Development of complex syntax in the narratives of children with English as an Additional Language and their monolingual peers

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Abstract: English syntax acquisition is crucial for developing literacy but may be challenging for many children learning English as an Additional Language (EAL). This study longitudinally investigates syntactic complexity and diversity of stories retold by children with EAL and their monolingual peers as well as the relationship between syntax and vocabulary. This is a secondary data analysis using data from the Surrey Communication and Language in Education study (SCALES). Sixty-one children with EAL were matched to their monolingual peers on sex, age and teacher-rated language proficiency. Children's narratives were collected in Year 1 (age 5-6) and Year 3 (age 7-8) and coded for clause type. Dependent variables included Mean Length of Utterance in words (MLUw) and Clausal Density (CD) as measures of syntactic complexity and Complex Syntax Type-Token Ratio (CS-TTR) estimating syntactic diversity. Children with EAL presented syntactically complex and diverse narratives equivalent to monolingual peers in Year 1 and Year 3. Growth rate in syntactic complexity was associated with English vocabulary in Year 1. Among children with low vocabulary, children with EAL developed syntactic complexity at a faster rate than monolingual peers, while the opposite was true in the high-vocabulary group. Children with average vocabulary progressed at parallel rates. Children with EAL and their monolingual peers used broadly the same complex structures but with varying frequency. In this longitudinal study comparing children with EAL and monolinguals on complex clauses, the interaction between emerging bilingualism and vocabulary knowledge in the societal language predicted different patterns of growth in syntactic complexity. Children with EAL frequently use different syntactic structures to achieve similar syntactic complexity and diversity. These findings demonstrate that in early primary school, children with EAL have syntactic skills comparable to their monolingual peers.

Keywords: bilingualism; EAL; syntactic development; complex syntax; grammar; narrative.

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Citation: Witkowska, D., Lucas, L., Jelen, M., Kin, H., & Norbury, C. (2022). Development of complex syntax in the narratives of children with English as an Additional Language and their monolingual peers. *Language Development Research*, *2*(1), 180–222. https://doi.org/10.34842/2022.0551

Introduction

Worldwide, it is estimated that more people are now bi- or multilingual than monolingual (Grosjean, 2010b). In many countries, bilingual populations have increased because of immigration, which impacts on the proportion of school-age children mastering more than one language (OECD, 2019). In England, over 20 per cent of primary school pupils speak a language other than English at home (Department for Education, 2021), with implications for managing the English-dominant classroom. Limited evidence suggests that children learning English as an Additional Language (EAL) may find grammar challenging to learn (e.g. Babayiğit, 2014; Bowyer-Crane et al., 2017), but trajectories of grammar development in longitudinal cohorts have rarely compared monolinguals and those with EAL. In this paper, we track the development of complex syntax during primary school in narratives of children with EAL and their monolingual peers.

A Note on Terminology

Overlapping and sometimes inconsistent terminology, together with multiple labels used in different countries makes it difficult to define bilingualism. Broadly speaking, individuals can be considered bilingual even if the proficiency in their languages differs, if they acquired them at different ages and if they use them for different purposes (Grosjean, 2010a; Stow & Dodd, 2003). For consistency, in this paper, we use the UK education policy term “English as an Additional Language (EAL)” to describe both the study participants without making any assumptions about their home languages’ proficiency and the population of children that speak more than one language. When we use an abbreviation “L2”, we refer to the language of school instruction, which in this study is English.

Grammar Development in Children with EAL

Language is essential for school success and therefore for societal participation: proficiency in the language of school instruction at school entry is positively correlated with academic attainment in monolinguals (Norbury et al., 2017) and children with EAL (Whiteside et al., 2017), whose proficiency in the language of instruction covers the full spectrum of ability (Hutchinson, 2018; Strand et al., 2015).

Grammar is a key component of academic language and reading comprehension (Hjetland et al., 2020; Lervåg et al., 2018; Muter et al., 2004). The importance of grammar is recognised in the National Curriculum in England (Department for Education, 2013), which sets specific grammar targets of increasing complexity for every year group. However, the paucity of research on grammatical development of children with EAL presents challenges in providing suitable support through education or intervention.

While the importance of vocabulary for school success has been well-established, the importance of grammar has received less research attention. A recent systematic review of language intervention studies concerning children with EAL (published between 2014 and March 2017) found that all 25 included studies featured a vocabulary component, but none targeted complex grammar (Oxley & de Cat, 2019). Given that there is a strong relationship between vocabulary development and syntactic growth in monolingual children (E. Bates & Goodman, 1997) and children with EAL (Conboy & Thal, 2006), early English vocabulary knowledge may be associated with the rate of development of complex sentences in children with EAL.

Grammar is made up of two domains: morphology, focused on the internal word structure, and syntax, concerned with the sentence structure. While a recent meta-analysis (Bratlie et al., 2022) identified morphological knowledge as a challenge for children with EAL, there is emerging evidence that syntax might be a relative strength (Paradis et al., 2017). When studies feature a single grammatical outcome conflating both domains into morphosyntax, demonstrating developmental trajectories within each domain is difficult. Our study will provide insight specifically into growth in productive syntax.

Our study can also contribute to the debate about the role of age in bilingual acquisition of grammar (see Paradis et al., 2017). The early age hypothesis posits that younger children have an advantage in learning grammar, and therefore predicts more mature English grammar for monolinguals than children with EAL of the same age. The complexity hypothesis proposes that the parallel development of language and cognitive maturity in first-language acquisition may result in protracted learning of grammar. In this case, older and cognitively mature children with EAL may need less exposure time than monolinguals to develop equivalent levels of complex English grammars.

Narrative as a Vehicle for Showcasing Syntactic Growth

Language can be sampled from naturalistic interaction, or narrative and expository tasks. The benefit of narrative is that the target is clear, relies less on the language competencies of interlocutors, and more closely resembles book language, which tends to employ more sophisticated grammar (Cameron-Faulkner & Noble, 2013; Montag, 2019). Narrative compels children to simultaneously incorporate linguistic, cognitive and social skills to construct a logical sequence of events (Norbury & Bishop, 2003).

Narratives have been widely used in bilingualism research, in part because they are thought to be less biased than standardised tests (Boerma et al., 2016; Cleave et al., 2010). Both story generation and retelling have been used with children with EAL. Limited available evidence (see Otwinowska et al., 2020) is mixed as to whether retelling yields improved story structure and grammatical complexity in monolinguals and children with EAL. However, Otwinowska et al. (2020) showed a positive effect of retelling relative to story generation on story structure and comprehension, mental state terms and story length, but no increase in Mean Length of Utterance for both monolinguals and children with EAL.

Common methods of measuring complex syntax in narratives are presented in Table 1. Frizelle et al. (2018) used Mean Length of Utterance in words (MLUw) and Clausal Density (CD) to provide a comprehensive, cross-sectional account of the development of syntactic complexity in 354 monolingual English speakers from school entry to adulthood, using both story generation and story retell tasks. The most common clause type across all ages was the main clause, but its use decreased with age while clausal density increased with age. All clause types were present in four-year-olds' narratives, though most constructions were produced by relatively few children.

Development of Complex Clauses in Children with EAL

Monolingual English-speaking children usually start producing complex sentences after their second birthday, but the proportion of complex sentences in relation to total utterances is small until the age of four (Diessel, 2004). Complex sentences emerge type-by-type, with (non-finite) complements being first (e.g. *I wanna go*, then *I think it's a ball*), and coordinated (e.g. *I have this and you have that*), adverbial (e.g. *You can't have this cause I'm using it*) and relative clauses (e.g. *This is the toy I am playing with*) following later (Diessel, 2004).

Studies using standardised assessments of expressive grammar (e.g. sentence recall and picture description) have reported that children with EAL lag behind monolinguals in their L2 grammar (Babayiğit, 2014; Bowyer-Crane et al., 2017). However, Dixon and colleagues (2020) found no difference between the two groups, which was attributed to sufficient English language exposure prior to school entry in the EAL group.

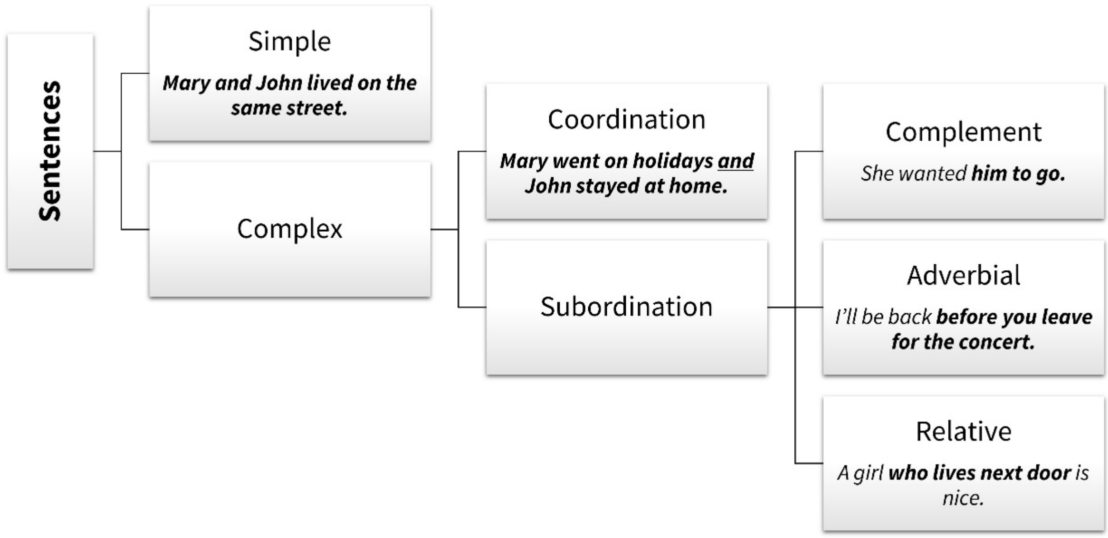

Figure 1. ***Basic classification of sentence types with examples.***

MLUw is frequently used as a measure of syntactic complexity in studies with children with EAL (e.g. Bedore et al., 2020; Simon-Cereijido & Gutiérrez-Clellen, 2009). A few studies that compared monolinguals and children with EAL (Bonifacci et al., 2018; Otwinowska et al., 2020; Rodina, 2017) produced conflicting findings, likely due to varying sample sizes (from n = 16 to 75 in groups with children with EAL), age ranges (3;1 to 7;3) and assessed languages (Norwegian, Russian, Italian and Polish).

