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Early preschool processing abilities predict subsequent reading outcomes in bilingual Spanish–Catalan children with Specific Language Impairment (SLI)

Eva Aguilar-Mediavilla [a,*], Lucía Buil-Legaz [a], Josep A. Pérez-Castelló [a], Eduard Rigo-Carratalà [a], Daniel Adrover-Roig [b]

[a] University of the Balearic Islands, Ed. Beatriu de Pinós, Cra. Valldemossa, km. 7.5, 07122 Palma de Mallorca, Spain
[b] University of the Balearic Islands, Ed. Guillem Cifre de Colonya, Cra. Valldemossa, km. 7.5, 07122 Palma de Mallorca, Spain

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ABSTRACT

Children with Specific Language Impairment (SLI) have severe language difficulties without showing hearing impairments, cognitive deficits, neurological damage or socio-emotional deprivation. However, previous studies have shown that children with SLI show some cognitive and literacy problems. Our study analyses the relationship between preschool cognitive and linguistic abilities and the later development of reading abilities in Spanish–Catalan bilingual children with SLI. The sample consisted of 17 bilingual Spanish–Catalan children with SLI and 17 age-matched controls. We tested eight distinct processes related to phonological, attention, and language processing at the age of 6 years and reading at 8 years of age.

Results show that bilingual Spanish–Catalan children with SLI show significantly lower scores, as compared to typically developing peers, in phonological awareness, phonological memory, and rapid automatized naming (RAN), together with a lower outcome in tasks measuring sentence repetition and verbal fluency. Regarding attentional processes, bilingual Spanish–Catalan children with SLI obtained lower scores in auditory attention, but not in visual attention. At the age of 8 years Spanish–Catalan children with SLI had lower scores than their age-matched controls in total reading score, letter identification (decoding), and in semantic task (comprehension). Regression analyses identified both phonological awareness and verbal fluency at the age of 6 years to be the best predictors of subsequent reading performance at the age of 8 years. Our data suggest that language acquisition problems and difficulties in reading acquisition in bilingual children with SLI might be related to the close interdependence between a limitation in cognitive processing and a deficit at the linguistic level.

Learning Outcomes: After reading this article, readers will be able to: identify their understanding of the relation between language difficulties and reading outcomes; explain how processing abilities influence reading performance in bilingual Spanish-Catalan children with SLI; and recognize the relation between language and reading via a developmental model in which the phonological system is considered central for the development of decoding abilities and comprehension.

* Corresponding author. Tel.: +34 971172566; fax: +34 971173190.
E-mail addresses: eva.aguilar@uib.es, aguilarmediavilla@gmail.com (E. Aguilar-Mediavilla), lucia.buil@uib.es (L. Buil-Legaz), pep.perez@uib.es (J.A. Pérez-Castelló), e.rigo@uib.es (E. Rigo-Carratalà), daniel.adrover@uib.es (D. Adrover-Roig).

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1. Introduction

The aim of this paper is to analyse the relationship between preschool processing abilities and the later development of reading outcomes in a sample of bilingual Spanish–Catalan children with and without SLI. For this purpose, a set of phonological (phonological memory, phonological awareness, and rapid automatic naming), attentional (auditory and visual), and linguistic variables (lexical comprehension, verbal fluency and sentence repetition) were compared between both groups of children, and the relative contribution of these variables to the later development of reading was evaluated through a regression model.

