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The Association of Sentence Imitation with Other Language Domains in Bilingual Children

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Abstract

The association of sentence imitation with other language domains has been of interest to researchers and clinicians for decades. Sentence imitation taps both working memory and linguistic competence. Working memory refers to the ability to recall and manipulate linguistic information making sentence imitation a clinical marker for language ability. Meanwhile, research on the application of sentence imitation with bilingual language pairs is still emerging. This article reports a study on a large sample of Maltese children brought up in an early bilingual language acquisition context. It analyses correlations between a sentence imitation task, verbal comprehension, narrative (story retelling), phonological awareness, and two measures of a phonology test: percentage consonants correct and the inconsistency score. Data were collected from a total of 241 children, aged 24 to 72 months, who were selected randomly from the public birth register. The subtests administered were part of a test battery, namely, the Maltese–English Speech Assessment (MESA) and the Language Assessment for Maltese Children (LAMC). Correlations were calculated for the sentence imitation scores with specific language subtest scores; significant correlations were identified as well as with chronological age. Regression analysis indicated that the sentence imitation subtest of LAMC is a predictor for verbal comprehension and even stronger predictor for phonological awareness. It was concluded that performance on a sentence imitation task is a valid and reliable indication of Maltese bilingual children's language ability.

Keywords
- bilingual
- sentence imitation
- sentence recall

Background

Sentence imitation has become a popular clinical test given that it is time–cost effective and that data are increasingly indicating that it is associated with other language domains. Sentence imitation taps both working memory and linguistic competence.[1,2] The former refers to the ability to store and manipulate information that is necessary for some cognitive tasks including language comprehension, learning, and reasoning. Alloway and Ledwon[3] studied the contribution of working memory in sentence imitation in 158 children between 8 and 10 years of age and reported that verbal working memory scores were significantly associated with the accuracy in imitating sentences. In a study of children with language impairment and age-matched and language-age controls, Riches[4] reported findings that those with language impairment made more errors on sentence imitation task than the controls, and errors were qualitatively similar to those on production tasks, indicating the role that linguistic competence plays in sentence imitation. It is claimed that as subjects are exposed to a given stimulus, they process and form a

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representation of that stimulus and then attempt to reproduce a response based on the representation they have stored. Sentence imitation is increasingly being considered as a sensitive tool to identify children with developmental language disorder (DLD[a]). Following a study of 160 children, Conti-Ramsden et al[5] concluded that sentence imitation showed high sensitivity, specificity, and accuracy levels in identifying language impairment. The respective participants were tested for different possible clinical markers.

Blom and Boerma[6] compared bilingual English–Dutch children with monolinguals, controlled for language ability, on working memory tasks, finding that the bilinguals performed better than the monolinguals. Although Meir and Armon-Lotem's[7] data indicated that bilingual children make lexical substitutions in a sentence imitation task, such errors were explained as reflecting the difficulty in processing two languages, as opposed to children with DLD who tend to use simpler or fragmented sentences. Similarly, Antonijevic et al[8] studied the performance of sentence imitation on bilingual English–Irish children; findings indicated that cross-linguistic influence from English reflected the children's errors in the Irish task.

While correlations between sentence imitation and monolingual speakers' other language abilities have been reported for decades, cross-linguistic studies are only now beginning to emerge. Association between spontaneous production and sentence imitation dates back to the early 1960s.[9] These authors observed 2 to 3 year old children maintaining lexical words in sentence imitation but not functional words and morphemes. Others claimed omission or inaccurate repetition of language structures that are not produced spontaneously.[10] Devescovi and Caselli[11] reported that they could discriminate between performance of typical age groups in terms of morphosyntax when using sentence imitation. Montgomery[12] also argued that phonological working memory may play an important role in children's lexical/morphological learning and sentence comprehension/processing. There is emerging cross-linguistic evidence to support this claim (e.g., Rispens[13]; Stokes et al[14] for Cantonese-speaking children; and Vicari et al[15] for Italian).

The theoretical implications of findings from research on children's sentence imitation are unclear. Both Archibald and Joanisse[16] and Stokes et al,[14] however, implicate deficits in language and/or working memory as underlying poor performance in sentence imitation. The basic premise of sentence imitation testing is that as a stimulus grows in complexity, the performance of the subject should diminish. This is because, once subjects are exposed to a given stimulus, they form a temporary storage of that stimulus and then attempt to reproduce a response based on the representation they have stored. It is assumed that linguistic content that exceeds the participants' knowledge of their language would not be encoded. However, for short time latencies or simple test items, short-term or working memory may serve to bypass the encoding/decoding steps. Hence, it is likely that sentence imitation taps short-term memory as well as longer lasting phonological working memory and linguistic competence.

