

# **Oral morphosyntactic competence as a predictor of reading comprehension in children with Specific Language Impairment**

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## **Abstract**

**Background:** Children with a diagnosis of Specific Language Impairment (SLI) present impaired oral comprehension. According to the Simple View of Reading, general amodal linguistic capacity accounts for both oral and reading comprehension. Considering this, we should expect SLI children to display a reading comprehension deficit. However, previous research regarding the association between reading disorders and SLI has yielded inconsistent results.

**Aims:** To study the influence of prior oral comprehension competence over reading comprehension during the first years of reading acquisition of bilingual Catalan-Spanish children with SLI (ages seven and eight).

**Methods & Procedures:** We assessed groups of bilingual Catalan-Spanish SLI and matched control children at ages seven and eight with standardized reading comprehension tasks including grammatical structures, sentence and text comprehension. Early oral competence and prior nonverbal intelligence were also measured and introduced into regression analyses with the participants' reading results in order to state the relation between the comprehension of oral and written material.

**Outcomes & Results:** Although we found no significant differences between the scores of our two participant groups in the reading tasks, data regarding their early oral competence, but not nonverbal intelligence measures, significantly influence their reading outcome.

**Conclusions & Implications:** Our results extend our knowledge regarding the course of literacy acquisition of children with SLI and provide evidence in support of the theories that assume common linguistic processes to be responsible for both oral and reading comprehension.

## **Introduction**

According to the Simple View of Reading (SVR; Hoover and Gough, 1990) skilled reading consists of two components. In order to understand a message expressed by means of written symbols the reader has, first, to decode the printed input. Decoding allows access to the appropriate entry in the mental lexicon and its corresponding semantic information. After the pertinent word-level semantic information has been activated, the reader needs to comprehend the message, using lexical-semantic information to derive sentence- and text-level interpretations. The SVR hypothesis assumes that reading comprehension involves the same ability as general linguistic comprehension applied to oral language. The only difference between oral and reading comprehension would, thus, be that the latter relies on graphic information.

Children with Specific Language Impairment (SLI) present impaired oral language with no evidence of physical or neurological damage or other cognitive or sensory deficit (Leonard and Deevy, 2006). Spanish-speaking children with SLI have been shown to present difficulties with inflectional morphology and the use of clitics (Bedore and Leonard, 2005), the latter being even more pronounced in the case of Catalan-speakers (Gavarró, 2012). Furthermore, according to data gathered by Catts, Fey, Tomblin, and Zhang, (2002) 60% of English-speaking children with a preschool diagnosis of SLI display some kind of reading deficit. Although evidence regarding this association in non-English speakers is sparse, a relation between SLI and reading deficits has also been pointed out in speakers of romance languages (Aguilar-Mediavilla et al., 2014). Nevertheless, the exact nature of this disorder is still not clear, in part because the profile of impairment is very variable (Catts et al., 2002) and the deficit can appear in relation to decoding, comprehension, or both components of reading (for a review see Ricketts, 2011). Along the lines of the SVR model, Snowling, Bishop, and Stothard, (2000) suggest that different profiles of reading impairment associated

with SLI might be related to specific patterns of oral language deficit. Thus, whereas phonological impairments might explain low decoding competence during reading acquisition, reading comprehension deficits would be related to general language comprehension problems.

The aim of this research was to study the influence of prior oral comprehension competence over reading comprehension during the first years of reading acquisition of children with SLI (ages 7 and 8). In contrast to most of previous studies of SLI and reading, which are focused on English-speaking children, the novelty of our work lies in the study of bilingual Catalan-Spanish children what provides the opportunity to explore the course of reading acquisition in a sample of language-impaired bilingual speakers of orthographically transparent languages.

