Journal of Child Language (2024), **51**, 454–469
doi:10.1017/S0305000922000411

CAMBRIDGE UNIVERSITY PRESS

BRIEF RESEARCH REPORT

Monolingual and bilingual children's production of complex syntactic structures

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(Received 25 June 2021; revised 20 July 2022; accepted 21 July 2022)

Abstract

Typically-developing bilingual children often score lower than monolingual peers of the same age on standardized measures; however, research has shown that when assessed in more natural discourse contexts, bilinguals can perform similar to age-matched monolinguals in some language subdomains. This study investigated complex syntax production in simultaneous French–English bilingual children and monolingual age-matched peers, using structured and spontaneous measures. Surprisingly, the bilinguals scored higher than the monolinguals on the structured task. There was no difference between groups on the spontaneous measure; however, predictors of complex syntax production differed by language groups and by tasks. Contrary to other language subdomains showing bilingual English development as protracted relative to monolingual peers, these results point to a relative strength of complex syntax acquisition among simultaneous bilingual children. Differences in exposure relative to monolingual children may be less pronounced in syntax, in part because bilinguals can benefit from syntactic knowledge in their other language.

Keywords: Bilingual language development; complex syntax; language assessment

Introduction

Young, typically-developing, English language learners (ELLs) often score lower than monolingual peers of the same age on standardized measures of language (e.g., De Lamo White & Jin, 2011; Gutiérrez-Clellen, 1996; Hasson, Camilleri, Jones, Smith & Dodd, 2012; Laing & Kamhi, 2003; Paradis, 2010; Restrepo, 1998; Roseberry-McKibbin, 1994; Stow & Dodd, 2003). The primary reason for this difference stems from reduced exposure relative to monolingual peers.

Interestingly, research has shown that when assessed in more natural discourse contexts, such as storytelling tasks, ELLs can perform similarly to age-matched monolingual children in some language subdomains (Cahill, Cleave, Asp, Squires & Kay-Raining Bird, 2020; Nicoladis & Jiang, 2018). Nicoladis and Jiang (2018) examined the lexical abilities of 4-6 year old Mandarin–English bilingual children and their monolingual Mandarin peers, in a storytelling task. The bilingual children used as many different words in each language as their monolingual peers, despite scoring lower on standardized

vocabulary measures. The aim of the current study was to compare the production of complex syntax between bilingual and English monolingual children, using both structured, contextualized tasks and unstructured, decontextualized measures.

Bilingual complex syntax acquisition

There has been increasing interest within the last decade in the complex syntax acquisition of bilingual children (Cahill et al., 2020; Chondrogianni & Marinis, 2011; Paradis & Kirova, 2014; Paradis, Rusk, Duncan & Govindarajan, 2017). Some studies have found that bilingual children score below monolingual norms in syntax (Chondrogianni & Marinis, 2011). Using standardized measures of complex syntax, Chondrogianni and Marinis (2011) found only 1/3 of a sample of Turkish–English simultaneous bilingual children scored within monolingual norms. In contrast, Paradis and Kirova (2014) measured the sentence complexity of young ELLs, using the Edmonton Narrative Norms Instrument (ENNI; Schneider, Dubé & Hayward, 2005). The majority of these children's performance was within the monolingual typical range. Similarly, Cahill et al. (2020) compared the complex syntax production of monolingual and bilingual children. The two groups performed similarly.

One possible reason for these divergent findings is how complex syntax was measured. Chondrogianni and Marinis (2011) used highly structured measures that require specific responses within a decontextualized testing context, whereas Paradis and Kirova (2014) and Cahill et al. (2020) used more spontaneous, narrative contexts. It is possible that highly structured measures, such as those used in Chondrogianni and Marinis (2011), do not accurately capture the complex syntax capabilities of bilingual children.

Predictors of bilingual complex syntax acquisition

There is substantial variation within bilingual language development, such as in children's onset of exposure to either language, the quantity of exposure, the richness of the English language environment, and the contexts in which children receive this input. One study found different predictors for monolingual and bilingual children's lexical selection in a spontaneous language task (Nicoladis & Jiang, 2018). For monolingual children, both age and vocabulary size predicted the diversity of words used to tell a story (Nicoladis & Jiang, 2018; see also Berman, 1988). If vocabulary size predicts children's storytelling, one would expect bilingual children to use fewer words to tell stories compared to their monolingual peers with greater English language exposure and bigger vocabularies. However, Mandarin–English bilingual children used as many different words in their stories as their monolingual peers of both languages (Nicoladis & Jiang, 2018). This study also found that attentional control predicted the bilingual children's diversity of words used. These findings suggest that on a relatively unstructured task, bilingual children may rely on cognitive resources to compensate for their smaller vocabularies. As a result, they may be able to reach the same level of performance as same-age monolinguals. Cognitive factors may also play a role in bilingual children's complex syntax production.