One goal of current research is to identify correlates between sentence imitation and specific language domains such as verbal comprehension and phonological awareness. Two populations might provide insight into the nature of this relationship. Cross-linguistic comparison of children acquiring two languages allow comparison of the effects of language specificity on sentence imitation performance. Children with developmental language difficulties provide an opportunity to examine the robustness of sentence imitation for differential diagnosis of children with DLD from typical language controls and children with other developmental difficulties.

Several researchers have reported poor sentence imitation in children with DLD.[17,18] Sentence imitation is increasingly being considered as a sensitive tool to identify children with DLD or working memory impairment. For example, Archibald and Joanisse[16] reported findings from their study on a large sample of children, whereby performance below the 10th percentile on a sentence imitation task was associated with more than 80% specificity and sensitivity values for identification of language impairment. They concluded that sentence imitation (but not nonword repetition) provided a useful clinical marker of DLD and deficits in both language and working memory. Conti-Ramsden et al[5] also found sentence imitation to be the best clinical marker out of four tests with sentence imitation having sensitivity and specificity values of 90 and 85%, respectively. Ellis Weismer et al[19] reported findings from a group of typically developing 5 to 9 years old children where they found a positive correlation between sentence comprehension and the number of words recalled. However, they did not include a clinical match to identify any possible differences. Further, Botting and Conti-Ramsden[20] reported findings on sentence imitation being a moderately good clinical marker to distinguish children with DLD from typically developing and children with pragmatic/autistic features. In contrast, Redmond[18] reported that sentence imitation did not differentiate children with DLD from those with attention deficit hyperactivity disorder, although both these groups of children performed worse than typically developing age-matched peers on this task.

Sentence imitation has not been used as a diagnostic marker in current clinical assessments (e.g., *Clinical Evaluation of Language Fundamentals-4*[21] and the *Test of Language Development*, 3rd edition).[22] This may be because sentence imitation is assumed to test auditory memory rather than expressive language skills. However, research has begun to show that sentence imitation draws on, and is informative about, a range of language skills. Polišenská et al[23] reported correlations between a sentence imitation task and tasks focusing on language skills. They also noted that children with atypical language development found it more challenging to repeat function than content words. This is in line with other reports that unstressed grammatical elements present a challenge to children with DLD.[24] Sentence imitation performance, then, taps language skills and should be considered as more than a test of auditory memory.

[a] Developmental language disorder (DLD) is a more recently used term replacing specific language impairment (SLI).

Consequently, sentence imitation is now often considered as a clinical tool to detect DLD. Children with DLD obtain different results on sentence imitation tasks in comparison to typically developing children.[5] Further, elicited language tasks such as sentence imitation provide a more reliable measure of children's language abilities than spontaneous speech where children select the complexity of their sentence structure. The use of sentence imitation as a marker for DLD is supported by Gathercole et al[25] where they investigated the relationship between cognitive processing and verbal memory. They assessed the performance of children aged 4 to 15 years finding that the ability to briefly retain and process verbal information is in place from the preschool years and improves over time into early adolescence.

Cross-linguistic findings on the robustness of sentence imitation as a clinical tool are scarce. For example, the study by Stokes et al[14] on Cantonese-speaking children reported sentence imitation to be a better tool than nonword repetition to distinguish between language-impaired children from the typically developing children, particularly when sentence imitation was scored as number of errors in the sentence. The authors suggested that this could be used as a clinical marker for Cantonese-speaking children. The authors also reported that the sentence imitation scores and not nonword repetition scores correlated moderately with receptive grammar scores in the children with DLD; their possible explanation was that sentence imitation is language dependent, whereas nonword repetition was not. However, the latter taps on a subcomponent of language, that is, phonology, and this undermines their claim.