In terms of complex syntax, Paradis et al. (2017) showed that five-year-old children with EAL needed less than a year of English exposure to start using a wide range of complex clauses without any apparent order of clause emergence. However, this study lacked an age- or language-matched monolingual comparison group, so it is unclear whether the pattern or growth in syntax is similar to that of monolinguals. Bonifacci et al. (2018) found that 4-5-year-old children with Italian as an additional language and their monolingual Italian-speaking peers produced stories with the same number of coordinate and subordinate clauses and the same proportion of complex clauses. Castilla-Earls et al. (2019) tracked the development of narrative abilities in both languages of Spanish-English speaking children using MLUw and clausal density at six points between ages 5;6 to 8;1. While English MLUw gradually increased over time, change in CD was relatively small. Children did not use subordination at all at 5;6 (CD = 1.0) and it remained minimal at four middle timepoints, peaking at 8;1 with 1.3 complex clauses per utterance. The lack of a monolingual comparison group means it is unclear whether monolinguals of that age would produce a greater quantity or variety of syntactic structures. Additionally, children were given different stories to retell at different timepoints, which may have influenced use of clauses at any given point.

To our knowledge, only one study has directly compared clausal density (defined as the number of finite and marked infinitive clauses per utterance) of monolinguals and children with EAL (Cahill et al., 2020). This small (n < 13 in each group), cross-sectional study reported no differences between English monolinguals and English-French-speaking children in the 7-8 and 11-12-year-old group, though the authors noted that small sample size and high within-group variability limit firm conclusions. In addition, we are not aware of any longitudinal studies that have tested the extent to which proficiency in other aspects of L2 such as vocabulary may be associated with expressive syntax growth in children learning EAL.

The Current Study

We adapted the syntactic complexity framework designed by Frizelle and colleagues (2018) to investigate developmental change in syntactic complexity in a longitudinal study of children with EAL and monolingual peers from Year 1 (ages 5-6) to Year 3 (ages 7-8), using a narrative retell task. This allowed us to ask:

1. Do the narratives of children with EAL differ in syntactic complexity (MLUw and CD) from the narratives of monolingual English-speaking children in Year 1 (age 5-6) and Year 3 (age 7-8)?
2. Is the rate of growth in syntactic complexity comparable between children with EAL and their monolingual peers between Year 1 and Year 3?
3. Does English Vocabulary in Year 1 affect the rate of growth in syntactic complexity in children with EAL and their monolingual peers?
4. Do the narratives of children with EAL differ in syntactic diversity measured by Complex Syntax Type-Token Ratio (CS-TTR) relative to narratives of monolingual English-speaking children in Year 1 and Year 3?

While all children started formal schooling at the same time, children with EAL were expected to have reduced L2 syntactic complexity compared to their monolingual peers, because of reduced exposure to English language outside school. Heritage language and literacy skills can positively influence L2 acquisition, but some children with EAL still need additional English exposure to gain sufficient proficiency in English to succeed in school (see Hoff, 2013 for an overview).

The existing evidence regarding syntactic growth in children with EAL suggests that they may develop L2 skills faster than their monolingual peers (Lonigan et al., 2013; McKean et al., 2015; Whiteside & Norbury, 2017). For example, Whiteside and Norbury showed accelerated rates of growth relative to monolingual peers between ages 5-6 and 7-8 in children with EAL on receptive vocabulary, sentence recall and overall language. This was true of children with both high and low levels of teacher-rated English language proficiency at school entry.

The strong positive relationship between the development of vocabulary and the development of grammar has been observed in early language acquisition in monolinguals (E. Bates & Goodman, 1997) and children with EAL (Conboy & Thal, 2006). A natural prediction would be to assume that better vocabulary would contribute to better grammar, hence a faster growth in syntactic complexity. However, little is known about initial vocabulary as a predictor of later syntactic growth in children with EAL, especially in comparison with monolingual peers. Conboy and Thal (2006) showed that toddlers with EAL who experienced the most growth in English vocabulary also showed the fastest rate of development of syntactic complexity in English, but demonstrated lower syntactic complexity scores at the last time point than children with slower language growth. Therefore, we tested the prediction that with increasing English vocabulary in Year 1, the rate of growth in syntactic complexity might decrease. Our study provides a strong test as we included children with a wide range of proficiency scores at school entry. EAL and monolingual groups were matched on teacher-rated English proficiency level, which ensures equal distribution of children with varying language skills across the two groups. Our longitudinal and within-subjects design featuring the same task at both time points allows us to minimise the impact of task changes and participant effects on growth estimates.

Finally, we predict that children with EAL will use fewer complex constructions than their monolingual peers, but the types of structures will be comparable across groups.

Methods

Study Design

This study is a secondary analysis using data on children with EAL and their monolingual peers from the Surrey Communication and Language in Education Study (SCALES; Norbury, Gooch, Wray, et al., 2016; Norbury, Gooch, Baird, et al., 2016; Norbury et al., 2017). First, a brief overview of the overall SCALES design is provided together with features relevant to the current study. Then follows a description of matching design and participants in the current study.

All Reception children (age 4-5) in Surrey state-maintained schools in September 2011 were invited to take part (n = 12, 398). Teachers completed questionnaires, including the Children's Communication Checklist-Short (CCC-S; see below), for 7,267 children (59% of invited children). 782 pupils (11%) spoke a language other than English at home (lower proportion than the national average in primary schools in England at that time, 16.8%) (Department for Education, 2011).

The CCC-S (Norbury et al., 2004), based on CCC-2 (Bishop, 2003a) featured seven items about communicative strengths and six about communicative errors, with higher scores (max. 39) suggesting lower English skills. Depending on CCC-S scores, three strata were identified: (1) children reported by teachers to have "no phrase speech (NPS)", based on the CCC-S item that indicates the child combines words into phrases less than once a week (assigned a maximum score), (2) "high-risk (HR)" for language disorder defined as a score 1SD or more above (indicating greater impairment) the monolingual population mean for their age group (autumn, spring, or summer born) and sex, and (3) "low-risk (LR)" for language disorder (scoring no more than 1SD above the mean for age group and sex). In this context, the term "risk" reflects teacher-reported scores on the CCC-S.

SCALES was designed to investigate individual differences in language, but not EAL per se. However, we did sample ~10% of the EAL cohort to reflect the population at the time. We included all children with no-phrase speech, and a random sample of children in the 'high-risk' group (teacher ratings of low English language proficiency relative to age and sex) and the 'low-risk' group (teacher ratings of English language proficiency in the expected range for age and sex). In this cohort, 'risk' cannot be interpreted as risk for language disorder as the CCC-S is not normed on a bilingual population. Nevertheless, it has some ecological validity in estimating children's proficiency in the language of instruction after the first year in school.

636 monolingual and 82 children with EAL from mainstream schools were invited to participate in the second part of SCALES involving intensive language assessment in Year 1 (age 5-6) and Year 3 (age 7-8). All children with NPS were invited to participate; remaining children were randomly sampled from each of the three identified strata, with equal numbers of males and females selected and a higher percentage of children at 'high-risk' of language disorder invited to participate (for further details of the selection process, see Whiteside & Norbury, 2017 and Norbury et al., 2017). In Year 1, 529 monolingual children (200 LR, 290 HR, and 39 NPS) and 61 children with EAL (25 LR, 19 HR, 17 NPS) participated. In Year 3, 499 monolingual children (192 LR, 273 HR, 35 NPS) and 51 children with EAL (21 LR, 16 HR, 14 NPS) were re-assessed.

Participants in the Current Study

61 children with EAL (29 girls) were individually matched to 61 monolingual peers on sex, language risk status (LR/HR/NPS) and age at Year 1 assessment (within 2 months). In Year 3, ten children with EAL (4 LR, 3 HR, 3 NPS) and five monolingual children (2 LR, 2 HR, 1 NPS) were lost to follow-up, therefore the final sample in Year 3 included 51 children with EAL (23 girls) and 56 monolingual children (28 girls). We did not exclude participants that had lower non-verbal reasoning or a biomedical condition. This sample partially overlaps with the sample reported by Whiteside and Norbury (2017), who analysed a sub-sample of children with EAL and monolingual peers but applied different matching criteria.

All children were recruited during the Reception Year and had at least one year of exposure to English before their Year 1 assessment. Children with EAL represented many linguistic backgrounds (24 languages spoken), with Bengali, Polish and Urdu the most frequently reported languages. The data on children's home language proficiency could not be collected due to sample heterogeneity and limited available assessments or skilled assessors in the languages required.

Socio-economic status (SES) was measured with Income Deprivation Affecting Children Index (IDACI; McLennan et al., 2011) rank scale, which is an index of neighbourhood deprivation and ranges from 1 to 32,482, based on the children's home postcode. Higher values indicate more affluent neighbourhoods with proportionally fewer households receiving means-tested benefits.

Prior to the first visit, children were randomly allocated into one of six testing blocks (half-terms in the UK school year). In Year 3, the block order was reversed (children seen in block 1 in Year 1 were seen in block 6 in Year 3 and children seen in block 6 in Year 1 were seen in block 1 in Year 3). This resulted in a variable lag of 14 to 34 months between Year 1 and Year 3 assessments, allowing us to make best use of this longitudinal design with two testing points.

Ethics and Consent Procedures

The SCALES screening phase relied on an opt-out consent procedure, allowing anonymised data from teacher questionnaires to be used in the study unless parents explicitly did not agree (20 families opted out). Informed, written consent from parents or legal guardians was required for the in-depth assessment in Year 1 and 3. The SCALES project was approved by the Ethics Committee at Royal Holloway, University of London, and further research analysis of the existing data was approved by the

Research Ethics Committee at University College London (Project ID 9733/002).

