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Sentence repetition as a measure of morphosyntax in monolingual and bilingual children

MARIAM KOMEILI[1] & CHLOË R. MARSHALL[1,2]

[1]*Division of Language and Communication Science, City University London, UK, and* [2]*Department of Psychology and Human Development, Institute of Education, University of London, UK*

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Abstract
Bilingual children are frequently misdiagnosed as having Specific Language Impairment (SLI). Misdiagnosis may be minimized by tests with high degrees of sensitivity and specificity. The current study used a new test, the School-Age Sentence Imitation Test-English 32 (SASIT-E32), to investigate sentence repetition in monolingual and bilingual children, and specifically to compare overall repetition accuracy and error patterns in the two groups. Eighteen English-speaking monolingual children (mean age = 8;8) and 18 Farsi-English bilingual children (8;2) participated. Monolingual children repeated sentences more accurately than bilingual children, but, once receptive vocabulary scores were taken into account, this group difference disappeared. However, the groups demonstrated a different pattern of errors, with the bilingual group producing a higher proportion of substitution and addition errors on function words compared to content words. The main error expected from children with SLI according to the existing literature, i.e. the omission of function words, did *not* characterize the bilingual children's performance. We therefore propose that the SASIT-E32 might prove to be a valuable tool in identifying SLI in bilingual children.

Keywords: multilingualism, language measurement, morphology, syntax

Introduction

Delayed language development can result from either *external* or *internal* factors. External factors include reduced input in any one language due to bilingualism, while internal factors include Specific Language Impairment (SLI), i.e. where the child receives adequate input for normal language acquisition but his or her language-learning mechanisms are impaired in some way.

Internal and external factors can of course occur in the same child: bilingual children can have SLI. However, SLI is commonly incorrectly diagnosed amongst bilingual children (Klingner & Artiles, 2003; Paradis, 2010). Such misdiagnoses have led to a disproportionate inflation of bilingual children in special education programs, which ultimately leads to the misuse of speech and language therapy resources (Klingner & Artiles, 2003; Rothweiler, 2007). Given that, worldwide, bilingualism rather than monolingualism is the norm (Tucker, 1998), this is an issue of considerable importance. In order to avoid misdiagnosis, what are needed are language assessments which differentiate

Correspondence: Chloë R. Marshall, Department of Psychology and Human Development, Institute of Education, University of London, 20 Bedford Way, London WC1H 0AL, UK. Tel: +44 02076126509. Fax: +44 02076126304. E-mail: c.marshall@ioe.ac.uk

language delay due to bilingualism from language delay due to SLI. In this study, we investigate whether sentence repetition, and in particular the linguistically informed *School-Age Sentence Imitation Test-English 32* (SASIT-E32; Marinis, Chiat, Armon-Lotem, Piper, & Roy, 2011), might be suitable for this purpose.

Sentence repetition has been shown to be an excellent psycholinguistic marker of SLI, with high sensitivity and specificity, and with the ability to identify children whose language abilities are currently within the normal range despite a history of SLI (Conti-Ramsden, Botting, & Faragher, 2001). More recent research indicates that children from deprived socio-economic backgrounds repeat sentences less accurately than children of higher socio-economic status (Roy & Chiat, 2013). Clinically, sentence repetition forms part of a number of diagnostic test batteries, including the Clinical Evaluation of Language Fundamentals-4 (CELF-4; Semel, Wiig, & Secord, 2003), the Early Repetition Battery (Seeff-Gabriel, Chiat, & Roy, 2008) and the Grammar and Phonology Screening Test (van der Lely, Gardner, McClelland, & Froud, 2007). Experimentally, sentence repetition tasks have been successfully used to investigate the language abilities of monolingual and bilingual children in various languages.

In assessments such as the CELF-4 (Semel et al., 2003) only an overall repetition score is generated. However, sentence repetition methodology potentially allows for the collection of a much richer set of information than just a single score (Hesketh, Riches, & Vance, 2012). This is because a large number of possible errors can be made, including the omission of grammatical morphemes, the changing of word order, and the substitution of vocabulary. Children with different language profiles make different types of errors. Whereas typically developing children repeat content and function words and inflections with equal accuracy, children with SLI repeat function words and inflections less accurately than content words, with the most usual error being omission (Chiat & Roy, 2008; Seeff-Gabriel, Chiat, & Dodd, 2010). Children with semantically based reading difficulties ("poor comprehenders"), however, tend to make more semantic substitutions than typically developing children (Marshall & Nation, 2003).