Although the global child population is increasingly becoming bilingual and to a lesser extent multilingual, few studies deal with language impairment in bilingual children, and data are even more scarce regarding clinical markers or inclusion criteria for identifying bilingual children with language impairment. Researchers now agree that when referring to a bilingual child with language impairment she/he should be exhibiting impairment in both languages.[26,27] Bedore and Peña[28] claimed that scarcity of information leads to over and under identification of bilingual children with language impairment. Potential referees of bilingual children to speech and language therapy may take the "wait and see" approach and will not refer bilingual children who are struggling with language acquisition as they keep waiting for the second language (L2) to appear. Alternatively, in the absence of age-appropriate normative data for language behaviors or clinical markers for bilingual children, it might be assumed that these children have difficulties because they differ from monolingual children. They may, however, be following a typical development trajectory for children exposed to more than one language. Bedore and Peña reported that the most vulnerable of bilingual children to be misdiagnosed are those who are exposed to the second language on pre/school entry. The authors stress the need for identifying developmental expectations/clinical markers that reliably differentiate children with language impairment particularly in case of bilingual exposure.

Bilingual language acquisition may be different compared with monolingual acquisition. In monolingual acquisition, there seems to be harmonization of trajectories in some language domains such as lexicon, morphosyntax, and narrative, whereas for bilingual children, data are not only scarce but are difficult to compare cross-linguistically, since language performance in each language may be influenced by various factors such as the amount, onset, and the context of exposure to each language. Bedore and Peña suggested potential clinical markers for language impairment in bilingual children on the basis of a review of cross-linguistic findings on language acquisition and impairment. Blumenfeld and Marian[29] claimed that bilingualism provides a unique context for examining linguistic and cognitive interaction. Therefore, examining the association between sentence imitation and specific linguistic domains in bilingual children would provide opportunities to evaluate theories that language development is guided by specific cognitive processes.

Research regarding the application of sentence imitation on bilingual language pairs is still emerging. Girbau and Schwartz[30] reported that nonword repetition was a significant clinical marker for language impairment for Spanish–English bilingual children; it was also found that the nonword repetition task highly correlated with other tasks related to auditory working memory. Kohnert et al[31] examined relationships between measures of lexicon and grammar in 2;11 to 5;2-year-old Hmong-English early sequential bilingual children. The authors used story retelling to elicit the mean length of utterance and the number of different words produced in each language. They also tested the children on a separate receptive lexical ability task in Hmong and English. Their results indicated that within each language, there were strong, positive relationships between words and utterance length; for English, results were similar to those reported for previous studies with monolingual and simultaneous bilingual children. However, weaker cross-domain associations in Hmong (the children's L1) were reported which the authors claimed to be reflective of the subjects' "more" developed Hmong (their L1) or as a result of typological differences between Hmong and English.

Currently debated models of language acquisition and impairment point toward similar expectations of difficulties in bilingual children. For example, on account of a linguistic model, Paradis et al[32] suggested that bilinguals have comparable linguistic difficulties in each of their languages relative to their monolingual peers. In support of the processing model of language impairment, bilingual language impaired children are also expected to demonstrate similar deficits to those of monolingual peers. However, Bedore and Peña[28] claimed that bilingual children may have more severe deficits since their language proficiency may be less in each language. The authors propose a framework on which to base the identification of bilingual children with language impairment. They recommend that identification of language impairment in bilingual children should be based on appropriate normative and clinical markers while taking into consideration the possible interaction/influence of the two

languages. In other words, children exposed to bilingualism are likely to produce words, forms or narratives that are influenced by the other language, and may show distributed knowledge, especially in vocabulary. Research in language acquisition and impairment has to address current trends and needs and should therefore focus on bilingual and multilingual matters. Children in Malta are inevitably exposed to bilingualism to varying degrees, usually as early sequential bilinguals. An evaluation of the sentence imitation task with Maltese children would have both clinical and theoretical implications. Given the unavailability of such measures for Maltese–English speaking children, the authors developed a series of speech and language tests for the population in question. One of these subtests is the *sentence imitation test* (SIT) which is geared to act as a future clinical marker for language impairment in Maltese children.

This article presents a SIT for Maltese children. The advantages of sentence imitation tasks are that they are controllable and quick in terms of data collection, they can be used to grade morpho/syntactic complexity, and/or to tap structures (e.g., questions and negation) that may otherwise be difficult to be noted in spontaneous speech and can collect reliable data on language skills from children whose spontaneous speech may be unintelligible for analysis. Sentence imitation results can be analyzed in detail to identify strengths and weaknesses in the child's language skills and to plan intervention accordingly.[33] However, the main advantage of this task is that it can be used as a screening test, which involves a shorter time than other language measures. The speech and language subtests administered are part of a test battery, namely, the Maltese–English Speech Assessment (MESA)[1] and the Language Assessment for Maltese Children (LAMC).[2] The research questions were (1) Is sentence imitation a reliable subtest to be used as a screening measure? (2) Do the sentence imitation scores correlate with speech and language subtest scores? (3) Can the SIT predict language and/or speech measures?