To our knowledge, only two studies have examined predictors of complex syntax acquisition in L2 English children. Both reported length of exposure to English as a significant predictor (Chondrogianni & Marinis, 2011; Paradis et al. (2017). Paradis et al. (2017) found other variables also predicted complex syntax production, including verbal memory. These results align with monolingual research, showing that cognitive maturity

https://doi.org/10.1017/S0305000922000411 Published online by Cambridge University Press

is a predictor of L1 development, particularly in the domain of complex syntax (Diessel, 2004; Huttenlocher, Waterfall, Vasilyeva, Vevea & Hedges, 2010; Vasilyeva, Waterfall & Huttenlocher, 2008, as cited in Paradis et al., 2017).

Current Study

The present study compared French–English bilingual and monolingual English children's performance on a standardized measure of complex syntax production, the New Reynell Developmental language Scales 4th Edition (NRDLS-4; Edwards, Letts & Sinka., 2011). We expected the bilingual children to perform worse than monolinguals on this measure, as previous studies have shown. We also elicited a story from the children, and coded their sentences for complexity. We predicted that the bilingual children would produce more complex sentences than would be expected based on their performance on the NRDLS-4 and similarly to their monolingual peers (as in Cahill et al., 2020).

Finally, we expected working memory to positively predict the bilingual group's complex syntax production in the storytelling task; however, we expected children's vocabulary scores to predict only the monolingual group's complex syntax performance. All of the bilingual participants had an L2 onset before 3 years of age, from an additive sociolinguistic context (French–English, Canadian city).

Methods

Participants

Seventy-one bilingual children and 77 monolingual children participated. Fifteen bilingual participants and 20 monolingual participants were removed from analyses due to not having completed one of the tasks. An additional 14 bilingual children were removed due to being strongly English dominant. The remaining bilingual and monolingual participants were age-matched using a four month range, leaving 39 children per group in the final analyses. By parent report, all children were typical in their language development. Participants were recruited from the greater Edmonton area.

The mean age of the bilingual participants was 5;01 months (range = 4;03–7;01). Nineteen were female and 20 were male. All were French–English bilinguals, the majority being simultaneous (N = 38). In this study, simultaneous bilingualism is defined as exposure to both languages by the age of 2 years. One bilingual participant was a sequential bilingual, who had begun learning English between 2–3 years of age. Information on age of English language exposure was not available for 3 of the bilingual participants. Information on language dominance was obtained via parent report. Three of the bilingual participants were strongly French dominant, 9 were slightly French dominant, 16 were balanced French–English speakers, and 10 were slightly English dominant.

The mean age of the monolinguals was 5;00 months (range = 4;02–6;12). Twenty-one were female and 18 male. Per parent report, the monolingual children had been consistently exposed to English only. There was no significant difference in age between the two language groups.

Materials

Standardized complex syntax production task

The NRDLS-4 was the standardized language measure (designed for children between the ages of 2;0–7;6) used to assess the production of complex sentences. We collected data

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using the complex sentence section of the production scale (test items Fi-Fiii), which examines the production of three types of sentences: four WH-questions, three passive sentences, and three relative clauses, using picture stimuli for each question. This section consists of ten questions, using picture stimuli for each question: the WH-questions subsection consists of 4 different WH-questions: 2 WHO questions in the subject position, 1 WHICH question in the subject position, and 1 WHICH question using the passive structure (e.g., *Which elephant is carried by the boy?;* Edwards et al., 2011, p.12).

Complex syntax in storytelling

We measured complex sentence production in a spontaneous storytelling task that consisted of two 4-minute clips of two different Pink Panther cartoons, shown back-to-back. In the first clip, the Pink Panther tries to get rid of an annoying cuckoo bird and finally ends up being friends with it. In the second clip, the Pink Panther flies an experimental jet that leads him on a merry romp. The clips contained no spoken words.

