Effects of frequency and idiomaticity on second language reading comprehension in children with English as an additional language

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Abstract

Vocabulary plays an important role in reading comprehension in both the L1 and the L2 (Murphy, 2018). In measuring vocabulary knowledge, however, researchers typically focus on mono-lexical units where vocabulary assessments tend not to take into account multi-word expressions which include phrasal verbs, collocations, and idioms. Omitting these multi-word lexical items can lead to an over-estimation of comprehension skills, particularly in reading. Indeed, adult learners of English comprehend texts containing a larger number of multi-word expressions less well compared to texts containing fewer of these expressions, even when the same words are used in each text (Martinez & Murphy, 2011). To investigate whether children learning English as an additional language (EAL) face a similar challenge, two reading comprehension tests were administered to EAL and monolingual (non-EAL) English-speaking children in primary school. Both tests contained the same common words, but whereas in one test some of the words occurred in multi-word expressions, in the other test they did not. Reading comprehension was significantly reduced for both groups of children when multi-word expressions were included. Monolingual

participants generally performed better than children with EAL on both tests further suggesting that children with EAL may face a particular disadvantage in English reading comprehension. These results are discussed within the context of the importance of developing rich vocabulary knowledge in all children, and especially emergent bilingual children, within primary school and beyond.

1. Introduction

Good reading skills are crucial for formal education as children need to be able to extract meaning from text in order to access the curriculum. Reading skill also supports linguistic development as readers receive input from texts, which subsequently offers them exposure to potentially rich linguistic environments. This, among other things, can have an important positive influence on vocabulary development (Joseph & Nation, 2018). Consequently, reading is in large part responsible for the significant growth in vocabulary knowledge in the primary school years and beyond. There is a reciprocal relationship here because vocabulary knowledge is equally important for reading as text is understood through the meaning of its words (e.g., Vermeer, 1992). Not surprisingly, therefore, vocabulary knowledge has been repeatedly shown to predict reading comprehension in young children, in both the first (L1) and second language (L2) (Babayiğit & Stainthorp, 2014; Murphy, 2018). In considering the type and amount of vocabulary needed for reading, common methods include vocabulary size and coverage estimates. However, research on vocabulary is dominated by a focus on mono-lexical units or word families, overlooking the fact that many words are often used in phrases that have different meanings compared to the individual words (Nattinger & DeCarrico, 1992). Some combinations of words have meanings that have little to no relation to the individual meanings of the constituent items, which can pose difficulties for readers. Therefore, comprehensive and informative measurements of vocabulary knowledge, especially in relation to reading comprehension, should take into account knowledge of multi-word phrases.

In the UK, a significant proportion of students in mainstream schools speak English as an additional language (EAL), where current estimates suggest over 21% of the primary school population are EAL (DfE, 2018). EAL children speak a home language that is not the language of the wider society or the language of formal education. The EAL population is highly diverse across numerous dimensions, including English proficiency. Research has repeatedly shown that EAL children's proficiency in English is a powerful predictor of their overall academic

achievement (Strand & Demie, 2005; Strand & Hessel, 2018; Whiteside, Gooch & Norbury, 2016). Children with lower English proficiency are more likely to experience a disadvantage in school because the curriculum is taught in English, and it is necessary that they be supported by an adequate level of ability in English reading comprehension to ensure that they do not fall behind (DfE, 2013). It is important to recognize, however, that merely being designated EAL does not in and of itself lead to underperformance either linguistically or academically. Recent research has demonstrated that EAL children are overall the top of the academic league table as they leave with their General Certificate of Secondary Education (GCSE) qualifications from English secondary schools (Hutchinson, 2018). Equally, however, the same report (Hutchinson, 2018) identifies that within the population of EAL there is significant heterogeneity where many sub-groups have considerable difficulties in academic achievement. Given the importance of literacy in academic attainment, the importance of vocabulary in literacy, and the general research finding that children with EAL tend to have lower scores on vocabulary assessments relative to non-EAL peers (Cameron, 2002; Murphy, 2018), understanding more deeply the range of vocabulary knowledge needed for good reading comprehension skills in the majority language is a key empirical and educational concern. The present study, therefore, investigated the effect of multi-word expressions on reading comprehension in children, by comparing the comprehension of formulaic texts with non-formulaic texts and the performance of children with EAL with monolingual, English-speaking children in the UK.

2. Literature review

2.1. Reading comprehension and vocabulary knowledge

Since the meaning of a text is largely constructed through the meaning of its words, knowing more words leads to a higher chance of understanding a text (Anderson & Freebody, 1979; Laufer & Ravenhorst-Kalovski, 2010). Vocabulary knowledge is crucial for developing literacy in general, but vocabulary knowledge is connected to reading comprehension as a concurrent correlate (Laufer, 1992; Nation, 2001), and it also predicts future reading achievement (Goswami, 2001). The same strong relationship is also found in L2 learners (e.g., Alderson, 2000; Smith & Murphy, 2015).

To explore the connection between vocabulary and reading, some studies have investigated how much vocabulary L2 learners need, through measuring vocabulary breadth, or size, for adequate comprehension: for example, Laufer (1992) suggested that knowing 3000 word families would enable adequate comprehension. Vocabulary size can be used to derive lexical coverage, which is the proportion

of words in a text that are known and indicates how large a vocabulary is needed for "adequate" comprehension. Figures ranging from 95%-98% have been proposed (Hirsh & Nation, 1992; Hu & Nation, 2000). However, in actual language use, many frequently used words occur in combination with other words, forming multi-word expressions that can have a different meaning (Martinez & Murphy, 2011). Therefore, equating vocabulary size with overall vocabulary knowledge can be misleading if the vocabulary size measures test only single word items.