Methods and Procedure

Sample Selection

The children were selected randomly from the public birth register. All children whose caregiver/s consented to participate were assessed. In total, 241 children participated. These children included 134 (55.6%) girls and 107 (44.4%) boys. The age of the children ranged from 24 to 72 months. Twenty-two participants were aged 24 to 35 months old; 35 were 36 to 41 months old; 45 were 42 to 47 months old; 40 were 48 to 53 months old; 34 were 54 to 59 months old; 37 were 60 to 65 months old; and 28 were 66 to 72 months old. Other information collected was related to the primary language of the child and language/s used at home. For 92 children, the language learning context was both Maltese and English at home; for 138 children, it was reported that Maltese was only used at home; and 11 spoke only English at home. The administrator opted to use the child's choice of language (primary language) during the test. Consequently, 211 (87.6% of the sample) children received instructions in Maltese, while 30 children (12.4%) were given the instructions in English.

Table 1 Maltese sample by age and gender from which data were collected

Age in mo	Total number of age cohort (*N*)	Number of girls in cohort	Number of boys in cohort
24–35	22	10	12
36–41	35	22	13
42–47	45	27	18
48–53	40	19	21
54–59	34	11	23
60–65	37	25	12
66–72	28	20	8
Total % of sample	241 100	134 55.6	107 44.4

Table 2 Maltese sample by language learning context, from which data were collected

Age in mo	Maltese	English	Maltese–English	Total per cohort
24–35	10	1	11	22
36–41	18	2	15	35
42–47	23	2	20	45
48–53	28	1	11	40
54–59	22	1	11	34
60–65	22	1	14	37
66–72	15	3	10	28
Total % of sample	138 57.26	11 4.56	92 38.17	241 100

The SIT was analyzed on a total of 235 children since 6 children who were aged between 24 and 30 months did not provide useable data; therefore, these data did not merit further analysis. Demographic characteristics of the Maltese sample are summarized in ►**Tables 1** and **2**.

Procedure

Most of the children were assessed at home in one or two sessions up to 60 minutes in length, with short breaks as often as was considered necessary. A few children were assessed in the university clinic following parental request. The children completed the LAMC.[2] The LAMC included subtests for verbal comprehension, narrative, sentence imitation, and phonological awareness. For verbal comprehension, the child was asked to point to pictures from a stimulus book following directions and narration of the story by the administrator. For the narrative, the child was asked to retell the story (with minimal verbal prompts) while the administrator flipped through the stimulus book. With regard to the

phonological awareness subtest, the child was tested for abilities in identification of syllables, rhyme awareness, identification of the initial sound in a word, phoneme segmentation, and sound-to-letter conversion. Additionally, the MESA[1] that assessed articulation, phonology, and oromotor function was administered. The articulation subtest identifies perceptually any phonemes that cannot be produced by the child. The assessment includes 42 pictures depicting all consonant and vowel sounds in English and Maltese. The phonology subtest identifies surface developmental phonological processes (error patterns). An inconsistency subtest includes 17 pictures and evaluates the consistency of production (stability) of the child's phonemes. The child is meant to name the 17 pictures on three separate trials within the same session. The oromotor function is tested by analyzing the diadochokinetic skills of the child for sequencing and intelligibility. Additionally, children imitate isolated and sequenced movements involving speech musculature. Another subtest involves the repetition of a list of 11 multisyllabic words and those with consonantal clusters. This word repetition test was constructed to address the Maltese complex phonotactics. The reader is referred to Grech (Unpublished PhD, Phonological development of Maltese speaking children. University of Manchester, UK, 1998) for further details.

Twelve children were selected randomly from the different age cohorts and the test battery was readministered within a month of the first test. This was done to calculate test–retest reliability. A clinician/academic was appointed to reanalyze at least 5% of the recorded transcriptions to measure the interrater reliability. Both test–retest and interrater reliability measures were calculated using Cronback's alpha. Reliability results are reported later in the "Results" section.