Receptive vocabulary tests

The Peabody Picture Vocabulary Test, Third Edition (PPVT-3; Dunn & Dunn, 1997) was administered to both language groups, according to the test manual. The bilingual participants also completed the Échelle de vocabulaire en images Peabody (EVIP; Dunn, Thériault-Whalen & Dunn, 1993), the French adaptation of the PPVT. We used the raw scores in the analyses, as we were interested in children's relative performance.

Visuo-spatial short-term memory

The Corsi-block tapping task is a measure of short-term visuospatial memory. Children were shown nine blocks on a computer screen. The experimenter touched a sequence of blocks and children were supposed to touch the blocks in the same order. In order to introduce the task, the experimenter first touched only one block. All children successfully touched the same block as the experimenter on this trial. The experimenter next touched two blocks, adding on one more block in the sequence until children made at least one error. The score was the highest number of blocks a child recalled correctly.

Verbal short-term memory

To assess the children's verbal short-term memory, we used a digit forward span (DFS) test. The DFS requires children repeat a sequence of numbers in the same order heard. The experimenter said a sequence of numbers to children, starting with a single number. All children successfully repeated one number. The experimenter then added one other number to the sequence, continuing in this pattern until children made at least one error in repeating a sequence. The score was the longest sequence a child remembered correctly.

Procedure

The data for this study come from a larger study on children's language and cognitive development. In a testing session, children were given a battery of language and cognitive tasks by a native speaker of the target language of the session. The bilingual children were

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tested in two different testing sessions: one in English and one in French, with the order of sessions counterbalanced. The two sessions for the bilinguals took place on two different days with two different experimenters, approximately a week apart. Task order was determined by the experimenter, based on rapport and the child's interest. The session usually started with the more passive tasks (like the receptive vocabulary tests) and proceeded to the more active tasks (like the storytelling task). We focus here on the tasks that were relevant to our research questions.

NRDLS-4 complex sentences section

The complex sentences section was administered following the procedures in the manual, beginning with the WH-questions. The examiner first administered the practice item, prompting the child to ask a WH-question to one of the animals in the stimuli (e.g., *You want Monkey to tell you which boy is chasing the girl. What do you ask Monkey?*; Edwards et al., 2011, p. 37). The four WH-question items were then administered in the same manner. Relative clause items were administered next, using a model-sentence completion format. For the practice item, the experimenter described the first picture, using a relative clause (e.g., *In this picture the boy who is pulling the lady is wearing a hat*), then turned to another picture and initiated the next relative clause sentence for the child to complete in the same way (e.g., *And in this picture, the lady…*). The three test items proceeded in this manner. Passive sentences were adminstered last. The experimenter explained that they would describe a picture a certain way and for the child to describe another picture in the same manner. For the practice and three test items, the experimenter modelled the passive sentence while describing a picture, and instructed the child to describe another picture using the same structure.

Storytelling task

Each participant watched the cartoons. After watching, they were asked to recount as many details of the cartoons as they could remember. If the children paused in telling the story, the experimenter asked open-ended questions like, "Was there anything else?" or "What happened next?" or "Was that the end?".

Scoring

NRDLS-4 complex sentences section

All items were scored as either correct (1) or incorrect (0) following scoring instructions in the manual, for a total possible raw score of 10. Correct WH-questions needed to begin with the correct WH-word, followed by the appropriate verb and tense marking. Determiners had to also be included in order to be considered correct. A relative clause response needed to contain the correct relative clause, correct verb and tense marking, and correct determiner. Finally, a passive response was considered correct if every element was included: determiners, auxiliary verb, and the passive morphological markers (-ed, by-phrase).

Storytelling task

Sentences were coded as simple, complex, or other (i.e., ambiguous). In order to be considered complex, a sentence had to contain at least two clauses. We also looked for

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instances of the complex sentences tapped by the NRDLS-4 (i.e., passives and WH-questions); there were none. Ambiguous sentences included false starts leading to verb changes (e.g., *He just kept he just sleep*), incomplete sentences (e.g., *But I saw*), complex sentences with omissions of connectives (e.g., *And then I think I don't know all the rest,* which could be a false start or implied relative clause), or other errors (e.g., *He sleeped just a bird*). Morphological and syntactic errors were not noted in participants' sentences. The number of complex sentences was counted, both as a total and as a proportion of the number of utterances.