## **Methods**

### **Participants**

Our sample consisted of two groups of 13 children with SLI and 14 matched children with typical language development. A summary of their characteristics is presented in table 1. SLI participants had been diagnosed at age 6 according to established criteria (Stark and Tallal 1981; Tomblin, Smith, et al. 1997) in the context of a wide screening survey conducted in all the schools in Majorca. Native children in Majorca are all Spanish-Catalan bilinguals with comparable amounts of exposure to both languages. Catalan and Spanish are very similar romance languages, both with fairly transparent orthographic systems. All our participants scored above 85 in non-verbal IQ scale on the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). Their phonology, morphosyntax, lexicon and pragmatics abilities were evaluated using the PLON-R: Navarra Oral Language Test-Revised, (Aguinaga, Armentia, Fraile, Olangua, and Uriz, 2004).

Children in the SLI group obtained scores of at least -1.25 SD below the mean in at least two of the subtests applied. Sensory, psychiatric, neurological or social disorders were also discarded. Control participants were selected amongst their classmates. The two groups were matched on the first assessment ( $p>.1$ ) on age and manipulative intelligence but significantly differed in their oral language abilities as measured with the PLON-R test (Aguinaga et al., 2004). Spanish standardized versions of the tests were used in the screening. However, the volunteers were allowed to respond using Spanish or Catalan as preferred. Although schooling in the Balearic Islands is officially received in Catalan, some children speak Spanish or both languages at home. Our two groups were also matched on this variable. Informed consent was gathered from the schools and from the participants' parents at the beginning of the study and every time the children were assessed.

Insert Table 1 about here

## **Procedure**

The participants were tested individually by trained experimenters who were not aware whether the children belonged to the SLI or control groups. During the first assessment, the morphosyntax development of the participants was assessed with the TSA comprehension subscale (TSA Morphosyntactic Development Test (Aguado, 1989). In addition, their reading abilities were tested with a selection of tasks from the Assessment Battery for Reading Processes (PROLEC: Cuetos, Rodríguez, Ruano, and Arribas, 2007). One year later, they were again assessed with the same PROLEC subtests. Given that literacy is taught in Catalan in our context, Catalan-adapted versions of the standardized Spanish TSA and PROLEC tests were applied. Throughout the study, the children were allowed to use their preferred language during assessment, instructions were adapted if necessary and responses were accepted in any

of the two languages.

The TSA is a test aimed to measure morphosyntactic abilities in children between three and seven years old. The test provides separate subtests corresponding to the production and comprehension domains. These global scores are based on different items that assess the participant's use or comprehension of articles, pronouns, adverbs, prepositions, questions, passive sentences, negations, reflexive sentences, verbal tenses, comparative sentences, relative clauses, etc.

The PROLEC test is used to detect reading deficits during primary school. It comprises tasks aimed to assess the child's capacities to read single letters and words, as well as full sentences and texts. In our study, we focused on reading comprehension and, hence, selected the three tasks that involve reading at supralexical levels:

*Grammatical structures:* in this subtest the participants are asked to read a sentence (e.g. "The rabbit is jumping over the cat") and then choose the corresponding drawing out of four candidates (e.g. a rabbit jumping over a cat; a rabbit jumping over a wolf; a cat jumping over a rabbit; a wolf jumping over a cat). This subscale includes 16 sentences, four of each of the following categories: active voice, passive voice, relative clauses and focus in complement clauses. The task focuses on the understanding of appropriate word order and syntactic-grammatical relations between words.

*Sentence comprehension:* this task includes 16 sentences. In the first nine sentences, participants are asked to follow various written instructions (e.g. "Open and close each of your hands twice"). In the other seven sentences they are asked to select the most appropriate drawing for a given sentence, focusing on the understanding of comparatives (e.g. "The boy is fatter than the girl") and prepositions (e.g. "The green ball is between the blue boxes").

*Text comprehension:* this task consists of two narrative and two expository texts. For each

text, the participant has to respond to four written questions, sixteen total responses. It is aimed to assess the participant's capacity to understand full written texts (e.g. "Why do the okapi live near trees?"/ "What does the tongue of the okapi look like?").