Assessment Measures

Children completed a core battery of six language assessments, comprising receptive and expressive tasks. Expressive tasks included Expressive One-Word Picture Vocabulary Test (EOWPVT; Martin & Brownell, 2011a), a sentence repetition task (SASIT-32; Marinis et al., 2011) and the information score from the narrative recall task (ACE 6-11; Adams et al., 2001). Receptive tasks included Receptive One-Word Picture Vocabulary Test (ROWPVT; Martin & Brownell, 2011b), short version (40 items) of Test for the Reception of Grammar TROG-S; (TROG Bishop, 2003b) and narrative comprehension questions. Non-verbal reasoning was measured in Year 1, using the Block Design and Matrix Reasoning subtests of the Wechsler Preschool and Primary Scale of Intelligence (Third Ed., Wechsler, 2003) (for details, see Norbury et al., 2017).

English Vocabulary in Year 1 was assessed using the Receptive One-Word Picture Vocabulary Test (ROWPVT; Martin & Brownell, 2011b). Several other measures were used to characterise the EAL and monolingual groups (see Table 3). We also used three indices Mean Length of Utterance in words (MLUw), Clausal Density (CD) and Complex Syntax Type-Token Ratio (CS-TTR) as our dependent variables (see Table 1 for explanation of concepts and our pre-registration at https://doi.org/10.17605/OSF.IO/SP24Y for implementation details).

Procedures

At each assessment point, a trained researcher met the child for a two-hour session in a quiet space in the child's school. Children completed the Assessment of Comprehension and Expression (ACE-Recall) Narrative Recall task (Adams et al., 2001), which required the child to listen to a story about a monkey and a parrot, read by an English first language speaker and played over headphones. The child simultaneously followed a PowerPoint presentation on the computer screen with eight pictures depicting the story. Immediately after the listening, the researcher asked the child to retell the story while the pictures remained on the screen. After the retelling the child was asked to answer comprehension questions, which were transcribed and scored straight after the assessment. Children's narratives were recorded using a dictaphone and later transcribed by trained student research assistants.

Table 1. ***Methods of measuring complex syntax in narratives and the rationale for using them.***

Measure	Definition	Rationale
Mean Length of Utterance in words (MLUw)	The total number of words in each utterance divided by the total number of utterances.	1. A simple way of measuring syntactic complexity development because every new grammatical construction in early child's language increases the utterance length (R. W. Brown, 1973), 2. Mainly used with children's language samples but some evidence that can successfully be used with older participants, even until adolescence and adulthood (Nippold et al., 2005).
Clausal density (CD)	The mean number of clauses per utterance, where utterance is defined as a main clause with any dependent clauses (Hunt, 1965; Loban, 1976)	MLUw might not be sufficient to assess the grammar complexity: possible to produce longer simple sentences without employing more complex syntactic structures (1). *(1) Afterwards the monkey immediately showed the parrot the juicy pineapple with a green crown.* (2) *The monkey showed the parrot the pineapple, which had a green crown.* CD rewards for a higher number of dependent clauses attached to the main clause, e.g. (1) would score 1, while (2) would score 2 (two clauses within the utterance).
Complex syntax Type-Token Ratio (CS-TTR)	The novel estimate of syntactic diversity: the mean number of different dependent construction types relative to all dependent clauses produced.	CD does not change depending on whether a speaker uses the same type of a subordinate clause throughout the narrative (3), or whether they use different types (4). (3) *The monkey showed the parrot the pineapple,* ***which had a crown*** *that was green.* *(4) After the monkey returned, he showed the parrot the pineapple,* ***which had a green crown.*** MLUw and CD provide quantitative estimates, but syntactic diversity is necessary for a more qualitative description of the development of complex sentences.

Narrative Analysis

Our coding manual (Witkowska, Lucas, & Norbury, 2021; https://osf.io/wqgz9/), based on Frizelle et al. (2018), described the process of splitting and coding the narratives. We divided sentences into clauses following a general rule of no more than one verb in each line, except for no-verb clauses (zero verbs), and g*o AND do* and *go do* constructions (two verbs but treated as one: e.g. *The monkey went and searched for treasure, Go look under the curtain*) (Frizelle et al., 2018). After splitting, narratives were transferred to Microsoft Excel and saved as comma-separated values (.csv) files.

Table 2 presents clause types distinguished in the coding manual (Witkowska, Lucas, & Norbury, 2021). Grammatical errors, word omissions or substitutions were not treated as prerequisites for discounting a clause. For example, a clause *He fellen down* was coded as a main clause despite the error in the past tense of *fall*. Where two codes were possible, we chose the code that indicated the most syntactically complex sentence. For instance, if a clause could either be coded as reported speech or imperative, we chose the first option because a main clause together with that reported speech clause would form a more syntactically complex sentence (one sentence with two clauses, i.e. (main) *The monkey said* (reported speech) *"Find me some treasure!"*) than a main clause and an imperative clause (two sentences, one clause each, i.e. (main) *The monkey said* (imperative) *"Find me some treasure!"*).

We made the following adaptations to Frizelle et al.'s (2018) coding scheme:

- Introduction of causal clause (separate codes for its finite and non-finite versions), expressing a reason for an event happening with a subordinate conjunction *because* and thus crucial for a high-quality narrative production. Previously, causal adverbial clauses (e.g. *The monkey went back* ***because*** *he was tired*) were part of an adverbial category (e.g. ***When*** *the parrot came, monkey was annoyed*), while causal non-finite non-complements (e.g. *The monkey left the tree* ***to search for treasure***) were grouped together with other non-causal non-complements (e.g. *There was a monkey* ***hanging on the high branch***).
- Separate code for imperatives (e.g. *Go to the forest!*), usually expressing commands or requests, because their lack of overt subjects makes them syntactically distinct from English main sentences.
- Separate code for verb phrases (e.g. *Locked the parrot in the cage.*) to reward children for producing more fully-developed simple sentences than no-verb utterances, despite omitting the obligatory subject.
- Preserving false starts, fillers, repetitions and unfinished sentences in the transcriptions but clearly labelling them in separate lines and excluding from syntactic complexity calculations.

Table 2. ***Codes for clause types with a short definition and a typical example.***

Code	Clause type	Description	Example
x	No-verb phrase	A non-clause which does not contain a verb.	***The end.*** ***Treasure.***
m	Main	A standalone sentence, typically following subject-verb-object word order.	***The monkey locked the parrot*** *in the cage.*
m+	Main with elided subject	A clause that could be a main clause if the subject had not been elided.	*A parrot came* ***and made lots of noise.***
cf	Finite complement	A complement clause with a marked/tensed verb.	*He knew* ***that it wasn't treasure.***
cn	Non-finite complement	A complement clause containing an unmarked verb (not indicative of tense or number).	*If you want me* ***to leave the tree...***
n	Non-finite, non-complement	A clause that contains an unmarked verb (not indicative of tense or number) and is not a compulsory part of the sentence.	*There was a monkey* ***hanging on a high branch****.*
n+	Causal non-finite non-complement	A non-compulsory clause that contains an unmarked verb and has a causal meaning	*The parrot was squawking* ***to get the monkey off the tree.***
cr	Reported speech	A complement clause that consists of a direct quotation of one of the characters.	*The parrot said* ***"let me out."***
a	Adverbial	A clause typically specifying locational or temporal information related to the main clause.	*I won't go away* ***until you find me some treasure.***
ca	Causal Adverbial clause	A clause that contains a cause-and-effect relationship, typically specifying a hypothetical situation with its consequences.	*The monkey went to the village* ***because he was tired****.*

Code	Clause type	Description	Example
i	Imperative	A clause without an overt subject, containing an implied subject "you."	***Don't talk to me.*** ***Go to the forest.***
vp	Verb phrase	An utterance composed exclusively of a verb phrase (missing the subject).	***Locked the cage.*** ***Was hanging on the tree.***
cc	Comment Clause	A clause expressing the speaker's attitude towards the sentence.	***I think*** *he's picking up the scarf.* ***It looks like*** *the monkey is annoyed*
co	Other comment	A clause expressing a general comment unrelated to the content of the story.	***I'm not sure.*** ***That's all I remember.***
u	Unfinished utterance	An abandoned utterance that is followed by the start of a new clause.	***He's got>*** *He's taken the parrot to the treasure.*
rr	Repetition/filler/ false start	A repetition of a word or clause, sentence-initially or otherwise; the use of filler words or just the initial letter or syllable of an intended utterance (false start).	***Ummm*** *Let me out* ***(let me out).*** ***(The m)*** *the monkey said…*
ui	Unintelligible clause	An utterance where at least 20% of the words are unintelligible and cannot be transcribed.	***The parrot *** the monkey.***

Note. These codes are a mix of Frizelle et al.'s (2018) codes together with our additions. All codes are described in detail in our syntactic coding manual (Witkowska et al., 2021).

The first and second authors prepared the narratives for coding. Two trained research assistants, the third and fourth author, coded all the transcripts, blind to group (EAL vs. Monolingual). Twenty-five narratives (out of 213, 11.7%) were double-coded by the third and fourth author. All coding queries were documented in an Excel spreadsheet and responded to by the first and second author on an ad-hoc basis. Weekly coding meetings with all the authors were an opportunity to resolve difficult issues and to ask further clarification questions. Their agreement on clause codes was good

(Cohen's Kappa = 0.85, z = 55.8, $p < .001$), as was the agreement on the number of grammar errors in each clause (Intra-Class Correlation, ICC = 0.75, $F(1256, 1257) = 6.85$, $p < .001$). The two coders also agreed 97 per cent of the time on verbs used in each clause.

Data analysis

This study was pre-registered on the Open Science Framework (Witkowska, Lucas, Jelen, et al., 2021; https://doi.org/10.17605/OSF.IO/SP24Y). Deviations from the plan are mentioned in the Results section. Analyses were conducted in RStudio (R Core Team, 2020) and data and analysis scripts are available on the Open Science Framework (https://osf.io/cgw9j/).

