw themselves from the study at any time by contacting Natalie Smith using the details below. You are also free to withdraw your child from the research project at any time. Data will be stored in locked filing cabinets and on password protected computers. Only members of the research team will have access to this data. Any identifying information will be stored separately.

The anonymised data will be stored indefinitely and may be used in presentations, for further research or for teaching purposes but your child will not be identified. If you would rather the data was not used in this way please **do not** sign the consent form.

Please note: If we gather information that raises concerns about your child's safety or the safety of others, or about other concerns as perceived by the researcher, the researcher may pass on this information to another person.

This project has received ethical approval from the Dept of Education Ethics Committee. We hope that you will agree to your child taking part in this study. If you have any questions about the research study that you would like to ask before giving consent, please feel free to contact Natalie Smith via email (ns1084@york.ac.uk) or the Chair of the Education Ethics committee (education-research-administrator@york.ac.uk).

Please return the enclosed form to your child's class teacher **as soon as possible** if you are happy for your child to participate in this project.

Thank you for taking the time to read this information,

With best wishes,

Natalie Smith (University of York)

Parent/Carer Consent Form

Exploring the reading comprehension skills of monolingual English speaking children and children learning English as an additional language.

Please read the information below and sign the form if you are happy for your child to take part in this research study.

I confirm that I have read and understood the information leaflet explaining the above research study and have had the opportunity to ask questions about the project.

I agree for my son/daughter* to take part in the above research project.

☐

*delete as appropriate

Please tick the box if you DO NOT consent to your child being audio recorded

______________ ___________________________ ________________________

Date Signature (Parent/Carer) Print name (Parent/Carer)

Child's name____

What languages does your child speak?-

____

____

What is your child's first or home language?

____

Appendix 2: The Multi-Word Phrase task – Stimuli and Score Sheet

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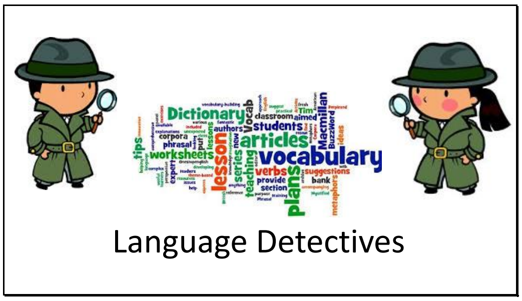

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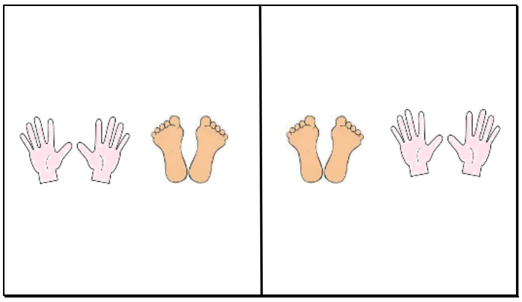

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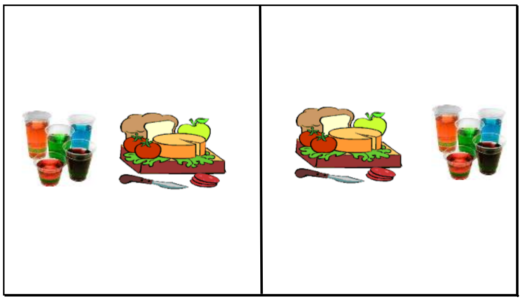

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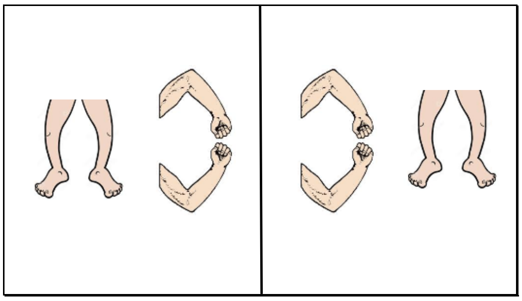

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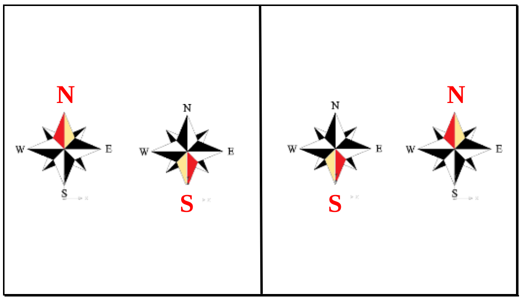

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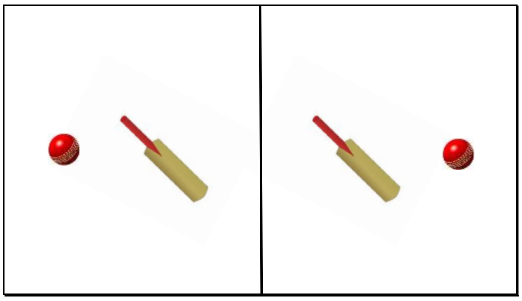