2.2. Comprehending multi-word expressions

Formulaic language refers to words or combinations of words whose meaning often extends beyond the literal meanings of its components (Pawley & Syder, 1983; Siyanova-Chanturia & Martinez, 2015); it is thus *figurative*, as opposed to *compositional* (Siyanova-Chanturia & Van Lancker Sidtis, 2018). Much of formulaic language exists as multi-word units or sequences that constitute one semantic unit, which recur in language and are recognized as such by L1 speakers (Carrol & Conklin, 2019; Siyanova-Chanturia & Pellicer-Sánchez, 2018). Some multiword units are expressions comprised of fixed combinations of words (Wray, 2002), such as idioms. They range from phrases to sentences (e.g., *come to terms with*, *it's raining cats and dogs*) whose meaning is unrelated to the individual meaning of their components. The contexts for the original formation of these expressions are often lost, with only the form-meaning relationship remaining (Nattinger & DeCarrico, 1992). Idioms can be further sub-categorized according to the degree of idiomaticity (transparency of meaning) (Grant & Bauer, 2004). Other types of multi-word expressions, such as phrasal words and collocations, are also formulaic in the sense that they are combinations of words that occur together to signify a meaning beyond that of their components, but their meanings are usually more transparent compared to idioms.

Since the meaning of multi-word expressions may not be apparent through word-by-word analysis, their presence in a text can lower comprehension, and analyses based on mono-lexical units may overestimate actual understanding. This was clearly demonstrated by Martinez and Murphy (2011), who assessed the influence of idiomaticity on the reading comprehension of adult L2 learners using two reading tests. The texts in both tests were similar in terms of total word count and clause count. The individual words were identical in both tests and the words were all high frequency. The key difference was that the formulaic test contained a larger number of idioms compared to the non-formulaic test. Adult learners of English achieved better comprehension on the non-formulaic test and completed it more quickly. These results, later replicated by Özoflu (2012), showed that texts containing (more) idiomatic expressions are

more difficult to comprehend for L2 learners. Consequently, the influence of multi-word expressions on reading comprehension may be underestimated by vocabulary assessments focusing on single lexical items.

The participants in Martinez and Murphy (2011) also significantly overestimated their comprehension of the formulaic texts, as shown through comparing their self-rated comprehension to actual scores. Since the target multi-word phrases were composed of highly frequent words, participants may have been led towards a literal interpretation of the more formulaic texts, and thus appeared to not notice their idiomatic nature (Bishop, 2004). The failure of learners to understand multi-word expressions could be due to a lack of awareness of such language (Martinez & Murphy, 2011; Spottl & McCarthy, 2004). Without noticing that certain words in a text form a sequence that maps onto one meaning there may be no attempt to find the meaning of that sequence (Bishop, 2004; Paribakht & Wesche, 1999). Therefore, noticing formulaic expressions may be a first step towards comprehension of formulaic language.

2.3. Reading comprehension in students with EAL

EAL children with lower English proficiency can have difficulties developing adequate literacy skills (Murphy, 2014, 2018). Research on reading skills with EAL children (i.e., minority language children in English-speaking contexts) has consistently demonstrated that EAL children tend to have matched, or sometimes even superior skills in decoding, yet often have problems with reading comprehension. In other words, they have good single word reading accuracy but struggle to extract meaning from text, likely due to smaller English vocabulary (e.g., Bialystok, Luk, Peets, & Yang, 2010; Burgoyne, Kelly, Whiteley, & Spooner, 2009; Cameron, 2002; Hessel & Murphy, 2018; Hutchinson, Whiteley, Smith, & Connors, 2003; Mahon & Crutchley, 2006; Pearson, Fernandez, & Oller, 1993; Smith & Murphy, 2015).

This body of research in general indicates that many children with EAL require greater support in English vocabulary which would likely improve their reading comprehension. Indeed, a review of intervention studies aimed at improving EAL children's language and literacy has shown that vocabulary interventions can indeed improve children's reading comprehension skills (see Murphy & Unthiah, 2015; Oxley & De Cat, 2018). These interventions demonstrate then, that it is possible to support the development of vocabulary knowledge in children with EAL through appropriate pedagogy, which, in turn, can have a positive impact on reading comprehension. What has not yet been adequately investigated, however, is the role that multi-word vocabulary plays in this respect, although multi-word vocabulary may be especially difficult to children with EAL. Bilinguals hear and use words in their two languages less frequently compared

to monolinguals speaking either language, and multi-word expressions form only part of the vocabulary that children are exposed to. This leads to poorer links between the meanings and phonological representations of vocabulary items (*weaker links hypothesis*; Gollan & Silverberg, 2001; Gollan, Montoya, & Werner, 2002). Multi-word expressions can be interpreted literally while the figurative, intended meanings are less/not activated (Cieślicka, 2006), leading to further weaknesses in this particular area. The interventions reviewed in Murphy and Unthiah (2015) and Oxley and De Cat (2018) did not include multi-word units. Indeed, little research has been carried out examining the multi-word vocabulary knowledge of children with EAL apart from a few notable exceptions.