Sample Size and Power Calculation

Power curves were modelled (using pwr package; Champely, 2020) for a between-group comparison (independent-samples t-test) as a function of sample size (n = 61 for each group) for three effect-sizes d = 0.3 (small), 0.5 (medium) and 0.8 (large). The modelling showed 80% power to detect an effect size of 0.5, and 38% power to detect an effect size of 0.3.

Missing Data

Narrative data were available for 54 children with EAL and 55 monolingual children in Year 1, and for 51 children with EAL and 53 monolinguals in Year 3. Children who were seen for assessment but did not produce a story (6 children with EAL and 4 monolinguals in Year 1, and 3 monolinguals in Year 3) were assigned a score of 0 on each outcome measure to reflect their minimal expressive language.

Missing narratives that were excluded from analysis included those with no audio-recording (1 child with EAL and 2 monolinguals in Year 1) and families lost to follow-up (10 children with EAL and 5 monolinguals in Year 3). Children who were not followed-up in Year 3 did not consistently differ from those who remained in the study on any of the measured variables, including socio-economic status (EAL group: $M_{no\text{-}follow\text{-}up} = 18124.2$ and $M_{rest} = 17218.2$, $p = .753$; MONO group: $M_{no\text{-}follow\text{-}up} = 24344.00$ and $M_{rest} = 21757.38$, $p = .457$); vocabulary Year 1 (EAL group: $M_{no\text{-}follow\text{-}up} = 65.5$ and $M_{rest} = 69.55$, $p = .419$; MONO group: $M_{no\text{-}follow\text{-}up} = 75.4$ and $M_{rest} = 77.29$, $p = .8$); or ACE Narrative Information scores in Year 1 (EAL group: $M_{no\text{-}follow\text{-}up} = 11.75$ and $M_{rest} = 9.72$, $p = .325$; MONO group: $M_{no\text{-}follow\text{-}up} = 10.75$ and $M_{rest} = 10.87$, $p = .96$).

We had intended to use Full Information Maximum Likelihood estimation to account for missing data, but this could not be used within the framework of *lme4* as pre-registered. However, one advantage of linear mixed models (LMMs) is that only an observation at a specific time point is excluded from the analysis, not all observations from the same participant, and thus LMMs are robust to handle the missing data. That allowed use of data from 60 children with EAL and 59 monolingual children in Year 1 and 51 children with EAL and 56 monolingual children in Year 3. In total, 226 observations were used in each LMM.

Statistical Analysis for Confirmatory Analyses

We employed linear mixed models (LMMs), using lme4 package (D. Bates et al., 2015), that account for the non-independence of the data (V. A. Brown, 2020), that is, the fact that within-children scores were more similar to each other than between-children scores. LMMs are also robust to unequal sample sizes (Baayen et al., 2008). We acknowledge that the growth in the measures of interest might not be linear, however, a growth curve analysis with quadratic or cubic terms could not be implemented with only two testing points.

For Research Questions 1-3, two separate LMMs with MLUw and CD as dependent variables were run, with Group (EAL vs. MONO), Age (in months) and English Vocabulary in Year 1 (ROWPVT-4 score) as fixed effects and Child ID as by-participants random intercept. The models also contained the following interactions: Group x Age, Group x English Vocabulary, Age x English Vocabulary, and Group x Age x English Vocabulary. To correctly interpret the interactions, Age and Vocabulary scores were centred, thus 0 means an average age in Year 1 and an average vocabulary score in Year 1 respectively. We used Age (in months) instead of Timepoint to account for our use of variable testing lags between each Timepoint (Year 1 and Year 3).

A maximal random effect structure (Barr et al., 2013) comprised by-participants (Child ID) random intercept to account for the initial variation in the complexity of the children's narratives. By-participants random slope was not possible because we had only one observation (one MLUw or CD score) per child per timepoint.

For Research Question 4, a separate LMM was constructed with CS-TTR as dependent variable. It included Group and Age fixed effects, by-participants (Child ID) random intercept and the Group x Age interaction.

Results

Background Measures

Children with EAL and their monolingual peers were matched on sex, age at Year 1 (within two months), and their teacher-rated, English language proficiency status (NPS/HR/LR) derived from their CCC-S score (see Table 3).

Table 3. ***Descriptive statistics for background variables for EAL and Monolingual groups (raw scores are provided for standardised assessment).***

Variable	EAL	MONO	t-test	
	M (SD)	M (SD)	*t*(df)	*p*
Year 1 Participants – n	61	61	NA	NA
Female – n (%)	29 (47.5%)	29 (47.5%)		
Year 3 Participants - n	51	56	NA	NA
Female – n (%)	23 (45%)	28 (50%)		
Year 1 Age (months)	71.34 (4.15)	71.43 (4.24)	-0.11 (120)	0.914
Year 3 Age (months)	95.45 (4.54)	94.21 (4.25)	1.46 (105)	0.148
Year 1 - Year 3 Lag (months)	24.43 (5.6)	22.84 (5.3)	1.51 (105)	0.134
CCC-S	21.43 (13.82)	19.93 (14.83)	0.57 (120)	0.567
IDACI Rank	17366.72 (8224.72)	21969.39 (7373.43)	-3.25 (120)	0.001
Non-verbal reasoning	25.8 (4.17)	25.62 (4.57)	0.23 (119)	0.815
Year 1 Receptive Vocabulary	68.89 (14.33)	77.13 (15.74)	-3.03 (120)	0.003
Year 3 Receptive Vocabulary	96.16 (14.34)	94.73 (16.99)	0.47 (104)	0.642
Year 1 Receptive Grammar	20.66 (8.84)	23.63 (7.76)	-1.97 (119)	0.051
Year 3 Receptive Grammar	26.8 (7.25)	28.98 (7.79)	-1.48 (103)	0.142
Year 1 Narrative information score	10.02 (5.34)	10.86 (4.44)	-0.91 (110)	0.365
Year 3 Narrative information score	15.82 (4.6)	14.47 (5.48)	1.36 (102)	0.177

Note. Abbreviations: CCC-S – Children's Communication Checklist-Short; SES – Socio-Economic Status operationalised as IDACI rank; Non-Verbal reasoning = Block Design and Matrix Reasoning subtests from the Wechsler Preschool and Primary Scale of Intelligence; Receptive Vocabulary = ROWVPT-4; Receptive Grammar = TROG-S; Narrative Information Score derived from the ACE Narrative sub-scale.

Children in the two groups did not differ with respect to age at Year 3, time lag between Year 1 and Year 3 assessments, or non-verbal reasoning. Children with EAL lived in more economically deprived areas and had poorer English vocabulary in Year 1, but not in Year 3, compared to monolingual peers. Receptive grammar (TROG-S) was marginally lower for the EAL group relative to monolingual pupils in Year 1, but not in Year 3. The groups did not differ on narrative information scores at either time point, indicating that their stories contained a similar number of key narrative events.

Narrative Characteristics

Prior to the main analysis, children's narratives were characterised with respect to several factors potentially relevant for the explanation of the main findings.

Table 4. ***Means and SDs of narrative characteristics between EAL and Monolingual groups in Years 1 and 3.***

Variable	EAL		MONO					
	Year 1	Year 3	Year 1	Year 3	Year 1 t-test		Year 3 t-test	
	M (SD)	M (SD)	M (SD)	M (SD)	*t*(df)	*p*	*t*(df)	*p*
Utterances (n)	17.96 (7.65)	22.94 (7.03)	16.62 (5.01)	18.98 (5.92)	1.08 (91.16)	.281	3.11 (102)	.002
Dependent clauses (n)	7.65 (5.52)	12.37 (6.7)	6.72 (4.48)	12.8 (6.6)	0.94 (100)	.348	-0.33 (100)	.744
Different verbs (n)	14.74 (6.64)	20.02 (5.26)	14.24 (4.5)	18.62 (5.67)	0.46 (93.05)	.644	1.3 (102)	.196
Grammar errors (n)	4.37 (3.19)	3.61 (3.86)	3.42 (3.63)	2.32 (1.95)	1.45 (107)	.149	2.13 (73.27)	.036
Children with at least one grammar error - n (% of all children in that group)	52 (96%)	48 (94%)	45 (82%)	45 (85%)	NA	NA	NA	NA

Note. Calculation excludes 10 children in Year 1 and 3 children in Year 3 who did not produce the narrative.

Table S1 (supplementary materials) shows the number of clause codes excluded from the main analysis (unfinished and unintelligible utterances, comments unrelated to the story, repetitions, fillers and false starts). There were numerically more repetitions and false starts in the EAL group than in the monolingual group.

Children produced stories of similar length in Year 1, while in Year 3 children with EAL produced longer stories than monolingual peers (see Table 4). Children in the two groups at both time points employed a similar number of dependent clauses. The mean number of grammar errors was numerically higher in the EAL than in the monolingual group at both time points but the difference was statistically significant only in Year 3. Of all children who produced a narrative, the vast majority committed at least one grammatical error at both time points, but the proportion of children who made at least one such error was numerically higher in the EAL group in both Years 1 and 3.

Children in the two groups used a comparable number of distinct verbs at both time points. A wider range of verbs was employed in Year 3 relative to Year 1. Figure S2 (in supplementary materials) illustrates that the top 10 most frequently employed verbs – likely driven by the narrative content – by children with EAL and their monolingual peers were almost the same, with “be”, “find” and “say” always being in the top 3.

Correlations

Pearson’s correlations are provided in Figure 2 as they not only show the relationships between key variables but might also be useful for future meta-research. Syntactic complexity indices were more stable between Year 1 and Year 3 in the monolingual group relative to the EAL group (see Figure 2 for Pearson’s correlations), indicating more variation in growth trajectories within the EAL group relative to the Monolingual group.

Main Analysis

Research Question 1-3: Syntactic Complexity

The means and standard deviations of the outcome measures are in Table 5, while the distribution of MLUw and CD is shown in Figure 3. Contrary to the pre-registration, we decided not to exclude outliers as we were interested in children who span the range of language proficiency. Removing extreme, but relatively frequent, observations would not address the heterogeneity of language skills in both groups and therefore blur the real-life picture. As models with MLUw and CD as dependent variables (see Table 6) had statistically significant interactions, the lower-order effects could not be interpreted as main effects but as simple effects, when all other predictors are equal to 0 (V. A. Brown, 2020).