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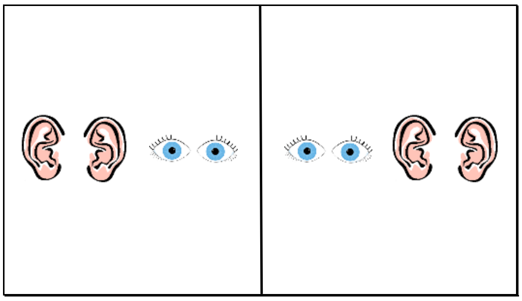

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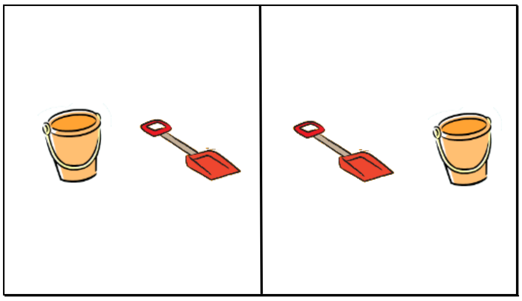

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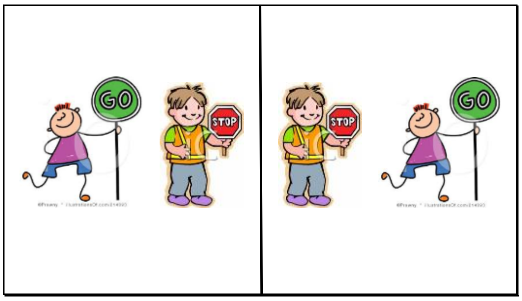

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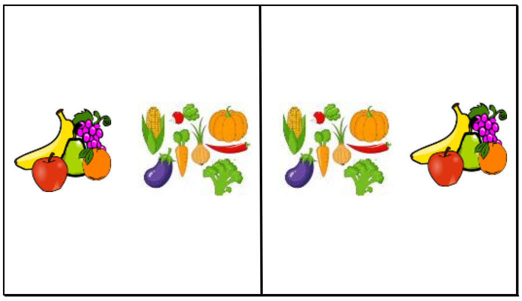

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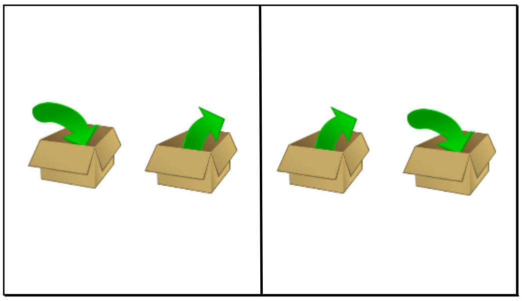

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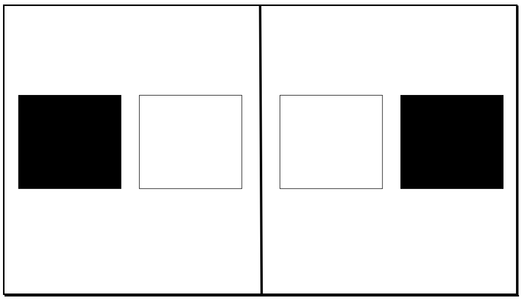

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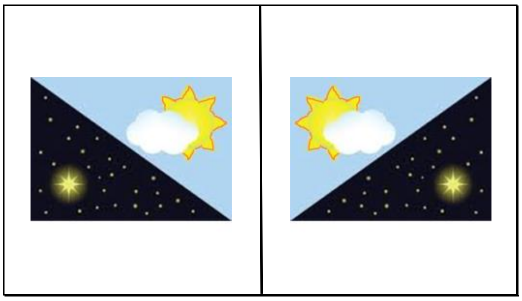

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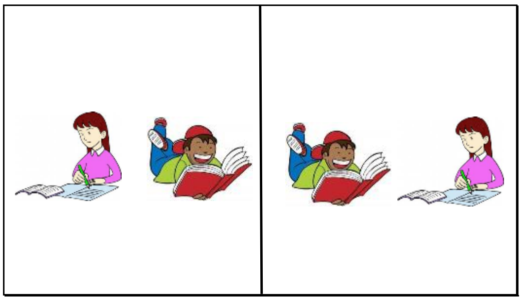

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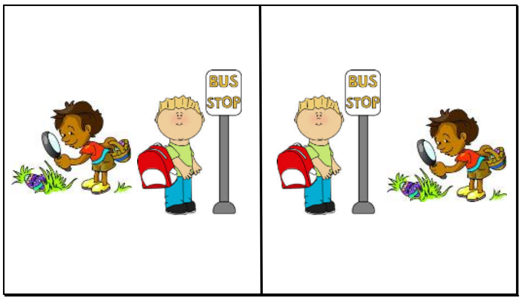