Smith and Murphy (2015) examined children's collocational knowledge in English and found that EAL children performed differently on a measure of collocations relative to non-EAL and appeared to develop their collocational knowledge along a different developmental trajectory. Furthermore, they also demonstrated that children's scores on the collocational measure predicted 25% of the variance in a reading comprehension measure even after controlling for contributions of nonverbal IQ and expressive and receptive vocabulary. This finding demonstrates that multi-word vocabulary is likely to develop differently in children with EAL and make important contributions to reading comprehension skills.

Hessel and Murphy (2018) examined children's metaphor comprehension, and in particular compared young EAL and non-EAL children on a novel metaphor comprehension task. They found that the older children (aged 6-7) had higher scores on metaphor comprehension than younger children (aged 5-6) and that EAL children generally had lower scores on the metaphor comprehension task than non-EAL children, particularly on a metaphor reasoning subtest. This research lends further support to the idea that EAL children's multi-word vocabulary is an area that requires greater support in educational settings, as it may lag behind that of non-EAL pupils, which can lead to not only weaker vocabulary knowledge, but weaker reading comprehension skills.

In summary, weaker vocabulary knowledge is related to poorer reading comprehension in many children with EAL. Since knowing the component words does not necessarily entail comprehension of the multi-word expressions, the high frequency of some multi-word phrases could cause vocabulary difficulties for young learners. However, little (to no) research has directly examined the impact of including multi-word vocabulary in reading comprehension tests and whether children with EAL will be disadvantaged on such a measure. Therefore, this study aims to replicate Martinez and Murphy (2011) in investigating the influence of frequently used words and multi-word expressions on English reading comprehension in children with EAL. The research questions are:

1. Do children with EAL and monolingual English-speaking peers perform similarly in comprehending two sets of texts composed of the same, frequent words but different in terms of the number of multi-word vocabulary items?

2. Do these speakers report their comprehension of the two sets of texts similarly, and does their reported comprehension reflect a similar awareness of multi-word expressions?

3. Methodology

3.1. Design

The variables of interest in our study were language status (EAL vs non-EAL), a between-subjects variable, and whether the text was formulaic or not – a within-subjects variable. Hence the study adheres to a 2 x 2 mixed design. The study received ethics clearance from the University of Oxford and all children's parents/legal guardians provided their informed consent prior to carrying out this research.

Analyses conducted included a repeated measures ANCOVA to compare the scores of the two groups on the two comprehension tests; a one-way ANOVA to compare scores of year groups; and repeated measures ANOVAs to check possible test order effects, as well as to compare the groups in terms of accuracy of self-reported comprehension and time taken on tests.

3.2. Participants

25 monolingual children (14 female, 11 male) and 22 children (8 male, 14 female) with EAL were recruited from three schools in a county in South East England. In the year of testing, these schools were comparable in terms of percentage of pupils eligible for free school meals (22%, 22%, and 10% respectively) but were more different in number of pupils (400, 600, and 600 respectively) and percentage of pupils with EAL (30%, 60%, and 90% respectively) (DfE, 2016; figures are rounded off to protect schools' anonymity). Monolingual children were defined as those not speaking any language other than English[1] and whose parents spoke only English to them. Children with EAL were defined as those who had learned another language (other than English) from birth and whose parents always or mostly used a non-English language at home. They spoke 14 different

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[1] While in general completely monolingual children are increasingly difficult to find, it is still (unfortunately) possible to find English-speaking children in England with little to no knowledge of another language apart from a few foreign language vocabulary items they might have learned at school.

L1s, including Urdu (*N* = 9), Mandarin, Tamil, Arabic, Punjabi (all *N* = 2), Malawi, Italian, Nepalese, Swahili, Hindi, Polish, Sri Lankan, French, and Portuguese (all *N* = 1). Whether the children met our criteria for inclusion was determined through the administration of a *Language Background Questionnaire* (LBQ) described below in the Instruments sub-section. This questionnaire enabled us to identify the relative degree of home language/English exposure for each child.

This study focuses on children in Key Stage 2 (KS2). From Year 4 (age 8) onwards, the focus of literacy instruction and assessment shifts from reading skills to comprehending texts (Burgoyne, Whiteley, & Hutchinson, 2011). Testing children at this age range can reveal whether reading skills are in place for further development in comprehension. Therefore, invitations to participate were distributed evenly across Years 3-6 (age 7-11). The number of participants in each year group is shown in Table 1.

Table 1 Number of participants in each year group

	Monolingual group	EAL group
Year 3 (age 7/8)	2	0
Year 4 (age 8/9)	6	5
Year 5 (age 9/10)	7	6
Year 6 (age 10/11)	10	11

3.3. Instruments

A reading comprehension test with two versions – one with multi-word items, one without – developed by Martinez and Murphy (2011) was used in this study. Each version of the test contained four texts. The texts imitated personal profiles on social networking websites. Texts in the more formulaic version contained multi-word expressions, and those in the non-formulaic test contained either none or very few such expressions. The 24 multi-word expressions targeted in the formulaic version were phrases composed of multiple words that are recognized as having a meaning unrelated to the meaning of component words individually, including idioms, collocations, and phrasal verbs (e.g., cost an arm and a leg, every so often, grow on you). Otherwise the tests and corresponding texts had similar word counts, clause counts, and T-unit counts. The two tests had the same proportion of high frequency words in the top 1,000 words and top 1,000-2,000 words of the British National Corpus (95.7% and 2.77%, respectively) (Martinez, 2008). The same individual words were used in a formulaic text and the corresponding non-formulaic text, but they appeared frequently as part of multi-word expressions in the formulaic version. In this way, differences in performance across the two versions of the test could be attributed to the presence of multi-word items.