## Results

We present a summary of the raw scores obtained by the two groups in the oral language comprehension subscale and in each of the PROLEC tasks in the two assessment times in table 2. SLI participants obtained significantly lower scores than control children in the oral language comprehension subscale ( $t(25) = 2.435, p = .02$ ). Regarding the results of the PROLEC test, we carried out a mixed MANOVA analysis with age, within-participants, and group, between-participants, as independent variables and the results of the three reading subtests as dependent measures. Our data showed a significant effect of the time of assessment (Pillai's trace:  $F(3,23) = 32.170, p < .001$ ). Within-participants tests (age) yielded significant differences in all the tasks for this variable ( $ps < .001$ ). Regarding the between-participants comparisons, we only observed significant differences between the two groups in the written sentence comprehension task ( $F(1,25)=4.352, p = .047$ ). However, separate planned comparisons of the scores of the two groups in the two assessment times yielded no significant results (age 7:  $t(25) = 2.052, p = .051$ ; age 8:  $t(25) = 1.102, p=.281$ ). Neither the group differences in the reading grammatical structures ( $F(1,25) = 4.136, p = .053$ ) or text comprehension ( $F(1,25) = 2.860, p = .103$ ) subtests, nor the interaction between group and age (Pillai's trace:  $F(3,23) = 1.712, p = .192$ ) appeared to be significant.

Insert Table 2 about here

Backwards stepwise regression analyses were conducted with group and TSA comprehension scores as independent variables in order to study the influence of oral comprehension competence over the three measures of reading comprehension of our participants at ages 7 and 8. IQ measures gathered during the SLI diagnosis at age 6 were also included as a predictor variable in all the models. Scores obtained in the oral language comprehension subscale were able to significantly predict the participant's results in the reading grammatical structures task at the first ( $R^2 = .307$ ;  $B = .257$ ,  $\beta = .554$ ,  $p = .003$ ) and second assessments, ( $R^2 = .419$ ;  $B = .221$ ,  $\beta = .647$ ,  $p < .001$ ) as well as the sentence ( $R^2 = .314$ ;  $B = .101$ ,  $\beta = .561$ ,  $p = .002$ ) and text ( $R^2 = .190$ ;  $B = .166$ ,  $\beta = .436$ ,  $p = .02$ ) comprehension scores at age 8. No significant effects of group or early nonverbal intelligence were observed in any of the analyses.

## **Discussion**

Our study aimed to explore the influence of oral comprehension over reading comprehension during the acquisition of literacy in bilingual children with an early diagnosis of SLI. The participants in both our SLI and control groups showed a significant improvement in their reading comprehension abilities between the first and second assessments, ages 7 and 8 respectively. Along with the absence of a significant interaction between assessment time and group, this result suggests that the two groups had progressed in a similar way in the acquisition of their reading capacities (St. Clair et al., 2010).

Regarding the comparison between the two groups, in spite of numerical differences between the scores of SLI and control participants in the two tasks (note that the effect in the reading grammatical structures subtest approaches the significance threshold), significant differences



appeared only between their scores in the written sentence comprehension task overall but not in direct comparisons of the scores obtained by the two groups in each assessment time.

Hence, although the differences between the two groups at age 7 approached significance, our results, indicate that reading comprehension of the children with prior SLI diagnosis was not impaired in comparison to that of the control participants, at least at a group level.

Previous studies have found high rates of SLI-dyslexia comorbidity (Snowling et al., 2000), and, more specifically, a relation between SLI and reading comprehension deficits has been proposed (Bishop and Adams, 1990). The absence of significant differences in the direct comparisons in our study might be due to the resolution of their language difficulties.

Nevertheless, we lack oral language measures for our participants at these later stages so we cannot test this hypothesis. Another possibility is related to the characteristics of the Catalan orthographic system, which is fairly transparent. This could have facilitated literacy acquisition by our participants compared to speakers of English, which is a deeper language. However, these results should be taken with caution given the high heterogeneity of language profiles presented by children with SLI (Catts et al., 2002) and that even SLI children whose language problems have resolved can present reading difficulties later on during adolescence (Stothard, Snowling, Bishop, Chipchase, and Kaplan, 1998).