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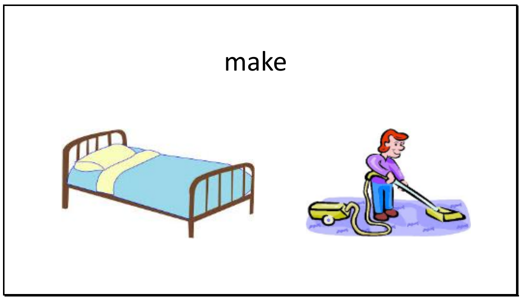

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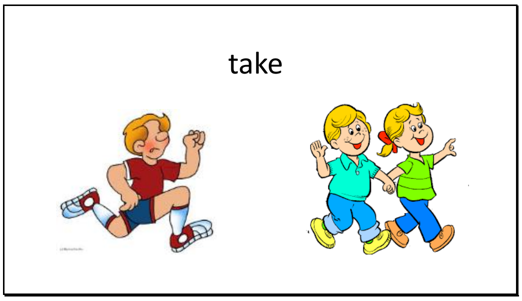

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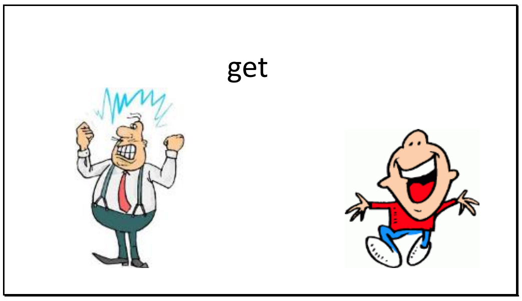

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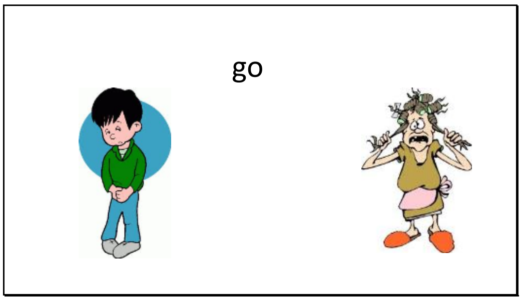

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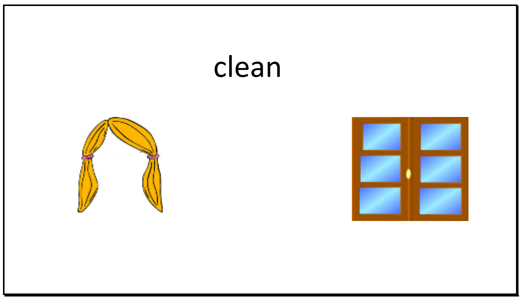

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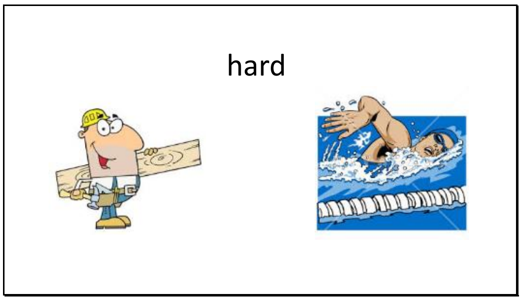

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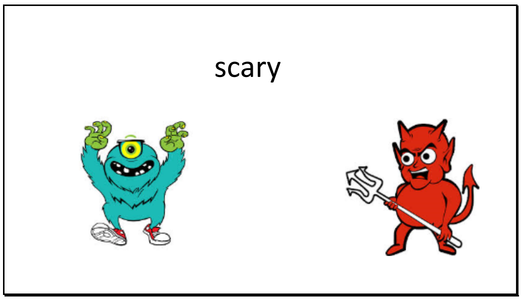

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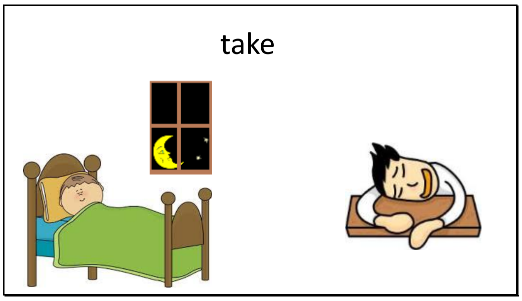

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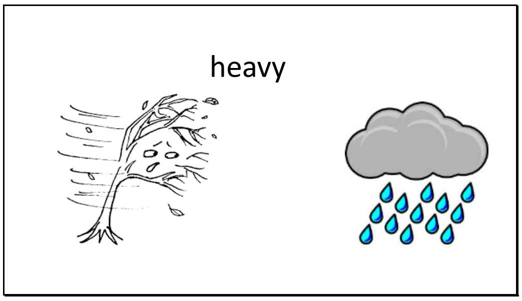