Results

Performance on standardized measures

Table 1 summarizes the children's performance on the standardized measures. Results from the Shapiro Wilk test indicated a significant deviation from normality; thus we conducted Mann-Whitney U tests to compare groups' performances. For the NRDLS-4 complex sentences, the bilinguals scored significantly higher than the monolinguals ($p = 0.049$). For the PPVT-3, the bilinguals scored significantly lower than the monolinguals ($p < 0.001$). One monolingual child did not complete the PPVT-3. There was no significant group difference between performances on the Corsi Blocks test ($p = 0.960$). Two monolingual children and one bilingual child did not complete the Corsi Block test. For the DFS task, the bilingual scored significantly higher than the monolinguals ($p = 0.022$). One monolingual child did not complete the DFS task.

Performance on storytelling task

Table 2 presents, for each group, the average total number of sentences produced in the storytelling task, as well as the proportion of simple and complex sentences. Mann-Whitney U tests were conducted to compare group performances for all three measures. No significant group differences were found for the number of sentences produced ($p = 0.149$), the proportion of simple sentences produced ($p = 0.222$), or the proportion of complex sentences produced ($p = 0.389$).

Thirty-four of the 39 bilingual participants completed the French storytelling task (see Table 3). These participants produced an average of 10.4 sentences ($SD = 7.2$). On average, 65.7% of the bilingual children's sentences were simple ($SD = 28.6$), and 34.3% were complex ($SD = 28.6$).

Table 1. Raw Scores on Standardized Measures

	NRDLS-4		PPVT-3		Corsi Blocks		DFS	
	ML	BIL	ML	BIL	ML	BIL	ML	BIL
Mean	5.4	7.1	96.4	64.6	3.7	3.7	4.18	4.64
SD	4.1	3.7	20.0	21.8	0.94	0.90	0.83	0.99
Min	0.0	0.0	63.0	20.0	2.0	2.0	3.00	3.00
Max	10.0	10.0	137.0	102.0	7.0	5.0	7.00	7.00

Note: ML = Monolingual participants. BIL = Bilingual participants. DFS = Digit Forward Span

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Table 2. Descriptives for English Storytelling Task

	# Sentences		Proportion Simple		Proportion Complex	
	ML	BL	ML	BL	ML	BL
Mean (SD)	11.4(14.1)	7.6(5.0)	0.69(0.25)	0.60(0.30)	0.31(0.25)	0.37(0.29)
Min	2.0	0.0	0.0	0.0	0.0	0.0
Max	89.0	26.0	1.0	1.0	1.0	1.0

Note: ML = Monolingual participants. BIL = Bilingual participants

Table 3. Descriptives for French Storytelling Task

	Proportion Simple	Proportion Complex	Total
Mean (*SD*)	0.66*(0.28)*	0.34*(0.29)*	10.39*(7.20)*
Min	0.0	0.0	3.0
Max	1.0	1.0	32.0

Predictors of performance on NRDLS-4 complex sentences section

Bilingual group

We conducted a hierarchical linear regression analysis to test predictors of the NRDLS-4, after accounting for participants' age (see Table 4 for summary). Only variables that were significantly or marginally correlated with NRDLS-4 scores were included in the model. In the first block, age was the predictor variable. In the second block, the predictor variables introduced were the bilingual children's proportion of complex sentences produced in the English storytelling task, PPVT scores, and DFS scores.

Age was a significant predictor of the bilingual children's proportion of English complex sentences (R^2-*change* = 0.136, *F change*(1,37) = 5.807, $p = 0.021$). The second model predicted an additional 16.5% of variance (R^2-*change* = 0.165, *F-change(3,34)* = 2.669, $p = 0.014$). Bilingual participants' PPVT-3 score was the only significant predictor in the model ($B = 0.364$, $p = 0.039$).

All participants

We examined whether there were any correlations with NRDLS-4 scores when collapsing across language groups. There were no significant correlations between children's NRDLS-4 scores and the proportion of complex sentences produced on the English storytelling task ($r = 0.160$, $p = 0.162$) or with children's raw Corsi Block scores ($r = 0.167$, $p = 0.153$); however, there were significant correlations with age ($r = 0.417$, $p < 0.001$), children's raw PPVT scores ($r = 0.244$, $p = 0.032$), and DFS scores ($r = 0.392$, $p < 0.001$). The correlation with language status (0 = monolingual, 1 = bilingual) approached significance ($r = 0.214$, $p = 0.06$).