After each text, participants answered seven true or false questions by ticking the boxes next to all the statements they considered true. These questions tested readers' comprehension of the text. Each formulaic expression was tested with one statement, except *over the hill*, which was targeted in four statements. Participants then indicated how much of each text they thought they understood, using a Likert-scale with 5 choices available: 5%, 25%, 50%, 75%, and 100%. They had a limit of 20 minutes to complete each test. The start and end time of both tests were recorded. Each version of the test together with their questions can be found in the Appendix.

The British Picture Vocabulary Scale (3rd ed.) (BPVS) (Dunn, Dunn, & NFER, 2009) was administered to measure receptive vocabulary, and was included due to the importance of vocabulary knowledge for reading comprehension. This is a widely used test in the literature on vocabulary learning and reading. The mean BPVS (standardized) score was 88.27 for the monolingual group and 92.17 for the EAL group. No differences were found between the BPVS scores of the two groups (p = .37).

The *Matrix Reasoning* (MR) sub-test of the *Wechsler Abbreviated Scale of Intelligence* (2nd ed.) (WASI) (Wechsler, 2011) was used to obtain an estimate of nonverbal IQ, to ascertain whether the participants differed in terms of cognitive functioning, which could affect reading comprehension. The MR sub-test of the WASI also enabled us to ensure all children were functioning within the normal range. A comparison of EAL and non-EAL children's scores on this subtest indicated that children with EAL scored higher on WASI than the monolingual children ($t(45)$ = .013, p < .05).

A *Language Background Questionnaire* (LBQ), adapted from Beech and Keys (1997), was used to confirm language group status. This adapted LBQ has been used in a number of our studies (e.g., Hessel & Murphy, 2018; McKendry & Murphy, 2011; Smith & Murphy, 2015) and has been a reliable index of children's EAL status in the absence of administering an independent, objective measure of their home language proficiency. This would of course be the ideal but given the significant linguistic diversity in the EAL population in England, developing, finding and/or implementing tests of home language proficiency remains a serious challenge.

3.4. Procedure

A small pilot study was conducted with two monolingual and three EAL participants, who were not included in the main study to ensure all assessments were appropriate for our sample. No changes were made to the texts or the questions of the reading comprehension tests following from this pilot.

In the main study the children were first administered the LBQ. The questions on the LBQ were read out loud to the participant (in English) and the experimenter

recorded the responses, after which the reading comprehension test was administered. An example text was used to explain the test format. When it was clear that the children understood what they were required to do, both versions (formulaic and non-formulaic) were administered in counterbalanced order within each language group. Following Martinez (2008), the four texts A-D were presented in alphabetical order in the non-formulaic test and in the order A-D-B-C in the formulaic test to reduce order effects. Finally, the BPVS and WASI were administered according to their respective requirements as specified in the testing manual. Each participant was tested in one single session, lasting between 1h to 1h 30 min.

4. Results

Reading comprehension scores and self-reported scores for each test were calculated as percentages. The time taken on each test was derived from the recorded start and end times. Standardized BPVS scores were obtained using the BPVS manual. SPSS (IBM Corp., 2017) was used for statistical analysis.

4.1. Effects of language group and receptive vocabulary on reading comprehension

Table 2 shows the mean reading comprehension scores (with standard deviations) of the two groups together with the difference between scores on the two tests, as well as the BPVS scores.

Table 2 Mean reading comprehension scores (%) for each group, the difference between mean scores on the two tests, and BPVS scores

	Non-formulaic (*SD*)	Formulaic (*SD*)	Difference between non-formulaic and formulaic scores (*SD*)	BPVS score (*SD*)
Monolingual	78.29 (13.48)	48.14 (9.17)	30.14 (19.26)	87.80 (11.20)
EAL	76.93 (14.43)	42.56 (10.29)	34 (19.31)	91.45 (16.17)

A repeated measures ANCOVA was conducted to evaluate the influence of the covariate BPVS (standardized) Score on reading comprehension scores. The between-subjects factor was Group with two levels (Monolingual, EAL), and the repeated measure was Test Type at two levels (Non-formulaic, Formulaic).

BPVS Score was a significant covariate of reading comprehension scores ($F(1, 44)$ = 11.44, $p < .01$, η_p^2 = .21). There was also a significant effect of Group on reading comprehension scores after controlling for BPVS Scores ($F(1, 44)$ = 5.20, $p < .05$, η_p^2 = .11) where the monolingual participants had higher scores than the EAL children. There was also a significant interaction between Test Type

and BPVS Score ($F(1, 46) = 5.34$, $p < .05$, $\eta_p^2 = .10$). Parameter estimates showed that BPVS Score had a significant effect on reading comprehension only at the Non-formulaic level ($B = .48$ (.13), $p < .01$) and not at the Formulaic level ($p = .89$), suggesting that idiomaticity modulates the effect of vocabulary size on reading comprehension. There was no significant interaction between Test Type and Language Group ($p = .66$).