The Sentence Imitation Test

The SIT is a subtest of the LAMC and allows the administrator to evaluate the ability of the child to imitate a series of sentences of increasing length and grammatical complexity, based on the previously narrated story of the verbal comprehension and narrative assessment. It is considered essential that the complexity of the stimulus be controlled. As suggested by Redmond (2005), the sentences are not too short to avoid ceiling effects but not too complex for school children be able to perform sufficiently to identify weaknesses. Recall the Baddeley and Hitch (1974) model indicating that working memory should be in place by 6 years of age and possibly earlier. Meanwhile, a study by Reznick et al[34] reported that the onset of working memory for children could be as early as 6 months of age. The SIT is a finely graded SIT in which the phonotactic structure, segmental phonology, and length of words were kept as developmentally simple as possible. A total of 10 sentences are read by the administrator with pauses in between to allow the child to repeat each sentence. The test is discontinued if the child says nothing after three consecutive attempts. Preassessment criteria were set in relation to the test administrators' language use for instruction. The clinician though encouraged is not obliged to administer the subtests in both the languages. The child can choose the language (Maltese or English) in which the subtests would be administered by the clinician. Maltese was used to give assessment instructions unless the child chose to do the test in English. If unsure, and the caregivers reported that the child was bilingual, Maltese was used. Only data from the SIT are reported in this article.

Scoring

Redmond[18] recommended that the scoring for a sentence imitation task should not be merely correct/incorrect but a scoring system should be employed. The total raw score for the SIT is the summation of the individual scores for each of the 10 sentences to be imitated. A score of 2 is given if the child repeats a sentence in its entirety; a score of 1 is given if half or more (but not all) of the words in a sentence are repeated; the child obtains a score of 0 if she/he repeats less than 50% of the words in a sentence. The maximum total raw score for the SIT is 20. The Maltese sociolinguistic context was captured in that SIT allows the child to *code-switch* and this is taken into consideration in the scoring and analysis of results. Hence, Redmond's[18] recommendation to count the total number of errors produced was not considered feasible since code-switching was not considered as "erroneous." On the other hand, a simpler scoring such as categorizing sentences as correctly or incorrectly recalled was considered too simple, and the researchers needed to identify the extent to which sentences were recalled. Ideally, responses are scored for number of content words, function words, and inflections correct. However, the SIT is used as a screening tool and further qualitative analysis by clinicians, though encouraged would only be recommended following further analysis of the data collected.

Outcomes and Results

Reliability of SIT

Reliability is the degree of accuracy and consistency of test results and thus indicates the amount of confidence one can have in the score. Interrater reliability was measured for each subtest by reanalyzing at least 5% of the recorded transcriptions. Test–retest reliability was also measured on 5% of the population as indicated earlier. Cronbach's alpha values of 0.909 for test–retest reliability and 0.904 for interrater reliability were obtained (►**Table 3**).

Correlations and SIT as a Predictor of Speech and Language Domains

The verbal comprehension (receptive language) and narrative scores were correlated with the sentence imitation scores. Possible correlations of the phonological awareness scores and two measures of the phonology test from the MESA, namely, percentage consonants correct and the inconsistency score were also analyzed, as indicated in ►**Table 4**. All these tests were assumed to be measures of implicit language knowledge.

Regression analysis was used as a substitute of partial correlations because some of the variables were categorical. The primary language of the child and age group predicts SIT

Table 3 SIT test–retest and interrater reliability values

Single measures	Cronbach's alpha	Intraclass correlation[a]	95% confidence interval		*F* test with true value 0			
			Lower bound	Upper bound	Value	df1	df2	Sig.
Test–retest reliability	0.909	0.832[b]	0.462	0.956	10.934	9	9	0.001
Interrater reliability	0.904	0.825[b]	0.283	0.968	10.420	6	6	0.006

Abbreviation: SIT, sentence imitation test.
[a]Correlation is significant at the 0.05 level (two-tailed).
[b]Correlation is significant at the 0.01 level (two-tailed).