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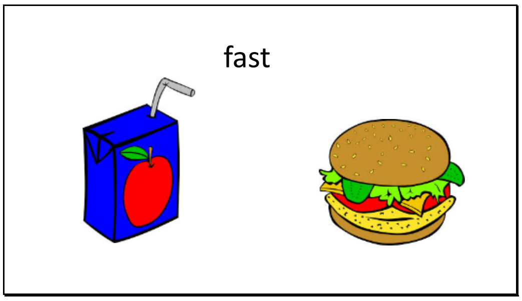

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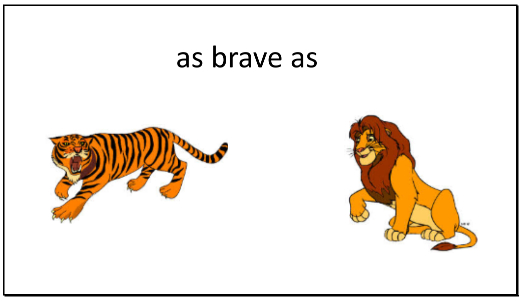

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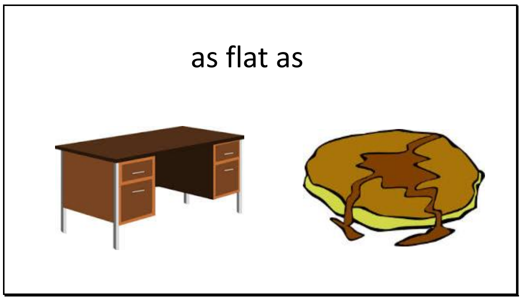

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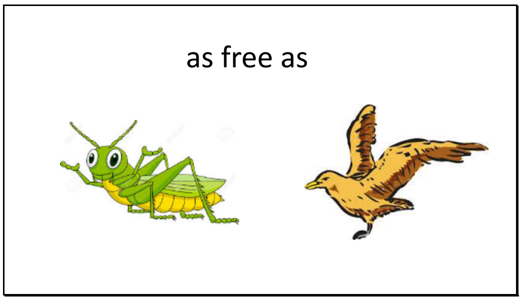

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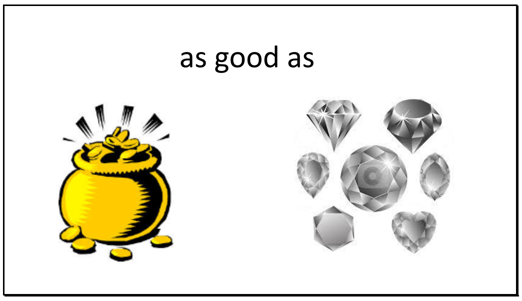

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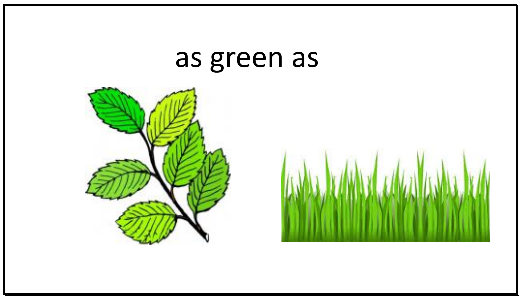

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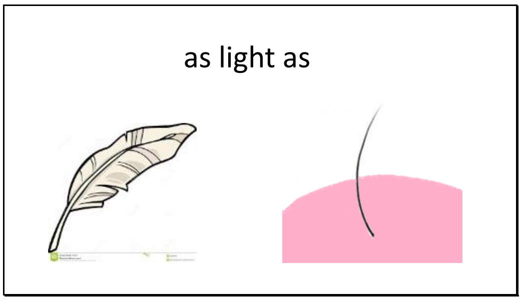

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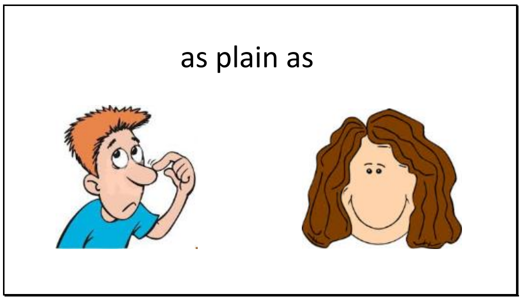

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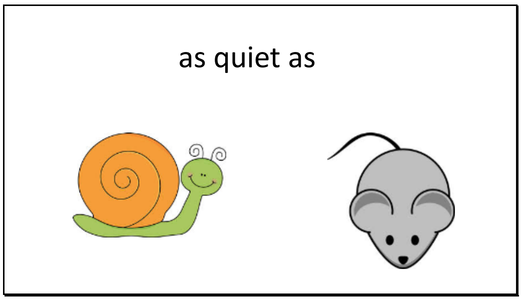