Furthermore, sets of sentences with different linguistic properties have the potential to differentiate between groups with different profiles of language impairment. For example, Riches and colleagues devised a sentence repetition test comprising relative clauses that varied in syntactic complexity (Riches, Loucas, Baird, Charman, & Simonoff, 2010). While children with SLI and children with Autism plus Language Impairment produced comparable numbers of errors, the error patterns were not identical in these two groups: participants with SLI were more affected by syntactic complexity (i.e. by the type of relative clause) and were significantly more likely to change the syntactic structure of the sentence than those with Autism plus Language Impairment. Investigators are therefore increasingly using sentence repetition tasks where sentence structure is carefully manipulated in order to gain qualitative as well as quantitative information. In other words, they are beginning to investigate sentence repetition in different groups not just by looking at overall repetition accuracy, but by looking at errors on different types of sentences and on different word types.

The question we address in this study is whether bilingual children with *no* diagnosis of SLI (according to parental and teacher report) will pattern in a sentence repetition task like typically developing monolingual children or whether they will pattern more like children with SLI. Specifically, we investigate whether overall repetition accuracy and error patterns are the same in two groups of children: monolingual English children and a group of early bilingual children (Farsi-English). The task we use is the SASIT-E32 (Marinis et al., 2011), which we describe in more detail in the methodology section. Briefly, the SASIT-E32 consists of eight different sentence types, and its scoring system allows content and function word accuracy to be scored, and four different error types to be scored for content and function words. It therefore affords the opportunity to perform a fine-grained linguistic analysis of children's sentence repetition abilities.

Bilingualism is a complex linguistic phenomenon. The degree to which individuals have a command of two languages, and the contexts in which they have this command, varies widely.

There are also developmental differences, in that the relative timing of acquisition of the two languages can vary from simultaneous acquisition from birth, to acquisition of the second language anytime after birth, and the amount of input in both languages is not likely to be equal or to be spread equally across different contexts.

In the research literature, a variety of terms are used to describe the relative timings of acquisition of the two languages. "Simultaneous Bilingualism" (also known as "Bilingual First Language Acquisition") is used for those children who are exposed to two languages from birth, but the cut-off between simultaneous and sequential bilingualism is disputed as being anywhere between one month and three or four years of age (see Genesee & Nicoladis, 2009, for a fuller discussion). The term "Second Language (L2) Learner" is used for children who have established (although not necessarily fully acquired) their first language before they begin to acquire the other (Paradis, 2009). These are typically children who use their first language at home and learn a second language when they go to school. In the current study, we use the term "Early Bilingualism" for our bilingual participants, who were exposed to English either at birth or at any age up to three years. A final term, "Dominant Language" is used for the language for which children have generally received the greater amount of exposure, although this can shift over time (Genesee, Paradis, & Cargo, 2004). One can therefore expect great heterogeneity in the pace of language development among bilingual children, given such a range of language-learning scenarios. Indeed, there has long been a concern over the language development of bilingual children, even for those who can be classified as experiencing simultaneous bilingualism.

With respect to vocabulary, bilingual children tend to know some words in both languages ("translation equivalents") but others are known in just one language, and for any one language their vocabulary scores tend to lag behind that of monolingual children (Ben Zeev, 1977; Verhoeven, 2000; Oller, Pearson & Cobo-Lewis, 2007; *inter alia*). The vocabulary of bilingual children has therefore been described as being "distributed" across their two languages (Oller et al., 2007). This does not mean that they suffer from an inherent difficulty in learning vocabulary (although a small proportion will, as is the case for a small proportion of monolingual children). Instead, bilingual children's lower vocabulary scores in each language reflect different word-learning opportunities and different input in the two languages. Indeed, total vocabulary size, taking both languages into account, is the same as (Genesee & Nicoladis, 2009), or arguably higher than (Bialystok, 2001), children who speak just one language.

With respect to morphosyntax, the picture appears different to that for vocabulary. Many researchers report that bilingual children acquire morphosyntax at the same rate as their monolingual peers, at least for their dominant language (see Genesee & Nicoladis, 2009, for a review). Although there is some evidence of influence of one language on another in morphology and syntax, this is limited, and where cross-linguistic transfer does occur, there is growing evidence that children are more likely to incorporate structures from their dominant language into their non-dominant language rather than vice versa (Genesee & Nicoladis, 2009).