We examined predictors of performance on the NRDLS-4 after collapsing the two groups (see Table 5 for summary). Similar to the first model, age was the predictor

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Table 4. Summary of the Hierarchical Regression Analysis of Bilingual Children's NRDLS-4 Performance

Model		Unstandardized	Standard Error	Standardized	Partial	*t*	*p*
H_0	(Intercept)	−3.795	4.547			−0.834	0.409
	Age	0.177	0.073	0.368	0.368	2.410	0.021
H_1	(Intercept)	−3.598	4.670			−0.770	0.446
	Age	0.068	0.079	0.140	0.145	0.852	0.400
	ENG% Complex	1.260	1.981	0.101	0.108	0.636	0.529
	PPVT	0.061	0.029	0.364	0.345	2.146	0.039
	DFS	0.455	0.588	0.122	0.131	0.773	0.445

Table 5. Summary of the Hierarchical Regression Analysis of All Children's NRDLS-4 Performance

Model		Unstandardized	Standard Error	Standardized	Partial	*t*	*p*
H_0	(Intercept)	−7.269	3.658			−1.987	0.051
	Age	0.223	0.060	0.398	0.398	3.727	< .001
H_1	(Intercept)	−10.582	3.473			−3.04	0.030
	Age	0.112	0.060	0.199	0.216	1.860	0.067
	Language status	3.175	1.093	0.410	0.326	2.906	0.005
	PPVT	0.064	0.021	0.434	0.346	3.110	0.003
	DFS	0.754	0.473	0.173	0.186	1.593	0.116

variable in the first block. In the second block, the predictor variables were language status, raw PPVT scores, and DFS scores.

Age significantly explained 15.8% of the variation in scores ($p < 0.001$). The second model significantly predicted an additional 18.1% of variance (R^2-*change* =0.181, *F-change*$(3, 71) = 6.469$, $p < 0.001$). Language status ($B = 0.410$, $p = 0.005$) and children's raw PPVT scores ($B = 0.434$, $p = 0.003$) significantly predicted variation in performance. Thus, when examining predictors of all children's NRDLS-4 performance, increased age, higher PPVT scores and bilingual language status all predicted a higher number of complex sentences produced.

Predictors of performance on English storytelling task

Bilingual group

To examine whether predictors of the bilingual children's English complex syntax production differed between tasks, we carried out another set of correlations with the bilingual performance on the English storytelling task. No significant correlations were

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found for age (r = 0.262, p = 0.107), English experience (r = −0.026, p = 0.882), or language dominance (r = 0.270, p = 0.101). Marginally significant correlations were found with the bilingual group's raw PPVT scores (r = 0.313, p = 0.052) and their NRDLS-4 complex syntax section scores (r = 0.294, p = 0.069).

Significant correlations were found with their proportion of complex sentences on the French storytelling task (r = 0.442, p = 0.009) and their DFS scores (r = 0.352, p = 0.028). We entered age, French storytelling performance, NRDLS-4 scores, PPVT scores, and DFS scores as predictors into the model.

The first model (age) was not significant (see Table 6 for summary). The second model significantly predicted 40.4% of variance (R^2-*change* = 0.404, *F-change*(4,28) = 5.374, p = 0.02), after controlling for age. Significant predictors of the bilingual children's complex sentence production in English were their complex syntax production in French (storytelling task) (B = 0.370, p = 0.010) and their DFS scores (B = 0.301, p = 0.044).

All participants

We also examined whether there were any relationships between the study variables and children's complex syntax production on the English storytelling task when combining both language groups. There were no significant correlations between all participants' storytelling task performance and language status (r = 0.122, p = 0.288), NRDLS-4 scores (r = 0.160, p = 0.162), PPVT-3 scores (r = 0.144, p = 0.212), DFS scores (r = 0.189, p = 0.100) or Corsi Block scores (r = 0.144, p = 0.219); however, there was a marginally significant correlation between children's storytelling task performance and age (r = 0.201, p = 0.077).

We conducted a hierarchical multiple regression model to examine predictors of complex syntax production on the English storytelling task after collapsing both groups (see Table 7 for summary). We examined the following predictors: age, language status, NRDLS-4 scores, PPVT-3 scores, and DFS scores. The model was not significant (p = 0.088).