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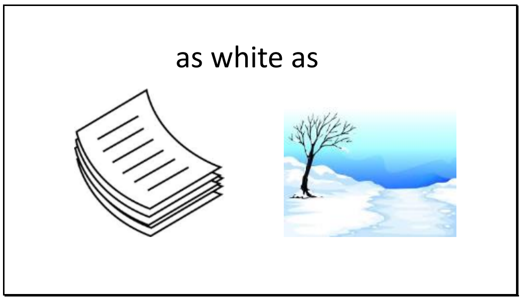

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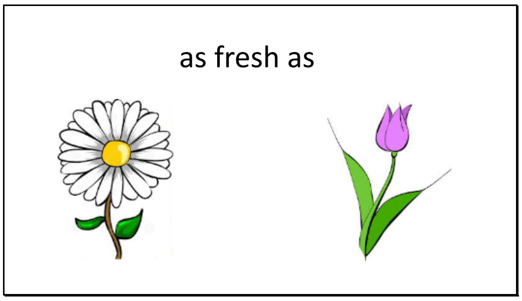

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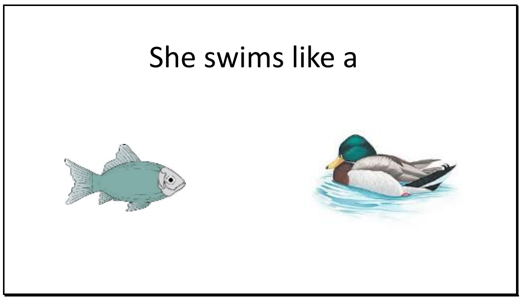


Q	Picture A	Picture B	Score
W	**hands and feet**	feet and hands	
W	drink and food	**food and drink**	
1	legs and arms	**arms and legs**	
2	**north and south**	south and north	
3	ball and bat	**bat and ball**	
4	ears and eyes	**eyes and ears**	
5	**bucket and spade**	spade and bucket	
6	go and stop	**stop and go**	
7	**fruit and veg**	veg and fruit	
8	**in and out**	out and in	
9	**black and white**	white and black	
10	night and day	**day and night**	
11	write and read	**read and write**	
12	see and wait	**wait and see**	
13	**some damage**	a mess	
14	**the bed**	the cleaning	
15	a run	**a walk**	
16	**angry**	happy	
17	sad	**crazy**	
18	your hair	**the windows**	
19	**the car**	the fridge	
20	**worker**	swimmer	
21	**monster**	devil	
22	a sleep	**a nap**	
23	wind	**rain**	
24	drink	**food**	
25	a tiger	**a lion**	
26	snow	**ice**	
27	a desktop	**a pancake**	
28	a grasshopper	**a bird**	
29	**gold**	diamonds	
30	leaves	**grass**	
31	**a feather**	hair	
32	**the nose on your face**	the hair on your head	

33	a snail	**a mouse**	
34	paper	**a ghost**	
35	**a daisy**	a tulip	
36	**a fish**	a duck	