On the basis of the existing literature, we had two main predictions in our study. First, we predicted that a general language delay for English caused by reduced input would result in the bilingual group repeating English sentences less accurately than the monolingual group. Secondly, we predicted that the bilingual group's errors would pattern similar to those of the monolingual group, and specifically that function words would not be harder for them to repeat than content words.

Methods

Participants

A total of 36 typically developing children were selected: 18 English-speaking monolingual and 18 Farsi-English bilingual children. They were recruited from mainstream schools and various Saturday

schools where they were learning Farsi, in two boroughs of London, UK. The Farsi-English bilingual children were chosen as a convenience sample, and not because we had any predictions for this particular pair of languages. In order to be selected for the study, children had to have no identified special educational needs, and no concerns over their language development, according to parental and teacher report. In addition, we administered the British Picture Vocabulary Scale Second Edition (BPVS-II; Dunn, Dunn, Whetton, & Burley, 1997) to ensure that children from both groups were within normal limits for their English receptive vocabulary skills. We also gathered background information on age and language exposure via a parental questionnaire.

The monolingual group (9 males (50%); 9 females (50%)) ranged in age from 6;6 to 11;2 with a mean of 8;8 (SD = 1;5), while the bilingual group (7 males (39%); 11 females (61%)) ranged from 5;7 to 12;5 and had a mean of 8;2 (SD = 2;0). Although the bilingual children were on average 6 months younger than the monolingual children, this age difference was not significant $t(34) = 0.903$, $p = 0.373$. The monolingual group achieved a mean raw score of 95.00 on the BPVS-II (SD = 14.76), while the bilingual group's mean raw score was 72.33 (SD = 23.79). An independent samples *t*-test on these scores revealed that the monolingual group scored significantly higher than the bilingual group, $t(34) = 3.44$, $p = 0.002$.

In order to check that receptive vocabulary was within the age-expected limits, we calculated each child's standard scores. The monolingual group had a mean standard score of 108.50 (SD = 9.46). As we have shown, the bilingual group had lower raw scores, and in order to check whether these scores were in line with other children who are exposed to English as an additional language (EAL), we used the BPVS EAL norms, which are available for children up to 8;5. However, we had to use the regular norms for children over 8;5, which means that the standard scores of these older children are likely to be underestimated. Using this method, the mean standard score for the bilingual group was 100.67 (SD = 12.70). Thus, although the raw scores of the bilingual group are lower than those of the monolingual group, they are not depressed relative to other children of a similar bilingual background.

The questionnaire that parents filled in confirmed that the English monolingual children were not exposed to and did not speak any language other than English at home or school. The bilingual children had Farsi as their first language and were exposed to English (i.e. their second language) between birth and 3 years of age, with a mean age of exposure of 9 months. By parental questionnaire, we determined that all bilingual children had daily exposure to both languages. The majority of their exposure to Farsi came from the home and the family, whereas the majority of their exposure to English was at school and from school friends. As they were receiving the majority of their schooling in English and were all living in England, they were judged by their parents to be more skilled in English than in Farsi, and English can therefore be considered to be their dominant language. Table 1 illustrates the age and range of language exposure for the bilingual participants.

Procedure

The repetition test we used was the SASIT-E32 (Marinis et al., 2011), which is in the process of being standardized. It consists of 32 English sentences made up of eight different sentence types. Examples of sentences are shown in Table 2. Children repeat all the sentences: there is no discontinuation point.

The SASIT-E32 was designed to be given via a computer PowerPoint presentation, whereby children hear a recording of the sentence and repeat it back in a microphone that records their response. However, for this study, it was administered live, so as to better build a rapport with participants. Responses were recorded for later transcription and scoring.

Table 1. Details of the bilingual participants' age and language experience.