Table 4 Correlations of SIT with LAMC and MESA subtests

		Sentence imitation score	Inconsistent score	Phonological awareness score	Chronological age	Receptive language score	Percentage consonants correct	Narrative score
Sentence imitation score	Pearson's correlation	1	−0.178[a]	0.555[b]	0.561[b]	0.485[b]	0.189[a]	0.411[b]
	Sig. (two-tailed)		0.021	0.000	0.000	0.000	0.013	0.000
	N	180	168	173	180	180	174	74
Inconsistent score	Pearson's correlation	−0.178*	1	−0.228[b]	−0.271[b]	−0.188[a]	−0.086	−0.317[b]
	Sig. (two-tailed)	0.021		0.003	0.000	0.012	0.261	0.006
	N	168	176	164	176	176	171	73
Phonological awareness score	Pearson's correlation	0.555[b]	−0.228[b]	1	0.723[b]	0.447[b]	0.177[a]	0.545[b]
	Sig. (two-tailed)	0.000	0.003		0.000	0.000	0.022	0.000
	N	173	164	175	175	175	169	71
Chronological age	Pearson's correlation	0.561[b]	−0.271[b]	0.723[b]	1	0.483[b]	0.367[b]	0.640[b]
	Sig. (two-tailed)	0.000	0.000	0.000		0.000	0.000	0.000
	N	180	176	175	190	190	184	76
Receptive language score	Pearson's correlation	0.485[b]	−0.188[a]	0.447[b]	0.483[b]	1	0.220[b]	0.583[b]
	Sig. (two-tailed)	0.000	0.012	0.000	0.000		0.003	0.000
	N	180	176	175	190	190	184	76
Percentage consonants correct	Pearson's correlation	0.189[a]	−0.086	0.177[a]	0.367[b]	0.220[b]	1	0.294[a]
	Sig. (two-tailed)	0.013	0.261	0.022	0.000	0.003		0.013
	N	174	171	169	184	184	184	71
Narrative score	Pearson's correlation	0.411[b]	−0.317[b]	0.545[b]	0.640[b]	0.583[b]	0.294[a]	1
	Sig. (two-tailed)	0.000	0.006	0.000	0.000	0.000	0.013	
	N	74	73	71	76	76	71	76

Abbreviations: LAMC, Language Assessment for Maltese Children; MESA, Maltese-English Speech Assessment; SIT, sentence imitation test.
[a]Correlation is significant at the 0.05 level (two-tailed).
[b]Correlation is significant at the 0.01 level (two-tailed).

scores but the category related to whether the child is bilingual or monolingual does not predict SIT results (►**Table 5**). Parameter estimates with the SIT score being a dependent variable are indicated in ►**Table 6**. ►**Table 7** indicates that the sentence imitation subtest of LAMC is a predictor of the receptive language scores but not the narrative scores.

Discussion

This study is, to my knowledge, the first to investigate the usefulness of a SIT specifically developed for Maltese children. The aims of the study were to investigate the reliability of SIT as a screening measure as part of a language assessment battery. Correlations of the SIT with speech and language subtest scores were also investigated. Finally, results were analyzed to check if the SIT predicted language and/or speech measures.

Is the SIT a Reliable Subtest to Use as a Screening Measure as Part of a Language Assessment Battery?

The accuracy and consistency of the SIT is measured by test–retest reliability and interrater reliability. Test–retest reliability estimate is used to assess the consistency of a measure from one time to another. Interrater reliability indicates

Table 5 Tests of between-subjects effects (dependent variable—SIT score)

Source	Sum of squares	df	Mean square	*F*	*p*-Value
Intercept	9,198.702	1	9,198.702	552.757	0.000
Primary language/language of administration	85.493	1	85.493	5.137	0.025
Age group	1,719.483	5	343.897	20.665	0.000
Language (bilingual/monolingual)	0.751	1	0.751	0.045	0.832
Error	3,211.807	193	16.641		

Abbreviation: SIT, sentence imitation test.
Note: R-square = 0.362.

Table 6 Parameter estimates (dependent variable—SIT score)

Parameter	Beta	Standard error	*t*	*p*-Value
Intercept	16.705	1.179	14.172	0.000
Primary language = English	− 2.194	0.968	− 2.267	0.025
Primary language = Maltese	0			
Age group—36–41 mo	− 8.314	1.094	− 7.597	0.000
Age group—42–47 mo	− 7.136	1.011	− 7.057	0.000
Age group—48–53 mo	− 6.198	1.054	− 5.879	0.000
Age group—54–59 mo	− 4.052	1.075	− 3.770	0.000
Age group—60–65 mo	− 1.119	1.085	− 1.032	0.304
Age group—66–79 mo	0			
Language = bilingual	0.136	0.639	0.212	0.832
Language = monolingual	0			

Abbreviation: SIT, sentence imitation test.