Appendix 3: Polysemous Word Knowledge Task

1. The brutal storm destroyed the old wooden **structure**.

a. part

b. length

c. introduction

d. building

e. organisation

2. The **weight** of his evidence changed my decision.

a. heaviness

b. metal

c. power

d. fragrance

e. absence

3. That **chapter** of the crime novel was frightening.

a. time

b. section

c. branch

d. cover

e. description

4. Her **flexible** nature made her easy to like.

a. easily movable

b. thin

c. easygoing

d. funny

e. smart

5. He **strikes** the baseball high into the treetops.

a. physically hits

b. walks out

c. taps

d. comes across to

e. goes away from

6. This poem's final image **carries** lots of anger.

a. drops off

b. avoids

c. holds and moves

d. expresses

e. orders and accepts

7. The puppy **followed** the children through the forest.

a. watched

b. led

c. walked behind

d. understood

e. disagreed with

8. Her comment **points** to mistakes in his reasoning.

a. uses a finger to direct attention

b. scores

c. indicates

d. uses a hand to say stop

e. brings corrections

9. The **light** jumper kept me warm and comfortable.

a. gentle

b. heavy

c. surprising

d. bright

e. thin

10. The book's exciting plot took another sharp **turn**.

a. long break

b. curve

c. steep drop

d. surprising event

e. chance

11. My younger sister **runs** faster than our brother.

a. drives

b. ends

c. owns

d. sprints

e. continues

12. My report **expands** on what we discussed earlier.

a. develops

b. looks

c. raises questions

d. spreads

e. rises

13. I used a yellow marker to **highlight** sentences.

a. verbally call attention to

b. verbally question

c. show the game's best plays

d. physically mark in colour

e. physically erase

14. She **found** her favourite coffee at the market.

a. come upon by chance

b. claimed

c. put down

d. searched for

e. discovered through study

15. He **opened** his report with a funny story.

a. installed

b. unfolded

c. unlocked

d. began

e. compared

16. The woman changed her **position** on the sofa.

a. job

b. way of speaking

c. memory

d. way of sitting

e. point of view

17. The character's **cold** words show she is unhappy.

a. useless

b. mumbled

c. unpracticed

d. freezing

e. unfriendly

18. The oranges increased the **weight** of his backpack.

a. heaviness

b. fragrance

c. metal

d. absence

e. power

19. He revised the **structure** of the whole argument.

a. organisation

b. introduction

c. building

d. length

e. part

20. The dancers stretched to keep their bodies **flexible**.

a. easygoing

b. thin

c. easily movable

d. smart

e. funny

21. That **chapter** of our mother's life was frightening.

a. description

b. cover

c. time

d. branch

e. section

22. The little boy **carries** lots of groceries home.

a. drops off

b. expresses

c. orders and accepts

d. holds and moves

e. avoids

23. Your idea **strikes** me as an intelligent one.

a. taps

b. goes away from

c. walks out

d. comes across to

e. physically hits

24. The woman **points** at her old apartment building.

a. uses a hand to say stop

b. scores

c. uses a finger to direct attention

d. brings corrections

e. indicates

25. I **followed** the author's argument through the book.

a. led

b. disagreed with

c. understood

d. watched

e. walked behind

26. The dangerous mountain road took a sudden **turn**.

a. surprising event

b. long break

c. chance

d. curve

e. steep drop

27. The prime minister's speech had some **light** humor in it.

a. gentle

b. heavy

c. surprising

d. thin

e. bright

28. The city **expands** beyond its ancient rock walls.

a. rises

b. looks

c. raises questions

d. develops

e. spreads

29. One day of the summer **runs** into the next.

a. drives

b. owns

c. ends

d. continues

e. sprints

30. He shouted the words to **highlight** their importance.

a. physically mark in colour

b. verbally question

c. verbally call attention to

d. show the game's best plays

e. physically erase

31. He **opened** the wooden door for his grandmother.

a. compared

b. unfolded

c. began

d. installed

e. unlocked

32. She **found** a connection between walking and health.

a. discovered through study

b. searched for

c. put down

d. claimed

e. come upon by chance

33. My fingers become **cold** without my blue mittens.

a. useless

b. freezing

c. mumbled

d. unpracticed

e. unfriendly

34. The woman changed her **position** in the debate.

a. way of sitting

b. point of view

c. job

d. memory

e. way of speaking

Appendix 4: Child Questionnaire for EAL Children

Child questionnaire

1. What language(s) can you speak other than English?

2. Can you read in that language?

3. Can you write in that language?

4a. Have you ever lived in another country? If yes, which one?

4b. If yes, did you go to school in that country?

5. What age (which school year) did you start at school (in England)?

6. Do you find it easier to speak in English or your L1?

7. (If yes to 2) Do you find it easier to read in English or your L1?

8. (If yes to 3) Do you find it easier to write in English or your L1?

9. How often do you speak English at home?

a. Never b. sometimes c. most of the time d. all of the time

10. How often do you speak your L1 at home?

a. Never b. sometimes c. most of the time d. all of the time

11. What language/s do you speak, and who with?

	Only English	**Mostly English**, but sometimes another language	**Both** English and another language equally	**Mostly not English**, but sometimes another language	**Only non-English**
Parents/Carers					
Brothers and sisters					
Other family and friends (e.g grandparents, aunt, uncle)					

Appendix 5: Parental Questionnaire

UNIVERSITY of York

DEPARTMENT OF EDUCATION

Heslington, York, YO10 5DD

Direct Line: (01904) 434398

Fax: (01904) 323459

Email: claudine.bowyer-crane@york.ac.uk

Web: www.york.ac.uk/educ

Parent/Carer Questionnaire

This questionnaire is part of the 'Understanding Reading' research being carried out by Natalie Smith from The University of York.

- This information will only be used to investigate the project data
- Children's names will be replaced by letter/number codes.
- Please answer the questions below about your child's language background

Your child's name: ________________________

Your child's gender: ☐male ☐female

Your child's date of birth: ___/___/________

1. **What is your relationship to your child?**

Mother	Father	Step-parent	Other (please specify)

2. How old were you when you finished full-time education?

16 or younger	17-18	19-21	21+

3. Which level of education did you reach?

No formal qualifications	GCSEs or equivalent	A-Levels or equivalent	Post-18 vocational qualification	Undergraduate degree	Postgraduate degree

4. How old was your partner when s/he finished full-time education?

16 or younger	17-18	19-21	21+

5. Which level of education did they reach?

No formal qualifications	GCSEs or equivalent	A-Levels or equivalent	Post-18 vocational qualification	Undergraduate degree	Postgraduate degree

6. Employment Status: Are you currently…?

Employed for wages	Self-employed	Out of work and looking for work	Out of work and not looking for work	A homemaker	A student	Military	Retired	Unable to work

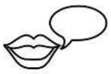
7. Employment Status: Is your partner currently…?