				Range of exposure to Farsi*					Range of exposure to English*				
Child	Gender	Age	Age of first exposure to English	Home	School	Family	Friends	Television	Home	School	Family	Friends	Television
1	F	8;2	3;0	1	1	1	1	1	0	1	0	1	1
2	M	8;6	0	1	1	1	0	1	0	1	0	1	1
3	F	12;5	3;0	1	0	1	0	1	0	1	0	1	1
4	F	9;11	0	1	0	1	1	0	0	1	0	1	1
5	M	10;10	0	1	0	1	0	0	0	1	0	1	1
6	F	8;6	0	1	0	1	0	0	0	1	0	1	1
7	F	6;5	0	1	0	1	0	0	0	1	0	1	1
8	F	9;2	0	1	0	0	0	0	0	1	0	0	0
9	F	10;08	2;0	1	0	0	0	0	0	1	0	0	0
10	M	8;7	0	1	0	1	1	0	0	1	0	1	1
11	M	7;4	0	1	0	0	0	1	1	1	0	0	0
12	F	5;11	0	1	1	0	0	0	0	1	0	1	1
13	F	5;7	1;0	1	1	0	0	1	1	1	0	0	1
14	F	5;11	1;0	1	0	1	0	0	1	1	0	0	0
15	M	5;9	0	1	0	1	1	0	0	1	0	1	1
16	F	8;9	3;0	1	0	1	0	0	0	1	0	1	1
17	M	8;10	0	1	1	1	1	1	0	1	0	1	1
18	M	7;3	0	1	1	1	1	1	0	1	0	1	1

*Child exposed to language in this context: 1 = yes; 0 = no.

Table 2. SASIT-E32 sentence types and examples.

Sentence Type	Example
Two auxiliary/modal verbs	The policeman has been looking at us
Two auxiliary/modal verbs + negation	John will not have talked about it with his father
Passives	The sandwich was eaten by the postman
Wh-object questions	Which drink did the milkman spill in the house?
Bi-clausal sentences	The child ate breakfast after he washed his face
Object–object relative	The monkey stroked the horse that the worm frightened
Subject–object relative	The swan that the deer chased knocked over the plant
Conditionals	If the kids behave we will go in the garden

Results

The SASIT-E32 has a rigorous scoring method. Participants are awarded 1 point for each sentence that is repeated correctly, and 0 for an incorrect repetition. This scoring method gives an "overall sentence score" measure. The total number of function words and content words that participants repeat correctly is also calculated. Included within the category "function words" are free-standing grammatical morphemes (e.g. *the*, *she*) and inflectional morphemes (e.g. plural *-s*, past tense *-ed*). With respect to errors, i.e. omissions, substitutions and additions, these are calculated separately for function and content words. A fourth error type, word order error, is also calculated: any sentence with one or more word order errors is given a score of 1 for that error type. Table 3 provides examples of each of the error types from the participants in this study.

The first author (a trained speech and language therapist) transcribed and scored the data. Inter-rater reliability on the scoring was carried out on 20% of the data. The second rater was a speech and language therapist who had been trained in conducting and scoring the SASIT-E32. Inter-rater reliability morpheme-by-morpheme was excellent, at 97.2%. The first author's scores were used in the analysis that follows.

Our first prediction was that a general language delay for English caused by reduced input would result in the bilingual group repeating English sentences less accurately than monolingual group. We tested this using the measure "overall sentence score". The highest possible overall sentence score is 32. The monolingual group achieved a mean score of 26.72 (SD = 4.70) and the bilingual group scored 20.89 (SD = 8.50). A univariate analysis of variance revealed this difference to be statistically significant, $F(1, 36) = 6.49$, $p = 0.016$. However, introducing BPVS raw scores into the analysis (i.e. running an ANCOVA with BPVS scores as a covariate) rendered the effect of group non-significant, $F(1,35) = 0.14$, $p = 0.713$. The covariate, i.e. BPVS raw scores, contributed significantly to SASIT-E32 scores, $F(1,35) = 23.46$, $p < 0.001$.

Our second prediction was that the bilingual group's errors would pattern similar to those of the monolingual group. We first tested this by investigating the correct repetition of content versus function words. There are different numbers of content and function words in the SASIT-E32, so the

Table 3. Examples of error types – words in which the errors occur are indicated in bold.