Discussion

In the present study, we compared the complex syntax production (both structured and unstructured measures) of French–English bilingual children and their age-matched monolingual peers. We predicted the structured measure (NRDLS-4) to show the bilingual group as scoring lower than the monolingual group, while performing similarly to their monolingual peers in the unstructured measure (storytelling task). Our expectations regarding syntax performance were partially upheld. As anticipated, the bilingual and monolingual groups did not differ in the proportion of complex sentences produced in a spontaneous narrative context. However, surprisingly, the bilingual group scored significantly higher than monolinguals on the standardized test. In other words, there was no bilingual disadvantage on either task. These findings underscore the possibility that syntax might be less influenced by language exposure in bilingual children than vocabulary.

Chondrogianni and Marinis (2011) compared English complex syntax between simultaneous Turkish–English bilinguals and their English monolingual peers, and found that only one third of the bilingual children were able to approach monolingual norms. One possible explanation for the difference in findings could be the different

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Table 6. Summary of the Hierarchical Regression Analysis of Bilingual Children's English Storytelling Performance

Model		Unstandardized	Standard Error	Standardized	Partial	*t*	*p*
H_0	(Intercept)	−0.250	0.419			−0.598	0.554
	Age	0.010	0.007	0.264	0.264	1.546	0.132
H_1	(Intercept)	−0.899	0.379			−2.371	0.025
	Age	0.007	0.006	0.167	0.205	1.109	0.277
	FREN % Complex	0.006	0.001	0.528	0.574	3.712	<0.001
	NRDLS-4	0.021	0.014	0.233	0.272	1.497	0.146
	PPVT	0.001	0.002	0.090	0.106	0.563	0.578
	DFS	0.094	0.044	0.301	0.370	2.108	0.044

Table 7. Summary of the Hierarchical Regression Analysis of All Children's English Storytelling Performance

Model		Unstandardized	Standard Error	Standardized	Partial	*t*	*p*
H_0	(Intercept)	−0.290	0.268			−1.082	0.283
	Age	0.010	0.004	0.267	0.267	2.382	0.020
H_1	(Intercept)	−0.462	0.299			−1.548	0.126
	Age	0.007	0.005	0.169	0.157	1.329	0.188
	Language status	0.102	0.093	0.189	0.129	1.092	0.279
	NRDLS-4	−0.002	0.010	−0.035	−0.030	−0.253	0.801
	PPVT	0.002	0.002	0.214	0.147	1.241	0.219
	Forward digit span	0.044	0.039	0.143	0.133	1.122	0.266

language backgrounds. Turkish is an SOV language with different syntactic patterns compared to English (Marinis & Saddy, 2013). French and English, on the other hand, are often identical in their word order and construction of complex sentences. As such, the role of exposure to English is arguably reduced in the acquisition of a French–English bilingual child's complex syntax. Cahill et al. (2020) found no significant differences in the production of complex sentences between English-French bilingual children and their monolingual English peers, aligning with the current study's findings that complex syntax performance may be less impacted by language exposure compared to other language subdomains. We next turn to a discussion of some reasons why bilingual children might (at least sometimes) be able to do well in complex syntax.

Factors predicting complex syntax performance on the NRDLS-4

In order to better understand how bilingual children might show such strong performance on measures of complex syntax, we explored some predictors of both their NRDLS-4 performance and the complex sentences they produced while telling a story. We considered the tasks separately because children's complex syntax production in the storytelling task was not significantly correlated with their NRDLS-4 performance.

The regression model for the bilingual children's NRDLS-4 scores showed that receptive vocabulary was the only significant predictor after controlling for age. The regression model collapsing across groups showed both bilingual language status and PPVT scores significantly after controlling for age. The direction of these predictors may seem counterintuitive at first glance, given that the bilingual group had significantly lower PPVT scores than their monolingual peers; however, recall that receptive vocabulary scores significantly correlated with all children's NRDLS-4 scores, as well as with those of the bilingual children only. Thus, even though bilingualism predicted higher complex sentence scores on the standardized task, receptive vocabulary scores seem to have an overall positive effect on complex syntax performance. These results suggest that for a structured task, like the NRDLS-4, the amount of exposure and practice with the language is an important predictor of performance.