Employed for wages	Self-employed	Out of work and looking for work	Out of work and not looking for work	A homemaker	A student	Military	Retired	Unable to work

Is your child growing up with more than one language in the home?

☐ **Yes** ☐ **No**

<u>If NO, you have now finished the questionnaire</u>. Thank you for your time.



8. What is <u>your</u> level of spoken English?

Beginner	**Low-intermediate**	**Intermediate**	**High-intermediate**	**Native-like**

9. What is <u>your</u> level of written English?

Beginner	**Low-intermediate**	**Intermediate**	**High-intermediate**	**Native-like**

10. What is your first language/mother tongue? [please complete for all main parents/carers]

Parent/Carer 1 ______________ Parent/Carer 2 _______________________

Parent/Carer 3 _________________ Parent/Carer 4 _ _____________________

11. Was your child born in the UK?

Yes	No

If NO, where was your child born?____

If NO, at what age did your child move to the UK?

Under 1 year old	1 year old	2 years old	3 years old	4 years old	5 years old	6 years old	7 years old

12. Which language(s) in addition to English does your child understand? 

1.	2.	3.

13. Which language(s) in addition to English does your child speak?

1.	2.	3.

14. Did your child attend an English speaking nursery/preschool/childminder?

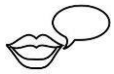
Yes	No

If YES, how many days per week?

1 day	2 days	3 days	4 days	5 days	Other (please comment)

15. Which language/s does your child hear, and who from: 

	Only English	**Mostly English**, but sometimes another language	**Both** English and another language equally	**Mostly not English**, but sometimes another language	**Only non-English**
Parents/Carers					
Brothers and sisters					
Other family (e.g grandparents, aunt, uncle)					

16. What language/s does your child speak, and who with: 

	Only English	**Mostly English**, but sometimes another language	**Both** English and another language equally	**Mostly not English**, but sometimes another language	**Only non-English**
Parents/Carers					
Brothers and sisters					
Other family (e.g grandparents, aunt, uncle)					

If you wish, you may add any additional comments about the languages your child hears and speaks here:

Thank you for completing the questionnaire. Please return to your child's class teacher.

Appendix 6: Rotated Component Matrix

Rotated Component Matrix[a]

	Component		
	1	2	3
YARC Reading Rate	.928		
DTWRP Total	.905		
YARC Reading Accuracy	.896		
PhAB phonological awareness spoonerisms	.676	.464	
t1 Morphological Awareness	.571	.570	
CELF RAN time in seconds	-.555	-.408	.459
Non Verbal WM		.806	
Wechsler non-verbal ability		.802	
Expressive Vocabulary	.383	.714	
BPVS receptive vocab	.363	.713	
CELF formulated sentences	.535	.650	
CELF understanding spoken paragraphs	.315	.615	
Verbal Working Memory WMTB-C	.421	.501	.416
CELF RAN no. of errors			-.811
Phonological Memory WMTB-C	.427		.493

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Appendix 7: t3 Non-verbal IQ Correlations

Section 4.3.1; Pearson's correlations between t3 NVIQ and <u>t1 variables</u>; EL1 across, EAL down

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. t3 Non-verbal Ability		.35 *	.32 *	.46 **	.27	-.25	-.09	.38 **	.44 **	.44 **	.48 **	.42 **	.49 ***	.45 **
2. t1 Reading Comprehension	.27													
3. t1 Total Word Reading	.38 **													
4. t1 Phonological Awareness	.45 **													
5. t1 Phonological Memory	.22													
6. t1 RAN (time)	-.22													
7. t1 RAN (error)	-.03													
8. t1 Expressive Vocabulary	.49 ***													
9. t1 Receptive Vocabulary	.35 *													
10. t1 Listening Comprehension	.35 *													
11. t1 Expressive Grammar	.43 **													
12. t1 Morphological Awareness	.49 ***													
13. t1 Verbal Working Memory	.41 **													
14. t1 Non-verbal Working Memory	.59 ***													

Note: *p<.05; **p<.01; ***p<.001

Section 4.3.1; Pearson's correlations between t3 NVIQ and t2 variables; EL1 across, EAL down

	1.	2.	3.
1. t3 Non-verbal Ability		.42**	.35*
2. t2 MWP Total	.42**		
3. t2 Morphology Total	.53**		