Considering this, we explored the relationship between oral and reading comprehension by means of regression analyses. Our results confirmed the relation between early oral comprehension competence and reading comprehension at the two assessment moments. At age 7, the oral language comprehension subscore was able to predict our participants' results in the reading grammatical structures task. The performance in this task reveals the participant's capacity to take relevant word order into account and identify the appropriate syntactic-grammatical relations between words during reading comprehension. At the second assessment, age 8, the oral comprehension subscale scores significantly predicted the

performance in the three reading comprehension tasks. Our data, thus, confirms the relevance of early morphosyntactic competence in the oral modality over the development of appropriate comprehension skills in the written language domain. These results go in line with those of Aguilar-Mediavilla et al. (2014), who observed early phonological awareness and verbal fluency to predict general reading ability of bilingual children with SLI at age 8. The present study delves into this relation establishing a specific link between the oral and written comprehension subcapacities. This observation provides support to the SVR (Hoover and Gough, 1990), according to which, oral and written comprehension share common language processing abilities.

Furthermore, the greater relevance of early oral linguistic comprehension over reading comprehension in the second, compared to the first, assessment is in line with the hypothesis outlined by Snowling et al. (2000). These authors suggested that, whereas a phonological deficit in the oral domain would predict reading impairments during the early moments of literacy acquisition, mainly dedicated to the development of decoding skills, the influence of general language abilities over reading comprehension would be apparent at later stages, when comprehension is more relevant. Further studies should be conducted in order to state whether a deficit would become apparent later on, as reading comprehension becomes more challenging.

Finally, in contrast with the results of previous research (Catts et al., 2002), nonverbal IQ measures did not influence our participants' comprehension capacities. This observation ruled out possible confounds due to intelligence variations in our sample, and highlights the relevance of early linguistic capacity over later reading comprehension abilities.

In sum, although we have found no evidence of a reading comprehension deficit in our SLI group as compared to the control participants, early oral competence data significantly

predicted their results in the reading comprehension tasks, especially at the moment of the second assessment. This result complements previous evidence obtained with bilingual speakers of two romance languages Aguilar-Mediavilla et al., (2014). Hence, the oral comprehension deficits of SLI children need to be taken into account during literacy instruction, even at early stages when reading disorders might not be apparent. Additionally, our study supports the idea proposed by the SVR (Hoover and Gough, 1990) that oral and reading comprehension both depend on the same general amodal linguistic capacities.

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Table 1. Summary of the sociodemographic and cognitive characteristics of the sample

	<b>Control (n=14)</b>	<b>SLI (n=13)</b>
Males	9	7
Age T1 (months)	79 (4.1)	79 (4.1)
Preferred Language		
Catalan	5	4
Spanish	8	8
Indistinct	1	1
PLON-R at age 6 (direct score)	10.4 (1.9)	8.0 (2)
Nonverbal IQ at age 6 (standardized score)	108 (8.6)	103 (9.0)

Table 2. Summary of the participants' scores in the oral comprehension test (TSA) and reading processes test (PROLEC) at ages 7 and 8.

		SLI mean (SD)		Control mean (SD)	
		Age 7	Age 8	Age 7	Age 8
TSA	max.				
Comprehension	72	42.8(10.9)		50.9(5.7)	
PROLEC					
Grammatical Structures	16	4.2(3.7)	8.2(2.9)	7.1(4.5)	10.2(3.3)
Sentence Comprehension	16	3.6(3.7)	10(1.8)	7.1(4.9)	10.7(1.6)
Text Comprehension	16	1.9(2.9)	6.5(3.1)	3.9(5.1)	8.9(3.7)

### **What this paper adds?**

Children with Specific Language Impairment (SLI) present an oral language deficit that affects syntax and inflectional morphology. The present study explores the influence of early oral language competence of children with SLI over reading comprehension. Our results confirm the importance of early oral abilities during literacy acquisition, and support theories that propose common linguistic processes to be responsible for both oral and reading comprehension.