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Similar to the current study, Paradis et al. (2017) found L2 receptive vocabulary scores to predict L2 English children's complex syntax performance. Other variables that may play a role in bilingual complex syntax acquisition were not included in the current study, such as phonological short-term memory (Paradis et al., 2017), language aptitude (Paradis, 2011; Paradis, 2016), and complex syntax in the other language (here, French). Thus, future research should include a wider range of variables that may better capture the impact of individual differences on the bilingual acquisition of English complex syntax.

Factors predicting complex syntax performance on storytelling task

For the bilingual group's storytelling task performance, the regression model showed that their French complex syntax performance and DFS predicted their English complex syntax production. The model for all of the children was not significant. These results point to positive cross-linguistic transfer for the bilingual children, as previous studies have found (Bedore & Peña, 2008; Goldstein & Oller, 2011; see Paradis, 2007b for a review). The structural similarity between complex syntax structures in French and English may support this facilitation. If so, English language exposure may play less of a role than exposure to both languages. Future research would benefit from examining predictors of complex syntax performance in monolingual and bilingual children separately as well as together, in order to obtain a fuller understanding of how predictors might differ based on language exposure.

Future Directions

Additional research comparing the development of complex syntax between monolingual and bilingual populations is needed to test if bilingual complex syntax acquisition differs from other areas of language development. It is important to note that the majority of bilingual children in this study had been learning both languages simultaneously, in an additive sociolinguistic context in which both languages are actively supported. Also, although we did not have measures of individual families' socioeconomic status, the French–English bilinguals are likely to be from high socioeconomic status families. Additional research is needed on bilingual complex syntax acquisition with ELLs from diverse L1 backgrounds, to examine the role of language exposure and background. In addition, future research should examine a broader range of factors involved in bilingual complex syntax development (such as language aptitude, and quantity and quality of language input). Research investigating the bilingual acquisition of complex syntax has primarily used production-based measures (Cahill et al., 2020; Chondrogianni & Marinis, 2011; Paradis et al., 2017). It would be valuable for future research to extend this investigation to comprehension-based measures. Finally, future directions would benefit from including a more focused examination of different complex syntax types.

Conclusion

The current study investigated the complex syntax production in English between monolingual children and their simultaneous French–English bilingual peers, using both structured (NRDLS-4) and spontaneous (storytelling) measures. Significant differences

https://doi.org/10.1017/S0305000922000411 Published online by Cambridge University Press

between language groups were found only in the standardized task, where the bilingual children scored higher. These differences were observed despite the fact that the bilingual children's vocabulary scores were significantly lower than age-matched monolinguals. One possible reason for this area of strength is that bilingual children use different language and cognitive abilities to support their performance, depending on task demands. For example, in the structured task in this study, bilingual children's English vocabulary scores were a strong predictor. In the unstructured task, their use of complex sentences in French and their verbal working memory were strong predictors. Differences in the trajectories of bilingual language development have important implications for the assessment of their language abilities (e.g., Abudarham, 1997; De Lamo White & Jin, 2011; Paradis, 2005; Pearson, Fernández & Oller, 1993). The findings of the present study, in conjunction with previous studies (Cahill et al., 2020; Paradis et al., 2017), suggest that additional focus on syntax may help to reduce some of these assessment challenges. Future research aimed at distinguishing a language difference from disorder in bilingual development would benefit from a closer examination of syntax development.

Acknowledgements. Thanks to Nathalie Savoie and Carrie Jansen for their help in collecting the data. This study was funded by a Discovery Grant (grant #2018-04978) to the second author from the Natural Sciences and Engineering Research Council of Canada.

Competing interests. The authors declare none.

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Appendix

Examples of Narratives by language status and age

FEBeELL: Bilingual, age 50 months

He was like sleeping at the whole day and then his cuckoo bird was like, cuckoo. And then he kept falling asleep, and he's like cuckoo. And then he's like shattering like scissors with um

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with … And then, when he was like sleeping he put it back in a drawer, and then he's like cuckoo. And then he kept sleeping in. And then he woke up in the middle of the night, and the cuckoo bird snuck into the night. He use a saw for to um put a hole in his house, and then he went out and knocked on his door. And then there was this like loud band um when he opened the door. And then he's like shutting it, and then he's going out into the night, throwing it into the sea. And then the next night, he thought about um getting back the cuckoo bird house and the cuckoo bird. Yeah, yeah and the cuckoo bird was just getting out and then he dove in and then … And he swimmed and then he threw flowers in into the sea thinking that there was um the cuckoo bird somewhere further down into the sea. And then he got back the cuckoo bird um um and then … And then um … he was happy. He was like in the middle of the morning, he was like sleeping in and then he like fell asleep in the morning and then he um … then the cuckoo bird said cuckoo and then he kept sleeping in again, and then he said cuckoo and then he woke up.