Table 7 SIT as a predictor of receptive language but not narrative score

ANOVA[a]						
Model		Sum of squares	Df	Mean square	*F*	Sig.
1	Regression	460.654	2	230.327	13.980	0.000[b]
	Residual	1,169.724	71	16.475		
	Total	1,630.378	73			
Coefficients[a]						
Model		Unstandardized coefficients		Standardized coefficients	*t*	Sig.
		Beta	Standard error	Beta		
1	Constant	− 2.264	2.343		− 0.966	0.337
	Receptive language score	0.593	0.177	0.413	3.348	0.001
	Narrative score	0.097	0.069	0.172	1.394	0.168

Abbreviations: ANOVA, analysis of variance; SIT, sentence imitation test.
[a]Dependent variable: sentence imitation task score.
[b]Predictors: constant, narrative score, and receptive language score.

the degree of consistency between persons scoring a test subjectively, in this instance the transcription and scoring of the children's responses. Cronbach's alpha is the overall reliability of the scale. By convention, a lenient cutoff of 0.60 is common in exploratory research such as this study. Many researchers consider a cutoff 0.80 for α to indicate good reliability. Results indicated high reliability measures for the SIT with Cronbach's alpha values of 0.909 for test–retest reliability and 0.904 for interrater reliability, respectively, as indicated in ►**Table 3**.

Does the SIT Correlate with Speech and Language Subtest Scores?

The SIT correlates significantly at the 0.01 level (two-tailed) with chronological age (indicating a developmental trajectory for sentence imitation). The rate of development is an important clinical sign of severe language impairment.[26] It is considered imperative to identify language-specific trajectories for monolingual and bilingual children as these could serve as a tool for identification of language impairment. SIT correlations are also significant at the 0.01 level for phonological awareness, receptive language, and narrative scores.

Can SIT Predict Language and/or Speech Measures?

Multiple regression analysis was performed to identify the possibility of SIT as a predictor speech and/or language domains. Results (shown in ►**Table 7**) indicating that the sentence imitation subtest of LAMC is a predictor for the receptive language score. The sentence imitation task has been identified as a good indicator of Maltese bilingual children's language skills and shows a significant relationship with performance on specific language tasks.

Limitations

The SIT yields a broad score and is primarily aimed at identifying whether a child has difficulty compared with his/her typically developing peers. Ideally, the specific skills in terms of the morphosyntactic strengths and weaknesses would be identified. Further analysis of test results could score for number of content words, function words, and inflections correct as these could potentially address intervention.

Conclusion and Recommendations

The results of the study revealed that the SIT of the LAMC is reliable, correlates significantly particularly with age groups and with language domains such as verbal comprehension and phonological awareness. The SIT is a good predictor for verbal comprehension and even stronger predictor for phonological awareness. This sentence imitation screen has the potential to be a clinically useful assessment that facilitates valid clinical management decisions; for example, available tests to measure verbal comprehension can be time consuming, whereas the SIT takes only a few minutes to administer and score. This ties in with findings of other studies, such as that of Archibald and Joanisse[16] who concluded that a sentence imitation task is clinically useful to measure language and working memory skills; their study focused on English-speaking children. Findings in this study are also in line with those of Stokes et al[14] whereby sentence imitation scores correlated with receptive grammar.

Findings reported in this study highlight the novelty, efficiency, and effectiveness of the SIT. Further qualitative analysis of the data collected from the sample population could address the type of errors made by the children, particularly, the distinction between morphological and phonological errors. Given that Maltese lexemes can be loaded with bound morphemes, in-depth qualitative analysis of the child's responses may reveal whether errors are phonological or morphological in nature. It is recommended that in the future, specificity and sensitivity of the SIT would be calculated on a clinical population, for example, children with DLD, to compare scores with those of the present study. Such a study would contribute to cross-linguistic data, such as those of Eadie et al[35] who reported that two different clinical cohorts performed poorly on sentence recall compared with typically developing matched controls. The present study points to the need for further investigation of the nature of speech and language difficulties in children who show both speech, working memory and language disorders. This will clarify whether the disorders are comorbid that is due to the co-occurrence of difficulties. Such data will address the research lacunae that currently exist in relation to management decisions.

Conflict of Interest
None declared.

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