There was no simple effect of Group for participants of average age and English vocabulary in Year 1, and no two-way interactions.

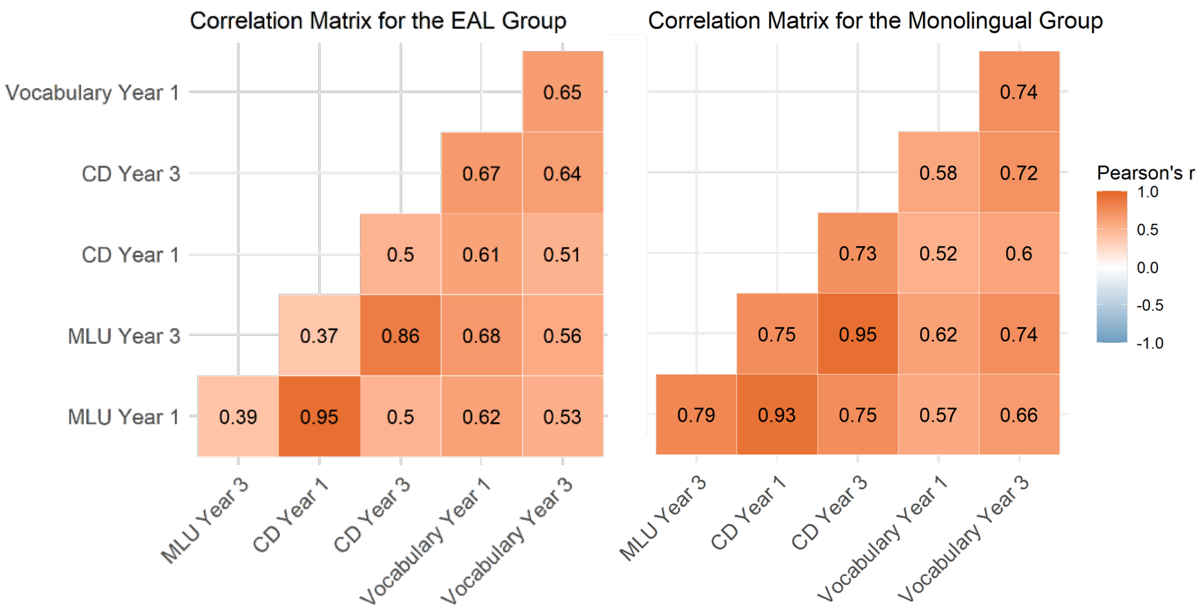

Figure 2. ***Correlations between Year 1 and Year 3 syntactic complexity indices (MLUw and CD) as well as English vocabulary for EAL and Monolingual groups. All correlations were highly statistically significant (p < .009).***

Table 5. ***Descriptive statistics for syntactic complexity (MLUw and CD) and syntactic diversity (CS-TTR) indices for EAL and Monolingual groups in Years 1 and 3.***

Outcome	EAL		MONO	
	Year 1	Year 3	Year 1	Year 3
	M (SD)	M (SD)	M (SD)	M (SD)
MLUw	5.95 (2.73)	8.02 (1.24)	6.38 (2.33)	7.82 (2.56)
CD	1.15 (0.53)	1.52 (0.28)	1.21 (0.43)	1.49 (0.5)
CS-TTR	0.54 (0.34)	0.5 (0.2)	0.55 (0.28)	0.48 (0.26)

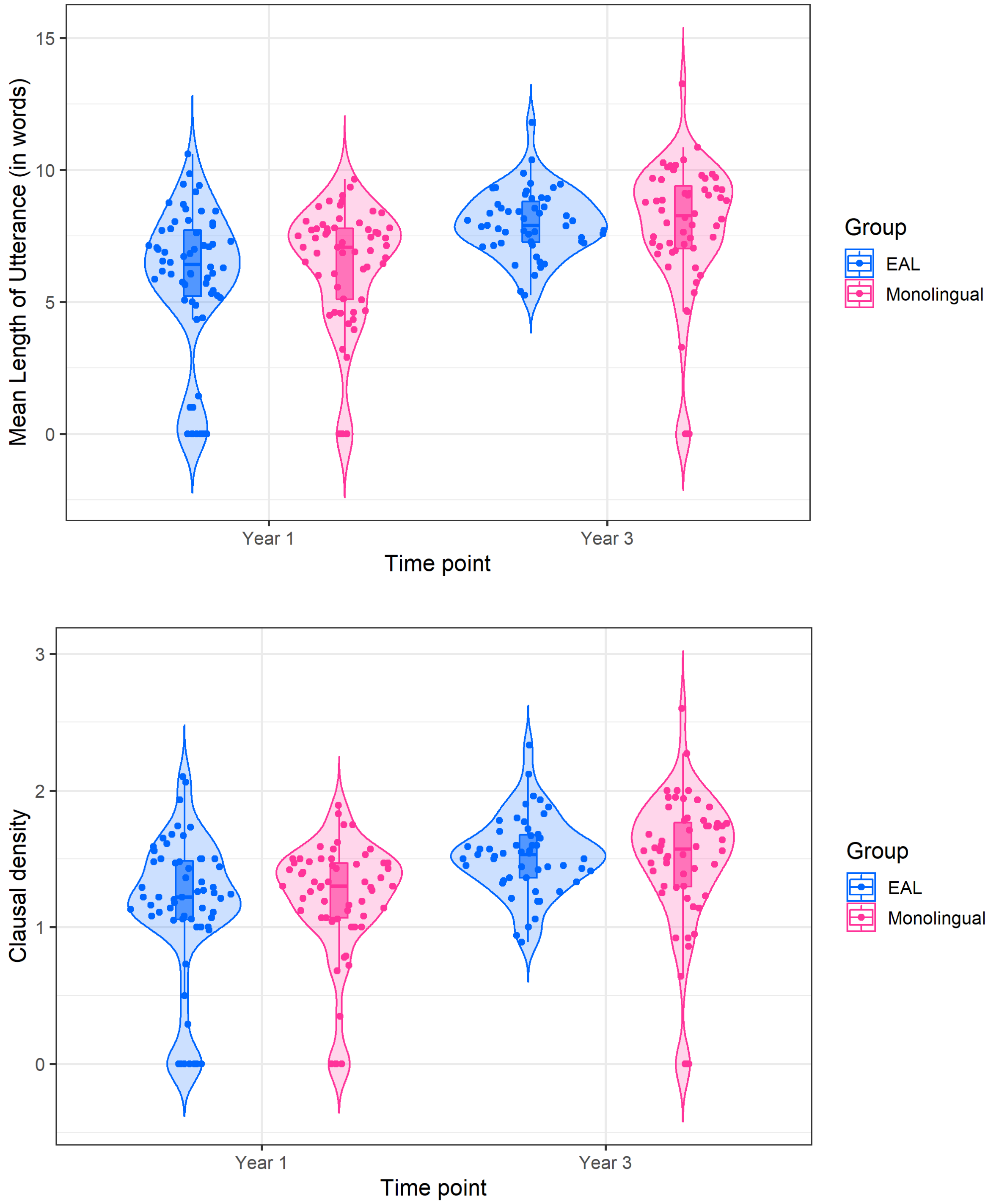

Figure 3. ***Distributions of syntactic complexity indices (MLUw and CD) for the EAL and Monolingual groups in Years 1 and 3.***

The statistically significant Group x Age x Vocabulary interaction indicated that the pattern of growth in syntactic complexity is different for EAL and monolingual groups. It is also dependent on the English vocabulary size in Year 1 (see Figure 4). For the EAL group, the higher the English vocabulary knowledge in Year 1, the lower the rate of growth in syntactic complexity. For the monolingual group, it was the opposite; the rate of syntactic growth increased with higher vocabulary size in Year 1.

Table 6a. ***Results of the linear mixed model with MLUw as a dependent variable.***

Effect	Estimate	SE	95% CI		*p*
			Lower	Upper	
Fixed					
Intercept	6.083	0.235	5.620	6.546	<.001
Group	0.390	0.335	-0.271	1.050	.246
Age	0.054	0.011	0.033	0.075	<.001
English Vocabulary	0.084	0.015	0.055	0.114	<.001
Group x Age	0.020	0.015	-0.010	0.050	.181
Group x English Vocabulary	0.038	0.022	-0.005	0.082	.083
Age x English Vocabulary	0.001	0.001	0.000	0.002	.188
Group x Age x English Vocabulary	-0.003	0.001	-0.005	-0.001	0.001

Table 6b. ***Results of the linear mixed model with CD as a dependent variable.***

Effect	Estimate	SE	95% CI		*p*
			Lower	Upper	
Fixed					
Intercept	1.149	0.047	1.056	1.242	<.001
Group	0.093	0.067	-0.040	0.225	.168
Age	0.011	0.002	0.007	0.015	<.001
English Vocabulary	0.015	0.003	0.009	0.020	<.001
Group x Age	0.003	0.003	-0.003	0.009	.280
Group x English Vocabulary	0.009	0.004	0.000	0.017	.054
Age x English Vocabulary	0.000	0.000	0.000	0.000	.102
Group x Age x English Vocabulary	-0.001	0.000	-0.001	0.000	.004

Note. SE = Standard Error, CI = Confidence Interval. Group: 0 = monolingual, Age – centred: 0 = mean age in Year 1, English Vocabulary – centred: 0 = mean vocabulary in Year 1.