Given we had a range of year groups (ages) reflected in our sample and that older participants might reasonably be expected to have higher reading comprehension and BPVS scores than the younger groups, we carried out a one-way ANOVA with one between-subjects factor (Year) at three levels (Years 4, 5, and 6), and overall reading comprehension score (non-formulaic test and formulaic test combined) as the dependent variable. Year 3 participants were excluded as there were only two participants in this group. There was no significant effect of Year ($p = .13$). Therefore, children did not seem to be performing differently on our task as a function of their age/year group. We note, however, that our sample size within each year group is very small and consequently this result should be treated with caution.

These analyses indicate that monolingual children outperformed children with EAL on both tests after accounting for variation in receptive vocabulary size, and that both groups scored higher on the non-formulaic test than on the formulaic test.

4.2. Order effects

The order of administering the formulaic and non-formulaic tests was counter-balanced within each language group. Across all participants, the mean scores (%) for the non-formulaic and formulaic tests were 84.09 ($SD = 9.15$) and 44.64 ($SD = 8.63$) respectively for those who completed the non-formulaic test first, and 72.88 ($SD = 14.84$) and 46.18 ($SD = 11.03$) for those who completed the formulaic test first. A repeated measures ANOVA on Order and Test Type examined whether the order of taking the two tests influenced the scores. Main effects were found for Order ($F(1, 45) = 5.55$, $p < .05$, $\eta_p^2 = .11$) and Test Type ($F(1, 45) = 150.51$, $p < .001$, $\eta_p^2 = .77$). There was also a Test Type × Order interaction ($F(1, 45) = 5.57$, $p < .05$, $\eta_p^2 = .11$). Scores on the non-formulaic test were higher if that test was completed first compared to if it was completed second. The same result applied to the formulaic test, but the advantage was smaller compared to the advantage found for the non-formulaic test.

4.3. Self-reported comprehension and awareness of multi-word expressions

Table 3 and Figure 1 show the mean self-reported reading comprehension rating of the two groups and the difference between self-reported ratings of the two tests.

Table 3 Mean self-reported reading comprehension scores (%) and the mean difference between self-reported scores on the two tests

	Non-formulaic (*SD*)	Formulaic (*SD*)	Difference between non-formulaic and formulaic scores (SD)
Monolingual	68.70 (25.44)	58.57 (23.79)	10.13 (22.02)
EAL	78.97 (15.01)	62.20 (22.58)	16.77 (17.94)

A repeated measures ANOVA was used to test the effect of Group and Test Type on self-reported comprehension ratings. There was a significant effect of Test Type ($F(1, 45) = 20.72$, $p < .001$, $\eta_p^2 = .32$) but no effect of Group ($p = .24$) and no Test Type × Group interaction ($p = .27$). Both groups rated themselves higher on the comprehension of non-formulaic tests. Figure 1 presents the self-report ratings against the actual scores illustrating that both groups over-estimate their comprehension and have lower comprehension scores on the formulaic texts. This pattern demonstrates that the presence of multi-word expressions has an impact on both actual and reported understanding of text.
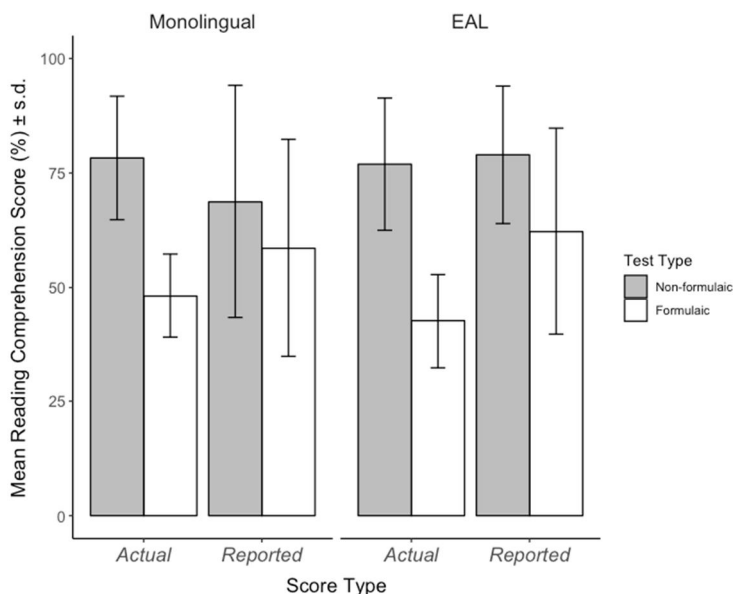
Figure 1 Mean actual and reported comprehension scores (%) on the non-formulaic and formulaic tests

As there was no significant group difference in self-reported comprehension but monolingual children had obtained higher (actual) reading comprehension scores, awareness of formulaic multi-word expressions was further compared by analyzing accuracy of reporting scores and time spent on each test. Accuracy in this analysis was calculated as the difference between actual and self-reported scores on each test (Table 4). A negative difference indicates overestimated comprehension, and vice versa.

Table 4 Mean difference between actual and self-reported scores (%) on the two reading comprehension tests

	Non-formulaic test (*SD*)	Formulaic test (*SD*)
Monolingual	9.58 (27.28)	-10.42 (24.76)
EAL	-2.04 (20.14)	-19.65 (22.35)

A repeated measures ANOVA examined whether the two groups differed in their accuracy of self-report on the two tests. There was a significant effect of Test Type on accuracy ($F(1, 45) = 23.56$, $p < .001$, $\eta_p^2 = .34$) but no effect of Group ($p = .08$) and no Test Type × Group interaction ($p = .76$). These findings demonstrate that participants were significantly less accurate in estimating their formulaic test scores, but the accuracy of the two groups was not different overall.