FEBeMO01: Bilingual, age 75 months

He went to bed because he was sleeping. Then the bird waked him up. But that was really loud so … but he took a hammer, and bonked …whatever with there, I forget. And then … it …, the bird waked him up again, so he let go of something on his foot into his drawer. But he was still sleeping, and then it woked him up again, so … he turned the trigger and then it opened the door. And … he was still asleep and then the bird woked him up again. So he opened it up, so he opened the trigger up again. And then he fell in it. And when he came up, he went back to bed. And then … the bird woke him up again, so he banged wood on his door, that he could do it, so then the bird drilled a hole in his birdhouse, and he put some string down, and he went …. I think it was rope, and then he went down. And then when he was sleeping he heard knocking on the, but it's the pink panther, not the bird, he heard knocking on its door. And then when he opened it up … ah no, when he went to his door he was sleepwalking, and then when he opened it up, um, there was loud music, so he took him. So he put him back in his birdhouse, and pulled something out. And, the hands, out of it, and then he was like, and then the bird was like cuckoo for the part where the hands should be. So then he put … a … top of a bottle of wine. And took it off his foot, and then kicked the thing that was making the loud music. And then you, he went outside, closed his door and started going to the street, and then he put him into the ocean. And then his, uh, birdhouse went into the ocean. Uh, he went back into his bed, and then he got a bad dream, nightmare, a nightmare. So he went back, and looked into the ocean, but he wasn't there. So he jumped into the ocean, and then he looked, the bird went out of the ocean with his birdhouse, pushed it across the street and into his house. And … the Pink Panther was looking still, so he went out of the ocean. Uhh … and then … he throwed flowers in and he walked back to his house, went to sleep, and then the bird went cuckoo. And woke him up, and then he did it again, cuckoo, and woke him up, so he took him into his bed and, uh, and then when they were sleeping together, the other clock woke them up. And then the bird, um, smashed the … clock, and then he patted, and then the Pink Panther patted the bird on his head, and that's it!

EM06: Monolingual, age 60 months

The big panther had a cuckoo clock and the cuckoo clock… He was so mad that he had to wake up and he didn't wake up. And then he threw the cuckoo clock away in the ocean. And the cuckoo clock did some stuff that was not good. And he was said cause he didn't have a

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timer to wake up. So he just he had to go, he had to go, he had to go see his friend. And he needed a cuckoo clock to wake him up and he went to found him. And then he didn't see him cause he was throwing flowers. And then he went home and then he heard the cuckoo. And then he was, he saw and then the cuckoo clock was laying with him.

Experimenter: Well that's good, what about the next one?

He didn't… he was walking and there was an airport. And there was… an airplane coming along. And he got stuck somewhere on the airplane. Like and then he went in circles. And he got dizzy and he puked. And then he, he got down… and then he stop. And he started to run cause another person was, well the airplane went past. And then come back and then went past. And then came back and then that's all.

EM18: Monolingual, age 68 months

He was sleeping… and the bird… the tiger wakes up but he… breaks… his, the thing where he puts his milk. And… the bird and and he wakes up again. And then he, and then he covered his ears and then he. And the bird made a hole. And and but but he, but he was locking the clock.

But the bird made the hole to get out. And then he knocked on the door and then he comed and he opened the door. And then the bird made music. And then, and then, and then he, and then the bird went in and then, and then he took the clock out and throwed it in the water. And and I can't remember the rest.

Experimenter: Okay what happened in the second story?

He… goed in the airplane and he pressed the button. And he flied and he goed in circles. All around. And then he goed in the… in the outer space.

And I can't remember the rest.

Cite this article: Korade C., Nicoladis E., & Charest M. (2024). Monolingual and bilingual children's production of complex syntactic structures. *Journal of Child Language* **51,** 454–469, https://doi.org/10.1017/S0305000922000411