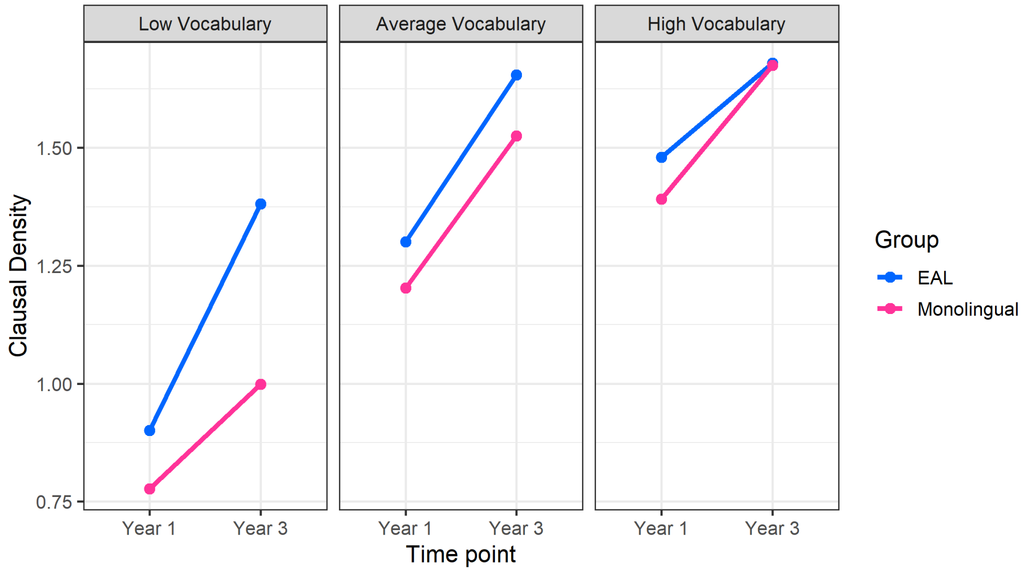

Figure 4a. ***Mean growth trajectories in CD between Year 1 and Year 3 for children with EAL and their monolingual peers with Low (below the EAL mean vocabulary score in Year 1, 68.89; n = 33 and n = 13 respectively), Average (between the EAL mean (68.89) and the monolingual mean (77.13) vocabulary score in Year 1; n = 8 and n = 17 respectively) and High (above the monolingual mean vocabulary score in Year 1; n = 20 and n = 31 respectively) English vocabulary in Year 1.***

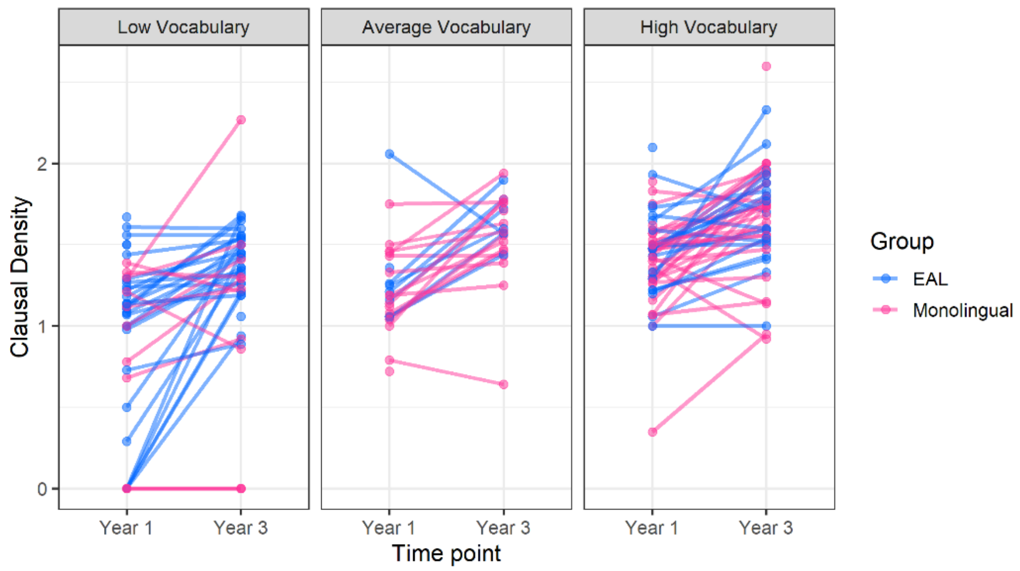

Figure 4b. ***Individual growth trajectories in CD between Year 1 and Year 3 for children with EAL and their monolingual peers with Low, Average and High English Vocabulary in Year 1.***

Children with EAL and lowest vocabulary scores (below the EAL mean vocabulary score in Year 1, 68.89) experienced faster growth in syntactic complexity than monolingual children with similar vocabulary scores. Children with EAL who had average vocabulary (between the EAL mean (68.89) and the monolingual mean (77.13) vocabulary score in Year 1) showed roughly parallel rates of growth in syntactic complexity to their monolingual peers with the same average vocabulary size. For children with EAL whose vocabulary in Year 1 was above the monolingual mean, the predicted rate of growth in syntactic complexity decreased and fell below the monolingual rate of growth, while monolingual children with the highest vocabulary scores in Year 1 exhibited the fastest growth in syntactic complexity among all monolingual participants.

Research Question 4: Syntactic Diversity

CS-TTR was introduced to quantify syntactic diversity in addition to syntactic complexity. However, many CS-TTR scores were located on the edges of the distribution, taking a value of 0, indicating that all clauses were the same, or a value of 1, showing that each clause was of a different type. The residuals distribution was not normal, therefore we could not run a linear mixed model with CS-TTR as a dependent variable.

Following Frizelle and colleagues (2018), we report the proportion of children who retold the story and produced at least one example of a given clause type (see Table 7). Almost all children could construct a main sentence, but there was a substantial proportion of children in both groups that used verb phrases or no-verb utterances. In Year 1, more than two out of five children in both groups resorted to no-verb phrases. In Year 3, this figure dropped considerably in the EAL group, but remained similar in the monolingual group.

We can also see different patterns of clause use employed by children with EAL and their monolingual peers over time. In Year 1, similar proportions of children across the two groups used finite complements (cf), relative (r) and non-complement non-finite (n) clauses. In Year 3, 69 per cent of children with EAL employed finite complements compared to 45 per cent of monolingual children. The opposite was found for non-complement non-finite and relative clauses, with a higher proportion of monolingual children using these types of clauses than children with EAL (42 vs. 33% and 47 vs. 31% respectively).

Table 7. ***Proportions of children who retold the story and produced at least one example of a given clause type for EAL and Monolingual groups in Years 1 and 3.***

Clause code	Clause type	EAL		MONO	
		Year 1	Year 3	Year 1	Year 3
m	main	0.96	1	1	1
m+	main with elided subject	0.69	0.82	0.58	0.91
cr	reported speech	0.63	0.88	0.62	0.83
cn	non-finite complement	0.57	0.78	0.55	0.75
ca	causal adverbial	0.54	0.75	0.56	0.72
x	no-verb phrase	0.41	0.24	0.45	0.4
a	adverbial	0.33	0.45	0.2	0.58
vp	verb phrase	0.31	0.2	0.31	0.26
cf	finite complement	0.3	0.69	0.36	0.45
r	relative	0.22	0.33	0.18	0.42
n	non-finite, non-complement	0.19	0.31	0.18	0.47
i	imperative	0.15	0.22	0.07	0.3
n+	causal non-finite non-complement	0.07	0.12	0.11	0.26
cc	comment clause	0.06	0.04	0.04	0.08

With respect to clauses most relevant for constructing a coherent story, different developmental patterns were observed for causal adverbials (ca) and non-complement non-finite clauses with a causal meaning (n+). Causal adverbials (e.g. *so he couldn't talk*, '*cause this is not your tree*, *if you bring me some treasure*) were used by a similar proportion of children in both groups at both time points (above 50% in Year 1 and almost 75% in Year 3). Non-finite clauses with a causal meaning (e.g. *[then he's going out]* *to get some things*, *[so the monkey set out]* *to find some treasure*), produced by a smaller proportion of children, were employed by more monolingual children than children with EAL at both time points, with the difference being especially large in Year 3 (12 vs. 26%).

Table S3 (supplementary materials) demonstrates the frequency of clause use in the children's narratives. Children in both groups employed main clauses roughly two-thirds of the time in Year 1, but they became less frequent in Year 3, particularly in the monolingual group. Overall, there were no large differences between the two groups at either time point, as different types of complex clauses appeared roughly the same number of times as in the narratives of monolingual children and those with EAL.

Exploratory Analysis

The Relationship Between Growth in Syntactic Complexity and Growth in English Vocabulary

We further investigated what motivates faster growth in syntactic complexity in the EAL low-vocabulary group. Our hypothesis was that it might be related to greater growth in English vocabulary.

An additional LMM with English Vocabulary as dependent variable, Age and Group as fixed effects and by-participants random intercept estimated a significant Group x Age interaction (β = 0.319, SE = 0.092, 95% CI [0.136, 0.501], p <.001), which indicated that children with EAL indeed developed their vocabulary faster than their monolingual peers.

Then, associations between the magnitude of growth in syntactic complexity and in vocabulary were computed. Growth in vocabulary, MLUw and CD was calculated as a difference between Year 1 and 3 raw scores.

Table 8a. ***Pearson's correlations between growth in syntactic complexity (MLUw and CD) and English vocabulary for all participants with observations at both time points (n = 106).***

Correlation	EAL		MONO	
	r	*p*	*r*	*p*
MLUw growth – Vocabulary growth	0.05	.733	0.09	.514
CD growth – Vocabulary growth	0.12	.397	0.18	.201

Table 8b. ***Pearson's correlations between growth in syntactic complexity (MLUw and CD) and English vocabulary for participants whose growth on each variable was greater than 0 (n = 76).***

Correlation	EAL		MONO	
	r	*p*	*r*	*p*
MLUw growth – Vocabulary growth	0.24	.136	<0.001	.984
CD growth – Vocabulary growth	0.22	.177	0.17	.321

Pearson's correlations between growth in vocabulary and growth in syntactic complexity (both MLUw and CD) were weak and not statistically significant in both EAL and monolingual groups (see Table 8), despite moderate-to-strong correlations between syntactic complexity (MLUw and CD) and English vocabulary in Years 1 and 3 (see Figure 2).

The same correlations were calculated for 76 out of 106 children who exhibited positive growth on each outcome measure to account for regression to the mean and measurement errors. Correlations in the monolingual group were even weaker than previously, while correlations in the EAL group were considerably larger, although did not reach statistical significance.