Error type	Target sentence	Examples of errors
Omission	Who did **she** give the beautiful rose to?	Who did__ give the beautiful rose to?
Substitution	The **children** enjoyed the sweets that they tasted	The **kids** enjoyed the sweets that they tasted
Addition	The child ate breakfast after he washed his face	The child ate **his** breakfast after he washed his face
Word order error	The horse that the farmer **pushed** kicked him in the back	The horse that **pushed** the farmer kicked him in the back

mean numbers of content and function words repeated correctly by each group were converted to percentage scores. The monolingual group repeated 97.70% (SD = 2.77) of content words and 97.47% (SD = 3.00) of function words correctly, and the bilingual group repeated 92.64% (SD = 7.13) of content words and 91.44% (SD = 8.69) of function words correctly. Because the data did not meet assumptions of homogeneity of variance (Levene's test, $p < 0.05$), we arcsine-transformed the data. A 2 × 2 mixed factor ANOVA on the transformed data, with Word Type (content, function) as the within-subjects factor and Group as the between-subjects factor revealed, not surprisingly, a significant effect of Group, $F(1,34) = 7.24$, $p = 0.011$, but no effect of Word Type, $F(1,34) = 1.70$, $p = 0.202$ and no interaction between Group and Word Type, $F(1,34) = 0.08$, $p = 0.785$. For both content and function words, the monolingual group was more accurate than the bilingual group.

The next set of analyses involved looking at the error patterns of the participants in both groups, illustrated in Figure 1, and specifically by comparing function word and content word errors within each error type (omission, substitution, addition) for the monolingual and bilingual groups separately. Again, our prediction was that the two groups would show similar patterns of errors, and again, these analyses were carried out on percentage scores.

The data were analysed using non-parametric analyses, as a number of children did not produce any errors. Within each group, a related samples Wilcoxon signed test was used to compare the number of content and function word errors for each of the omission, substitution, and addition error types. The analyses only provided significance levels and did not yield a Wilcoxon statistic. Neither group showed a significantly different number of omissions for content versus function words, $p = 0.327$ and 0.518 for the monolingual and bilingual groups, respectively. The monolingual group did not make a different number of substitution errors on content and function words, $p > 0.999$. The pattern for the bilingual group was different, with significantly more substitutions on function words, $p = 0.027$. The picture for addition errors was the same: while monolingual group did not make significantly different numbers of addition errors on function or content words, $p = 0.176$, the bilingual group produced significantly more addition errors for function words, $p = 0.002$. Finally, we investigated word order errors. These are not shown in Figure 1 because they could involve a mix of content and function words. The monolingual group produced word order errors on just 2.23% of sentences (SD = 3.34), and the bilingual group on 3.30% (SD = 4.03). An independent samples Mann–Whitney *U* test found no significant group difference, $p = 0.431$.

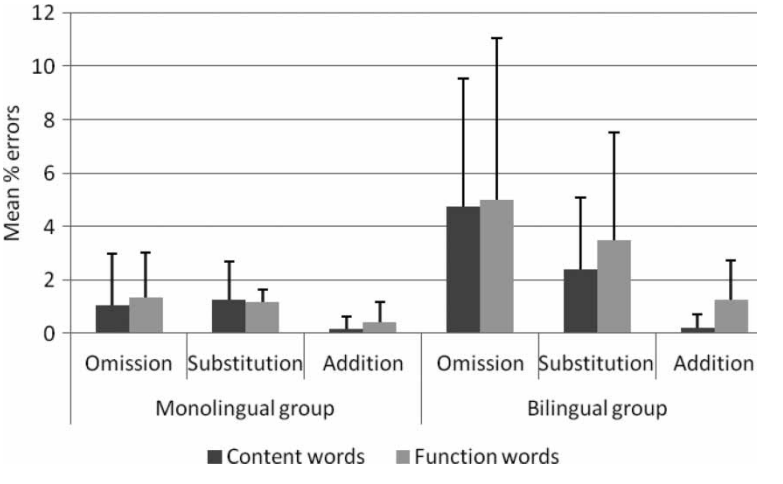

Figure 1. Mean percentage of content and function word errors in the monolingual and bilingual groups. Bars indicate 1SD from the mean.