4.4. Comparing time taken to complete the test

Since the words making up the texts were identical on the two tests, it may be expected that the same amount of time would be needed to complete each version. Were children to spend longer on one test, this could be an indication of more complex processing of formulaic language (as in Martinez & Murphy, 2011).[2] To explore this possibility, Table 5 presents the mean time taken to complete each test. On average, monolingual and EAL participants spent 1.20 minutes (*SD* = 2.83) and 1.14 minutes (*SD* = 3.72) longer on the formulaic test respectively.

Table 5 Mean time taken to complete each test (min)

	Non-formulaic test (*SD*)	Formulaic test (*SD*)
Monolingual	6.12 (1.86)	7.32 (2.56)
EAL	6.27 (2.03)	7.41 (2.74)

A repeated measures ANOVA with Group and Test Type (as above) showed that while there were no effects of Group ($p = .06$), and no Test Type × Group

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[2] Clearly other factors such as fatigue or impatience could also lead to more time being taken.

interaction (p = .95), there was main effect of Test Type where (F(1, 45) = 5.96, p < .05, η_p^2 =.12). Both groups, therefore, spent more time on the formulaic than the non-formulaic test (monolingual group: by 19.61%; EAL group: by 18.18%).

5. Discussion

5.1. Effects of idiomaticity

Two reading comprehension tests, one non-formulaic (few multi-word units) and one formulaic (more multi-word units), were administered to children with EAL and their monolingual English-speaking peers. The texts in these tests were composed of the same frequently used words, but nonetheless both groups scored higher on the non-formulaic tests, by 30% and 34% for the monolingual and EAL groups, respectively. This finding shows that idiomaticity in a text leads to poorer comprehension and both groups face considerable difficulty in comprehending texts containing multi-word expressions. When words appear as part of multi-word expressions, they contribute a meaning beyond the meaning of the individual words, and if readers do not understand the meaning of these expressions as a whole, they will necessarily have poor comprehension of the whole text. Therefore, while the participants may have reasonably good knowledge of the individual words used to compose the texts, they showed a weaker grasp of formulaic language. This finding also replicated the pattern found in adult L2 learners (Martinez & Murphy, 2011; Özoflu, 2012), suggesting that when determining the difficulty of texts, whether for young children or older language learners, it may not be appropriate to only include single word units. There was also a significant order effect, although the advantage of completing a test first is larger for the non-formulaic test (11%) than for the formulaic test (2%), again suggesting difficulties for young children generally with regards to multi-word expressions.

Comprehension of multi-word expressions requires first the ability to notice them in sentences (Bishop, 2004; Spottl & McCarthy, 2004). The reader has to have some understanding that some combinations of words form one semantic unit rather than contributing individual meanings, at which point, they can successfully retrieve the intended meaning. Without this awareness, the reader will seek to process the individual meaning of each word, potentially leading to poor comprehension. In this study, both groups reported higher comprehension on the non-formulaic test compared to the formulaic test. However, they also significantly over-estimated their comprehension of the formulaic test, but not on the non-formulaic test, with the EAL group overestimating their formulaic test scores by as much as 20% (see Figure 1). In other words, the participants

may have been aware they comprehended the formulaic test less well, but only to an extent. Future research could add in a more qualitative component where participants are interviewed after completing the comprehension test to help identify their degree of awareness of the presence of these items.

As the target expressions were all composed of common words, the participants may have been even less open to the possibility of alternative (formulaic) meanings of the words (or combination of words) and may have been led to believe that they had understood the formulaic texts correctly. It should be noted that while the options on the self-rating scale for comprehension were given at 20% or 25% intervals, the average difference between actual and self-rated comprehension was smaller than 20%, for both groups on both tests. Therefore, the scale itself could have affected the precision of self-comprehension scores. Nevertheless, the results indicate that the participants were not fully able to recognize the presence of the multi-word expressions in the formulaic texts, and so were less accurate in their actual as well as reported comprehension.

Time taken was also examined as a possible indicator of awareness of idiomaticity, with the hypothesis that if participants were aware of multi-word expressions, or if they found them challenging, they might require more time to process their meanings, and hence spend longer on the formulaic version. The analyses did not reveal any observable relationship between time taken and awareness. Both groups spent about 1 minute longer (around 20% more time) on the formulaic version, which may indicate difficulty in processing texts with more formulaic (multi-word items). However, it is important to note that there could be many reasons for this, beyond just the presence of multi-word units. Whereas time taken to complete the test does not appear to be related to performance here, it is also true that this is a relatively crude measure and is not likely to accurately tap into processing. In order to more reliably address processing, tracking online processes such as eye movements with eye-tracking equipment would be a valuable contribution to the literature in terms of understanding children's processing skills. Some current research is indeed using eye-tracking methodology with children with EAL to tap into their online processing when reading and encountering specific types of vocabulary (Hessel, Nation, & Murphy, in press; Joseph & Nation, 2018). Thus far this research has investigated the incidental learning of vocabulary in semantically diverse (or not) texts (Joseph & Nation, 2018), and comprehension monitoring while reading. Future research using eye-tracking methodology could examine how participants cope with multi-word units when encountered in texts to identify the processing costs of such lexical items.