The Effect of SES on Syntactic Complexity

Given group differences in SES, we included SES as a covariate in the LMMs with MLUw and CD as dependent variables. SES had a statistically significant effect on both measures (MLUw: $\beta = 0.081$, SE = 0.031, 95% CI [0.021, 0.142], $p = .009$; CD: $\beta = 0.017$, SE = 0.007, 95% CI [0.004, 0.03], $p = .012$). In neither case did the inclusion of SES alter the main finding, that level of Year 1 English Vocabulary is associated with growth in syntactic complexity. However, we note that due to the sample size, the models did not have sufficient power to examine a four-way interaction.

Discussion

Our study follows a unique cohort over a two-year period that spans a range of English language proficiency, has been in formal English language schools from school entry, and has been measured on the same narrative assessment on two occasions. This gives us a rare opportunity to look at the development of complex syntax using a more naturalistic task. Having matched children with EAL and their monolingual peers for English language proficiency at school entry, we see rather few differences between groups on syntactic complexity or growth. However, early levels of English vocabulary may differentially influence the rate of growth in syntactic complexity in the two groups. What is also note-worthy is the rapid progress of children with EAL at the tail of the Year 1 distribution, which could reflect their increased exposure to rich academic language. We now consider our research questions in more detail.

Did the Narratives of Children with EAL and Their Monolingual Peers Differ in Syntactic Complexity?

Contrary to our predictions, we found no difference in syntactic complexity (MLUw and CD) in Year 1 and Year 3 between the narratives of children with EAL and their monolingual peers. Mean syntactic complexity scores in our study were broadly similar to previous reports (Cahill et al., 2020; Castilla-Earls et al., 2019; Frizelle et al., 2018), although including children with varying English language skills in our study resulted in more variation than in the previous studies.

Our results provide stronger evidence for Cahill et al.'s (2020) report of no statistically significant difference between children with EAL and their monolingual peers on syntactic complexity. Our sample was also more linguistically diverse, thus the finding can be extended beyond French-English speaking children in the unique Canadian environment. Most importantly, our study is a longitudinal study and therefore gives more direct evidence for developmental trajectories than previous cross-sectional work.

There are several potential reasons for the similarities in syntactic complexity between children with EAL and their monolingual peers. First, we assumed that children in the EAL group may have had less exposure to English at home, but we could not verify that assumption. Thus, children with EAL could have had English exposure comparable to their monolingual counterparts, or at least sufficient exposure to produce stories of similar syntactic complexity. Dixon and colleagues (2020) found that most children with EAL were born in the UK and received substantial English input at home, which – they argued – might have attenuated group differences in their sample. Furthermore, one-year exposure to English during the first school year may increase exposure to academic language, which includes more complex grammatical forms than conversational English (Snow & Uccelli, 2009).

In addition, the quantity of input may be less important than the 'readiness' of children to make use of that input (see Paradis et al., 2017). The complexity hypothesis proposes that since cognitive maturity develops at the same time as language skills in first language learners, it can restrict the frequent use of complex constructions. This limitation would not apply to children L2 learners, as they would be older and thus more cognitively mature when exposed to L2, and therefore they could start producing complex clauses after a shorter language exposure than their monolingual counterparts. This could explain why children from the low-vocabulary EAL group, who had average non-verbal reasoning, were able to use school input to accelerate their language learning. In turn, slow growth in syntactic complexity in the low-vocabulary monolingual group might reflect reduced language input but could also be indicative of broader neurodevelopmental difficulties (such as language disorder) that make it more challenging to learn language from typical home or school input.

Our matching design meant that children with different levels of teacher-rated English language proficiency at school entry were distributed evenly across the EAL and monolingual groups. Considering the heterogeneity of language skills in both groups enabled us to estimate the effect of bilingualism, without confounding it with initial differences in English language proficiency. As a side note, our design might have contributed not only to similar syntactic complexity in the two groups, but also to the EAL group "catching up" in receptive vocabulary by age 7-8, an unusual finding in the literature (e.g. compare with Dixon et al., 2022). Very few studies employ such matching; usually a random sample of children with EAL and monolingual peers is selected, in contrast to our more balanced sample. This means that in our study children with EAL did not have to aim that high to achieve results comparable to their monolingual peers.

Furthermore, the narrative retelling task might have constrained the range of syntactic structures produced, enhancing similarities between the groups. The narratives exhibited striking similarities in both groups (e.g. equal story length, frequent use of the same verbs) and exposure to the model story might have provided useful (or necessary) scaffolding, enabling children with EAL to demonstrate their best storytelling and syntactic skills. This scaffolding may be less important for monolinguals, especially those with good vocabulary knowledge.

Similar syntactic complexity in the narratives of children with EAL and their monolingual peers also offers an interesting insight into the distinction between two components of grammar: syntax and morphology. Most children in the two groups at both time points committed at least one grammatical error and children with EAL committed more grammatical errors than their monolingual peers. Although we did not code specific error types, syntactic errors (such as wrong word order) were rare, whereas morphological errors were common (e.g. missing 3rd person singular –*s*, or past tense –*ed*). This would indicate that morphology might be a relative weakness of children with EAL (Bratlie et al., 2022), while complex sentences are a relative strength (Paradis et al., 2017).

Finally, we were unable to assess grammatical complexity in the child's home language(s) but acknowledge that this might play a role in the development of English syntax. Grammatical features can transfer from one language to another (Yip & Matthews, 2007), which might be responsible for ungrammatical or atypical constructions (Otwinowska et al., 2020). Simultaneously, there is some evidence that hearing a syntactic construction in one language can make children with EAL more likely to produce this construction in another language (e.g. Hervé et al., 2016; Vasilyeva et al., 2010; Wolleb et al., 2018), even if the primed construction is ungrammatical in the target language (Hsin et al., 2013). This suggests that a heritage language can provide scaffolding for children to learn similar constructions in another language, which could compensate, at least to some extent, for lesser exposure to the societal language.

Did the EAL and Monolingual Groups Differ in the Rate of Growth in Syntactic Complexity?

In general, both groups experienced growth in syntactic complexity during the two-year period. However, growth trajectories for the EAL and monolingual groups depended on the English vocabulary knowledge in Year 1. Among children with low English vocabulary in Year 1, syntactic complexity developed faster in the EAL group relative to monolingual peers, but the opposite was true among children with high vocabulary. Children with average vocabulary showed parallel rates of growth irrespective of whether they spoke EAL.

Notably, most children with EAL with poorer English language skills experienced rapid growth in syntactic complexity over the first three years in school, consistent with the complexity hypothesis. In contrast, monolingual children with low language skills demonstrated slower rates of growth that may indicate more general issues with language learning (Whiteside & Norbury, 2017). The slower growth in complex syntax of the high-vocabulary children with EAL than for the high-vocabulary monolinguals is quite surprising but suggestive of regression to the mean.

Overall, these findings add to the existing evidence that early proficiency in the language of instruction better predicts language growth and outcomes than the EAL label alone (Hessel & Strand, 2021; Whiteside & Norbury, 2017).

Despite moderate-to-strong associations between syntactic complexity (MLUw and CD) and English vocabulary at both time points, vocabulary growth was not correlated with growth in syntactic complexity in neither group. This seems to be consistent with Valentini and Serratrice's (2021) finding that in children with EAL in early primary school, vocabulary and grammar develop independently. Together with results of correlated growth in these two domains in younger children with EAL (aged 2;6 to 4; Hoff et al., 2018), it appears likely that there are developmental effects in the relationship between growth in vocabulary and growth in grammar. Our exploratory finding is thus worth replicating on in future studies with more assessment points.

Did the Narratives of the EAL and Monolingual Groups Differ in Syntactic Diversity?

In addition to the frequency with which complex syntax was produced, we were also interested in the range of syntactic forms that children included in their narratives. Children with EAL used a similar range of constructions to their monolingual peers, but some types of complex clauses were produced with varying frequency in the two groups. All construction types were present in both groups in Year 1 but increased in use to Year 3.

In sum, children with EAL were able to construct narratives with comparable number of utterances and clauses as their monolingual peers, and their stories were equally complex, although this was achieved through using different types of clauses with different frequency. Our findings provide evidence that bilinguals are not two monolinguals in one (Grosjean, 1989), as children with EAL in our study displayed different, but not detrimental, trajectories of syntactic diversity development.

Strengths and Limitations of the Study

This study has many strengths: it is one of few longitudinal studies comparing syntactic complexity of children with EAL and their monolingual peers over a two-year period. Using a population sample, we employed a matching design ensuring that children with different levels of English language skills were evenly distributed across the two groups. Our participants with EAL were from linguistically-diverse backgrounds, which is the more typical situation in community schools (as opposed to a single language community). Finally, our reliable and detailed coding manual could be used by educators to track the types of constructions used by children with EAL and mapped to grammatical forms targeted in the National Curriculum.

Our study is limited by the lack of data on home language exposure, both concurrent and prior to school entry. This would have allowed us to compare the English input in the monolingual and EAL groups and quantify the extent of the possible cross-linguistic transfer. However, in the UK context with over 300 languages spoken in schools (NALDIC, 2012), it is difficult for schools to collect this type of information about their pupils, and there is a lack of reliable assessment and qualified assessors to obtain such information directly. Additionally, despite a relatively large sample size giving us enough power to detect effect sizes of 0.5 or more, we had less power to detect smaller differences between the EAL and monolingual groups. Yet, the numerically higher Year 3 syntactic complexity in the EAL group than in monolinguals indicates the unexpected direction of the effect, which could be replicated in future studies with larger sample sizes.

Our groups differed with respect to socio-economic disadvantage, despite recruitment from a generally more affluent area of the UK. Inclusion of SES as a co-variate did not affect our primary findings, but the potentially different role that SES may play for children with and without EAL on language development requires further investigation with larger samples and more diverse socio-economic backgrounds.

Furthermore, our linear mixed models were able to account for initial language ability differences across children (random intercepts) but could not take into consideration by-participant differences in the rate of change. To construct models with random slopes, a longitudinal study with at least three time points is necessary.

The study also spotlighted one caveat to using a narrative task despite its many benefits: children might produce stories that are not a true reflection of their underlying maximal language skills. Therefore, replicating the analysis of the relationship between vocabulary and growth in syntactic complexity using different tasks (for example, expository discourse) would be necessary to examine the consistency of the effects we found in this study.