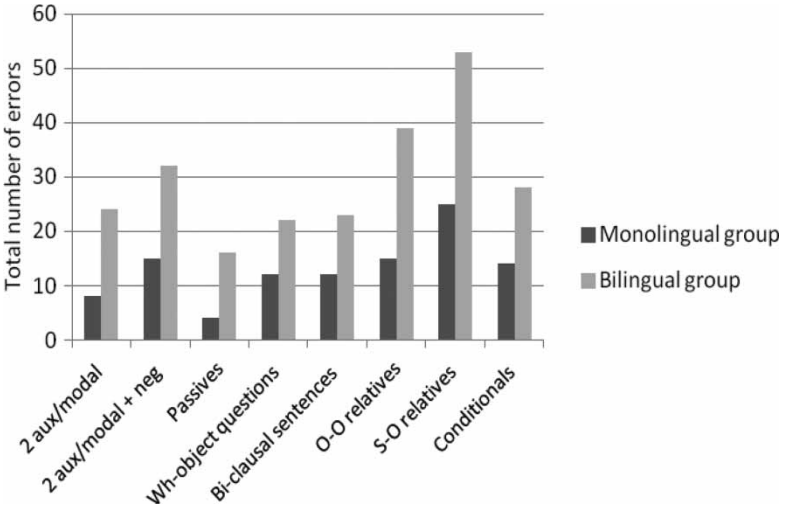

Figure 2. Total number of errors according to sentence type for both groups.

The last set of data concerns the pattern of errors across the different sentence types, presented in Figure 2. Given the very small number of errors by the typically developing children and consequent lack of statistical power, we do not analyse these data statistically to investigate whether the two groups show a different pattern of performance across these sentence types. Impressionistically though, it can be seen from Figure 2 that the pattern of performance appears very similar across the two groups.

Discussion

This study investigated sentence repetition in typically developing monolingual and bilingual children, using a new test, the SASIT-E32 (Marinis et al., 2011). The question we addressed is whether bilingual children will pattern in a sentence repetition task like monolingual children (as tested in this study) or whether they will pattern more like children with SLI (as tested in other sentence repetition studies). Our groups comprised 18 monolingual English speakers and 18 Farsi-English early bilingual speakers. We predicted that the bilingual group would repeat sentences less accurately than the monolingual group, due to a general language delay caused by reduced input. Secondly, we predicted that they would pattern similar to the monolingual group with respect to their pattern of errors.

As predicted, the monolingual group repeated sentences significantly more accurately than the bilingual group. However, this group difference disappeared once receptive vocabulary skills, as measured by the British Picture Vocabulary Scale (Dunn et al., 1997), were taken into account. It therefore appears that the lower performance of the bilingual children is part and parcel of their generally lower English skills, rather than a selective difficulty with sentence repetition. In this regard, the bilingual group differs from monolingual children with SLI, who have selective difficulties with sentence repetition above and beyond their general low language level (Briscoe, Bishop, & Norbury, 2001; Conti-Ramsden et al., 2001).

In some ways, the pattern performance of the bilingual children was very similar to that of the monolingual children. Each group showed no significant difference in repetition accuracy between content and function words. Again, this pattern differs from children with SLI, who have more difficulty repeating function words (Chiat & Roy, 2008; Seeff-Gabriel et al., 2010). A more

detailed error analysis also showed some similarities between the monolingual and bilingual groups. Monolingual children made equivalent numbers of omission errors across content and function words, as did bilingual children. This is in contrast to reports of children with SLI, who are more likely to omit function words than content words (Chiat & Roy, 2008; Seeff-Gabriel et al., 2010). The groups did not differ in word order errors. However, the bilingual children differed from the monolingual children in producing more substitution and addition errors on function compared to content words. Such a pattern has not been noted, as far as we are aware, in the SLI literature. Indeed, such errors would be unlikely in SLI, because they both indicate knowledge of function words and require the supply of function words. In contrast, the most characteristic error in SLI is omission of function words (Seeff-Gabriel et al., 2010). It appears that the bilingual children have appropriate knowledge of function words but are still sorting out where, when, and how to use them correctly.

This study is of course preliminary, in that it tested just one group of bilingual children within a limited age range (5–12) and with very similar degrees of exposure to English (0–3 years). Farsi-English bilingual children were chosen as a convenience sample, not because we had any predictions about linguistic transfer from Farsi into English, and nor did we create sentences to specifically investigate transfer. Given the heterogeneity within the bilingual population, it remains to future research to investigate whether our results would generalise to bilingual children with a language other than Farsi, with different degrees of exposure to English, and from a wider age range. Furthermore, we did not directly compare our bilingual group to monolingual and bilingual groups of children with SLI. Nevertheless, our results indicate that the SASIT-E32, and indeed other linguistically informed sentence repetition tasks, might have potential to differentiate language delay due to bilingualism from SLI, and therefore be an important part of diagnostic language batteries for bilingual children.

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