5.2. Differences between monolingual participants and participants with EAL

The monolingual group outperformed the EAL group on both tests after controlling for BPVS scores, showing that even though both groups were affected by idiomaticity, monolingual children had an overall advantage in reading comprehension, even when variability due to receptive vocabulary was factored in. Granted, an overall raw score difference between groups of 1% and 6% for the non-formulaic and formulaic tests respectively is relatively small (although statistically significant) given there were only 24 questions in each test. Reading comprehension plays an important part in the accessing curricular content. Therefore, children with EAL with more limited reading comprehension and lower vocabulary knowledge are disadvantaged in English and other areas of academic learning. Although bilingual children have the potential to reach native-like competence in both languages (Genesee, 2009), this is not always observed in children from EAL backgrounds. They often come to school with less well-developed English and then undergo a language shift (see Murphy, 2014), where they transition from dominance in the home language, to dominance in the majority language (English). EAL children's linguistic skills (across *all* of their languages) are not well understood, and very few majority language educational settings in the UK acknowledge or support EAL children's L1 skills, or take their home language proficiency into account during teaching activities or communication with the child (Bailey & Marsden, 2017). Consequently, for many children with EAL, and indeed minority language children with other linguistic profiles (non-English), they are likely to experience real challenges in developing adequate skills in the majority language at the same time as learning content. Not surprisingly, therefore, many children from ethnic minority backgrounds underperform on international achievement studies (OECD, 2012).

5.3. The role of vocabulary knowledge in reading comprehension

BPVS Score was a significant covariate of reading comprehension scores. This is consistent with findings on the relationship between vocabulary knowledge and reading comprehension (Laufer, 1992; Nation, 2001), and shows that any comparisons concerning reading comprehension should take into account potential differences in receptive vocabulary. From a pedagogical perspective our results reinforce the concern that adequate support is offered to primary school children in vocabulary learning. Vocabulary knowledge, or lack thereof, is a prominent issue in educational spheres[3] at present, which is welcomed. As previously

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[3] See a recent report by the Oxford University Press as an example:

mentioned, there is some evidence that vocabulary-based interventions can lead to improvements on literacy measures (Murphy & Unthiah, 2015; Oxley & De Cat, 2018). However, these studies will not have included multi-word units in their measures and interventions and we argue here that they should also be included as our research is clearly indicative of their importance.

In our study, we did not find a difference between the EAL and monolingual children on the BPVS scores, unlike previous studies (e.g., Bialystok et al., 2010; Cameron, 2002; Pearson et al., 1993). We did not sample for children with any kind of language problem or developmental language disorder, nor did we try to recruit children at the lower end of the vocabulary scale. In other words, our sample, while being small is ecologically valid and likely to reasonably represent the range of EAL skill and vocabulary knowledge in English primary schools. That is, some EAL children have matched or superior linguistic skills. In our sample, the EAL children had similar scores on the BPVS and they also had higher nonverbal IQ (MR sub-test of WASI). One might have predicted, then, that their scores on the reading comprehension test would be higher, or that they would be less affected by the multi-word units within the texts. This is not what we found. Despite matched receptive vocabulary, and higher nonverbal IQ, our EAL sample still had lower scores on the reading comprehension measure than our non-EAL sample. This finding underscores the importance of examining multiple measures that lead to successful reading (not just vocabulary) taking an individual differences approach (cf., Hessel et al., in press). It is also possible that whereas the BPVS only estimates vocabulary knowledge of single word units, a test that included multi-word lexical items could distinguish the EAL from the non-EAL children and explain why the EAL participants had lower scores on the reading comprehension measure.

6. Conclusions

Formulaic expressions are used frequently in languages and in English in particular. Our study demonstrated that children face difficulties in comprehending texts which include formulaic language. Importantly too, children may not be very aware of their lack of comprehension, as evidenced by their over-estimation of their perceived comprehension. If the learner is not aware of an impediment to either their language or reading comprehension skills, they are very unlikely to be in a position to do anything about it. Hence it is vital to support children's vocabulary knowledge within educational settings, and particularly children from linguistically diverse backgrounds who may have more limited exposure and/or experience with the language that functions as the medium of instruction.

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https://global.oup.com/education/content/dictionaries/key-issues/word-gap/?region=uk

Given the growing proportion of children with EAL in schools in the UK, and the growing number of minority language children internationally, this study contributes to a better understanding of the differences in English language knowledge between monolingual and children with EAL. There is a complex relationship between vocabulary knowledge and reading comprehension in children, and the substantial role of formulaic, multi-word expressions in comprehension is one factor that warrants more attention in research and teaching.

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APPENDIX

Reading comprehension test

(non-formulaic version)

Name: _____ Year: _____

What is the time now? _____

A.

Let me tell you about my home. It's on this little hill out in the country. But I'm not too far from the city (I don't like the city – do you?) – not much time to get here. I can't wait to show you a photo... or you can call me to come over to see in person! 07786 237 679

1.	☐	His home is not in the city.
2.	☐	He lives near the city.
3.	☐	He seems proud of his home.
4.	☐	His home probably has a view.
5.	☐	He wants people to visit his home.
6.	☐	He prefers the city.
7.	☐	He doesn't have pictures of the home.

My comprehension of this text: 5% 25% 50% 75% 100%

B.

People say there's nothing like a good book to warm your heart. It is true. A good book can be everything. I read every night, about a book a week. (And sometimes as many as five!) I read for hours and hours. In my town I go down to this nice book shop just on the corner and they have everything. There's a nice soft spot there by the fire that I like, and then I may spend nine hours there before I get out – all day! But I want someone to read with. So do call me now – I'm in the book!