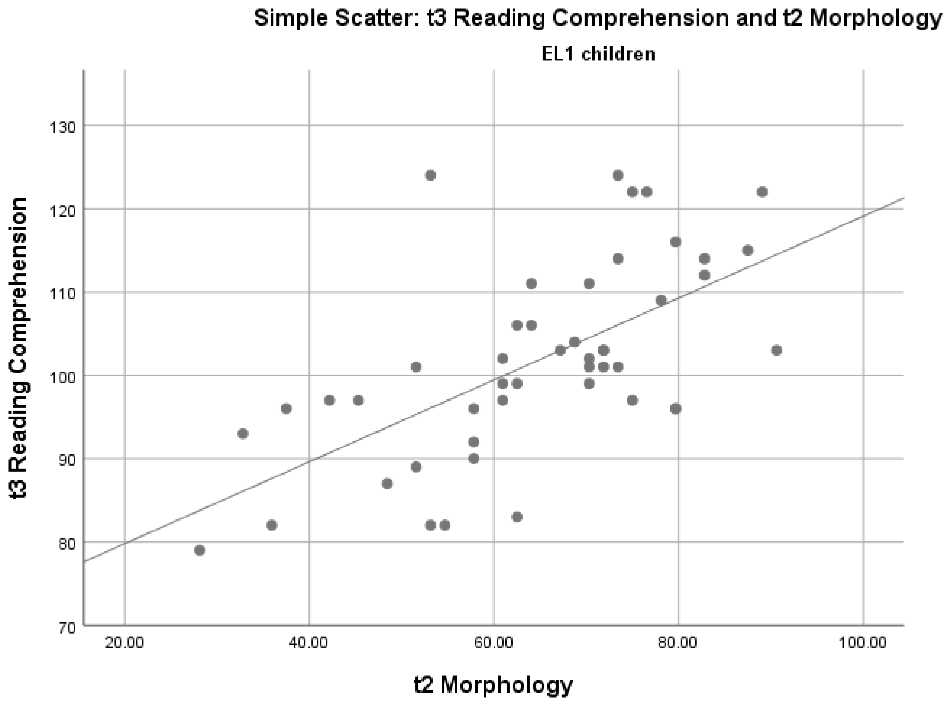
Note: *p<.05; **p<.01; ***p<.001

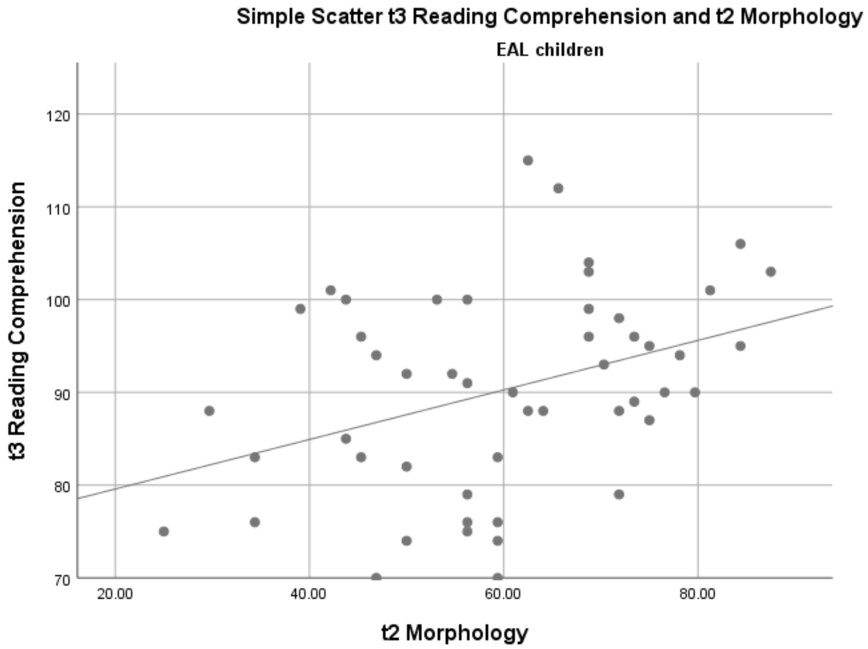
Section 4.3.1; Pearson's correlations t3 NVIQ and t3 variables; EL1 across, EAL down

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. t3 Non-verbal Ability		.29*	.21	.28	.28	-.14	.19	.54***	.53***	.44**	.38**	.27	.39**
2. t3 Reading Comprehension	.21												
3. t3 Total Word Reading	.47**												
4. t3 Phonological Awareness	.64***												
5. t3 Phonological Memory	.35*												
6. t3 RAN (time)	-.47**												
7. t3 RAN (error)	-.15												
8. t3 Expressive Vocabulary	.44**												
9. t3 Receptive Vocabulary	.48***												
10. t3 Listening Comprehension	.28												
11. t3 Expressive Grammar	.56***												
12. t3 Morphological Awareness	.49***												
13. t3 Verbal Working Memory	.53***												

Note: *p<.05; **p<.01; ***p<.001

Appendix 8: Scatterplots – t2 Morphology and t3 Reading Comprehension





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