Educational Implications

Our results can serve as reference data on the development of complex sentences in children with EAL and their monolingual peers. Furthermore, story retelling appears to be a useful pedagogical tool for assessing children's knowledge of syntactic constructions and identifying practice targets, minimising word-finding demands for the EAL group.

Conclusions

We found no difference between children with EAL and their monolingual peers on syntactic complexity, but different developmental patterns of syntactic diversity. Growth in syntactic complexity varied by initial English vocabulary knowledge, with the fastest growth experienced by low-vocabulary children with EAL and high-vocabulary monolingual children. Children with EAL made more grammatical errors than monolinguals at both time points but achieved comparable syntactic complexity, which suggests that errors might create a false perception of their relatively strong syntactic skills.

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Data, code and materials availability statement

The coded narrative data, participants' characteristics and R scripts for data wrangling and analysis are available on Open Science Framework at https://osf.io/cgw9j/. The syntactic coding manual can be found at https://doi.org/10.17605/OSF.IO/WQGZ9.

We endeavoured to make all the relevant documentation as open as possible, however, in the following cases it was not possible, and the Editor, Ben Ambridge, approved the exemptions from sharing on 21st January 2022.

We were unable to share any data that may be identifiable. Therefore, we did not share IDACI Rank scores, which use children's home postcode to estimate neighbourhood affluence. In addition, the small number of children speaking particular languages and the narrow geographical area from which we recruited could potentially identify participants. We therefore did not include children's home language data.

Furthermore, the standardised assessments that we used (most importantly Narrative Retell task from Assessment of Comprehension and Expression, Adams et al., 2001) are copyrighted and thus it was not possible for us to openly share the test material.

Ethics statement

Parents or legal guardians gave informed, written consent for the in-depth assessments in Year 1 and 3. The SCALES project was approved by the Ethics Committee at Royal Holloway, University of London, and further research analysis of the existing data was approved by the Research Ethics Committee at University College London (Project ID 9733/002).

Authorship and Contributorship Statement

DW was involved in conceptualisation and design of the study, led on creation of the syntactic complexity coding manual, participated in preparing narrative data for coding, co-supervised narrative data coding, analysed the data, prepared figures and tables, wrote the first draft and edited subsequent drafts. LL was involved in creating the syntactic complexity coding manual, took the lead on narrative data curation and preparation for coding as well as planning of narrative coding, co-supervised narrative data coding, contributed to writing Assessment Measures and Procedures sections of the paper, and reviewed and edited the manuscript draft. MJ and HK gave feedback on the syntactic complexity coding manual, coded the narrative data, prepared the table of clause types in the Methods section, and reviewed and edited the manuscript draft. CN conceptualised and designed the study, was responsible for overseeing research activity planning and execution throughout the study, provided supervision, and reviewed and edited the manuscript draft.

All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Acknowledgements

This research was supported by the Economic and Social Research Council Studentship (ES/P000592/1) awarded to Disa Witkowska and the Wellcome Trust (WT094836AIA) grant awarded to Courtenay Norbury.

We would like to thank Jo Saul and Sarah Griffiths for ongoing R coding support and helpful discussion of the findings. We would like to thank Aleksandra Petrykiewicz for assistance with writing the code for matching participants. We also thank Suet Yee Ng and Lik Hong Lo for starting the work at adapting Frizelle et al.'s (2018) coding manual for our purposes. Finally, we thank all the schools, parents and children who participated in this research project.

Supplementary Materials

Table S1. ***The mean number of other comments (co), repetitions (false starts and fillers; rr), unfinished (u) and unintelligible (ui) utterances for the EAL and Monolingual groups in Years 1 and 3.***

Clause type	EAL		MONO		Comparison between EAL and MONO			
	Year 1	Year 3	Year 1	Year 3	Year 1 t-test		Year 3 t-test	
	M (SD)	M (SD)	M (SD)	M (SD)	*t*(df)	*p*	*t*(df)	*p*
co	2.73 (2.88)	2.46 (2.35)	2.58 (1.84)	2.5 (2)	0.26 (48.47)	.799	-0.06 (52)	.952
rr	11.63 (8.96)	11.69 (6.49)	8.67 (6.04)	10.44 (7.2)	2.02 (92.96)	.047	0.92 (101)	.36
u	2.32 (1.75)	2.08 (1.4)	2.14 (1.24)	1.84 (1.07)	0.42 (56)	.677	0.84 (72)	.404
ui	1.5 (0.55)	1.83 (2.04)	1.25 (0.5)	1.81 (2.26)	0.73 (8)	.486	0.02 (20)	.984

Note. Calculation excludes 10 children in Year 1 and 3 children in Year 3 who did not produce the narrative.

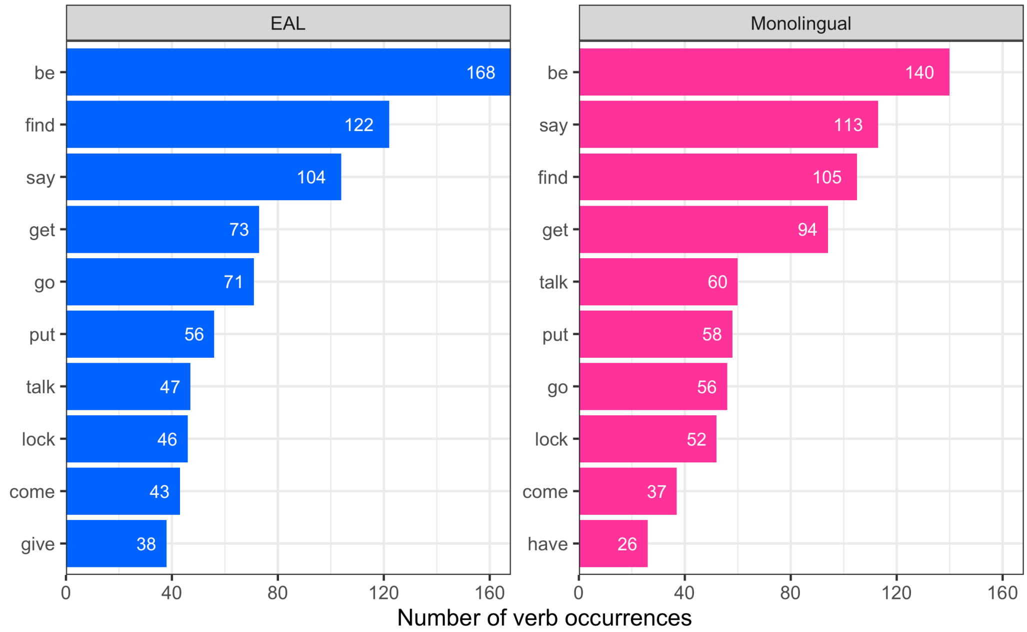

Figure S2a. ***Comparison between EAL and Monolingual groups on 10 most frequent verbs in Year 1.***

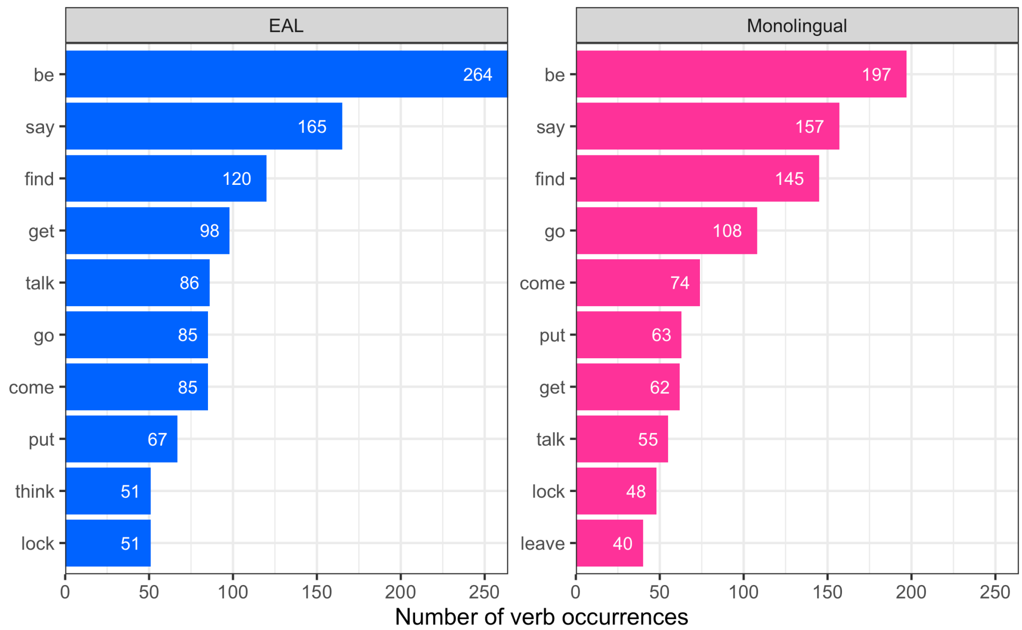

Figure S2b. ***Comparison between EAL and Monolingual groups on 10 most frequent verbs in Year 3.***

Table S3. ***Frequency of clause use by type for EAL and Monolingual groups in Years 1 and 3.***

Clause code	Clause type	EAL		MONO	
		Year 1	Year 3	Year 1	Year 3
m	main	0.66	0.62	0.65	0.56
cr	reported speech	0.07	0.08	0.07	0.08
m+	main with elided subject	0.06	0.07	0.04	0.1
cn	non-finite complement	0.05	0.06	0.04	0.07
ca	causal adverbial	0.04	0.04	0.05	0.05
vp	verb phrase	0.03	0.01	0.02	0.02
a	adverbial	0.02	0.02	0.02	0.03
cf	finite complement	0.02	0.05	0.03	0.02
x	no-verb phrase	0.02	0.01	0.04	0.02
i	imperative	0.01	0.01	0	0.01
n	non-finite, non-complement	0.01	0.01	0.01	0.02
r	relative	0.01	0.02	0.01	0.02
cc	comment clause	0	0	0	0
n+	causal non-finite, non-complement	0	0	0.01	0.01

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