8.	☐	She thinks that a book can help someone feel good.
9.	☐	She reads frequently.
10.	☐	She usually reads a maximum of five books per week.
11.	☐	She doesn't like to read outside the home.
12.	☐	The book shop is near her home.
13.	☐	The book shop is not very comfortable.
14.	☐	She would like to have company while she reads.

My comprehension of this text: 5% 25% 50% 75% 100%

C.

The good part about living here is nature. I need to be free in the world. As I like to make and grow things, I don't live by any large cities. The grounds here on my block are fairly good (and they are pretty). I've been across the country and around the whole world a few times, but I think that here is better than any place I know on earth. I don't ever need to go to the city to buy things – I don't like it there, actually. That's the good thing about living here, I feel: it's neither the country nor the city. I like to show it off. Call me to come down and see it if you like. I like company! (And I'm nice – really!)

15.	☐	She lives in a densely populated area.
16.	☐	She has traveled a lot before.
17.	☐	She enjoys having visitors.
18.	☐	She likes to garden.
19.	☐	She thinks the place where she lives is inconvenient.
20.	☐	She likes nature.
21.	☐	She lives in the country.

My comprehension of this text: 5% 25% 50% 75% 100%

D.

I go out so often with my two kids. But I don't mind spending all my time with my kids. It's worth it. Especially playing football: it's an all day thing. It doesn't cost much: all you need is to have a ball for football – not a special occasion or even to be on a real team. It's not hard. My kids don't even need me. You see, I'm not a real player, myself – I have flat feet. I lose every time. One time I broke my arm and left leg and had to be carried away! Now what I do is get a ball and watch my kids having a good time all the day through. Others like to drink, I like looking at my kids.

22.	☐	He seems to love his children.
23.	☐	He thinks football is expensive.
24.	☐	He has never played football.
25.	☐	He once hurt himself playing football.
26.	☐	His children do not play football without him.
27.	☐	He can't use his feet at all.
28.	☐	He likes to drink.

My comprehension of this text: 5% 25% 50% 75% 100%

What is the time now? _____

(formulaic version)

Name: _____ Year: _____

What is the time now? _____

A.

I don't get out much – it's about time I do. I'm not from here – this country or city (But I like this country.) I'm far from home. I'm a little over the hill, let me tell you, but you can't tell! (I can show you my photo, or wait to come see me in person!) Call me on 07786 554 0978.

1.	☐	He wants to go out but has a problem with time.
2.	☐	He is foreign.
3.	☐	He lives in a remote area.
4.	☐	He wants to keep his location a secret.
5	☐	He thinks he looks younger than his age.
6.	☐	He probably lives in an area with hills.
7.	☐	He lives on the hill, but not on top of it.

My comprehension of this text: 5% 25% 50% 75% 100%

B.

About me? I'm living large in the city, better than ever. Actually, I've been around the block a few times and I think I make a pretty good living on the whole, but that's neither here nor there. If you don't know any better, I come across as a show off. The thing is, my nature is to be fairly down to earth, by and large, on the grounds that I call it like I see it. I know my place in the world. If things are down and I need to part company with the world, I go to the country. I don't really need to buy nice things to feel better. But I live off cities – they grow on you. Feel free to call me.

8.	☐	He says he is experienced and honest.
9.	☐	He thinks he makes a decent salary.
10.	☐	He thinks his past and occupation are irrelevant.
11.	☐	Some people might think he likes to show what he has.
12.	☐	He cares about the earth and the environment.
13.	☐	He lives in the city but wants to live in the country.
14.	☐	He thinks cities tend to grow too big.

My comprehension of this text: 5% 25% 50% 75% 100%

C.

I don't like to go out much, myself. The thing is, I have two left feet and I need to watch my spending. (Mind you, I'm not flat broke!) Now, for what it's worth, I do have a ball, playing football with my kids every so often and even having one drink on occasion. (And not two at a time!) But I don't get carried away or lose it. Having a good time doesn't have to be hard or cost you an arm and a leg. I'm a real team player, looking out for others all the time – especially my special kids. My kids see me through the day. With my kids, a good time is to be had every time.

15. ☐ She does not know how to dance well.
16. ☐ She thinks football and drinks are worth the money.
17. ☐ She plays football with her children frequently.
18. ☐ Her children are with her most of the day.
19. ☐ She drinks only when it is a special occasion.
20. ☐ She says it can be cheap to have a good time.
21. ☐ She is looking for more players for the football team.

My comprehension of this text: 5% 25% 50% 75% 100%

D.

Many people say I'm all about my nine to five, and they say I do everything by the book. Be that as it may, I do have a soft spot for a warm heart to heart and there's nothing like a good night (and day) on the town with someone sometimes. I do have a fire for my shop and I spend hours and hours there, but every now and then I get down and out, so it is nice to just have someone in your corner to go to. I want someone I can read like a book, someone true. Call me this week (before nine)!

22. ☐ He likes to go out and have fun.
23. ☐ People think that he is obsessed with work.
24. ☐ He has a special place in his house for romantic occasions.
25. ☐ He likes to have tender and honest conversations.
26. ☐ He sometimes feels quite sad.
27. ☐ He likes to have someone who lives close to him to go out with.
28. ☐ Some people think he is too 'correct' and proper.

My comprehension of this text: 5% 25% 50% 75% 100%

What is the time now? _____