Language of children with SLI is characterised by a chronological delay of one or more years and a substantial limitation in acquiring language structures. This delay is not related to the factors that usually explain problems in language learning, such as hearing impairment, low IQ, detectable neurological damage, or partner-emotional problems (American Psychiatric Association, 2013; Leonard, 1998; Stark & Tallal, 1981; Tomblin, Freese, & Records, 1992; Tomblin, Smith, & Zhang, 1997). Besides these common underlying factors, crosslinguistic studies (see Leonard, 1998) have shown that the linguistic profiles of children with SLI vary according to the specificities of a particular language. Moreover, this logic also applies to typical bilingual language development, given that monolingual and bilingual children show differences and similarities in language acquisition, also depending on the languages considered (Genesee & Nicoladis, 2006). In light of these results, the specific characteristics of cognitive and language development should be explored in bilingual children with SLI, as it is the case in the present study. However, very few studies have described the linguistic outcomes in bilingual children with SLI, and even fewer have explored the cognitive and linguistic characteristics of bilingual Spanish–Catalan children with SLI, which is probably related to the difficulty to find enough children that meet all inclusion criteria. One finding that seems to be consistent across studies is that bilingual children with SLI manifest their linguistic deficits in both languages in such a way that both languages are learned at a much slower rate than in their age-matched bilingual peers (Hakansson, Salameh, & Nettelbladt, 2003). Focusing on language characteristics in bilingual Spanish–Catalan children with SLI, our previous studies have shown several problems at the linguistic level, such as omissions in function words, errors in inflected morphology, poor syntactic structure (Aguilar-Mediavilla, Sanz-Torrent, & Serra-Raventós, 2007; Serra-Raventós, 2002; Serra-Raventós, Aguilar-Mediavilla, & Sanz-Torrent, 2002), omissions of weak syllables and reductions of syllabic shapes (Aguilar-Mediavilla, Sanz-Torrent, & Serra-Raventós, 2002; Aguilar-Mediavilla & Serra-Raventós, 2006). Additionally, errors in verbs, difficulties in lexical access and poor coherence have also been reported (Sanz-Torrent, Serrat, Andreu, & Serra-Raventós, 2008). With respect to the written modality, there is still a lack of studies with bilingual Spanish–Catalan children with SLI. In other languages, different from Spanish and Catalan, most children with SLI display difficulties in learning to read and write during school age and adolescent years (Catts, Fey, Zhang, & Tomblin, 2001; Catts, 1993; Nippold & Schwarz, 2002). For instance, Tomblin, Zhang, Buckwalter, & Catts (2000) found that 46% of the children with SLI showed reading-accuracy difficulties (i.e. ability to accurately pronounce printed English words and non-words), and 52% showed reading comprehension difficulties. However, the preschool processing capacities that might underlie language difficulties have to be taken into account, which is one of the main goals of the present study. In this sense, the few existing studies conducted with bilingual children with SLI who had Spanish as one of their languages have reported a deficit in phonological working memory (Girbau & Schwartz, 2008) and in processing auditory and visual information (Pons, Andreu, Sanz-Torrent, Buil-Legaz, & Lewkowicz, 2012). Meanwhile, studies that have explored the processing deficits in monolingual children with SLI are more abundant. These studies have shown that children with SLI have deficits in phonological processing (Goulandris, Snowling, & Walker, 2000), phonological memory (Girbau & Schwartz, 2007; Montgomery, 2003), rapid automatised naming (RAN) (Vandewalle, Boets, Ghesquière, & Zink, 2010), auditory attention (Aguado, Cuetos-Vega, Domezáin, & Pascual, 2006; Buiza-Navarrete, Adrián-Torres, & González-Sánchez, 2007; Montgomery, Evans, & Gillam, 2009), executive functioning (Henry, Messer, & Nash, 2012; Marton, 2008) and language processing (see Leonard, 1998 or Mendoza, 2012, for a review).

Most of these observed deficits in children with SLI are difficult to constrain to a specific difficulty in the linguistic domain (Gopnik & Crago, 1991). An alternative account considers that language problems in children with SLI are due to a more generalised limitation in several cognitive capacities, such as perception, memory, auditory processing, or general information processing (see Bishop, 1992; Leonard, 1998; Miller, 2011 for a review). Following this account, the limited processing capacity hypothesis (Leonard, 1998) would include processing capacities at the linguistic and non-linguistic levels as the underlying factors that are causing linguistic deficits in children with SLI. Thus, children with SLI would show difficulties in the capacities that are necessary to understand and produce words, sentences or narrations (e.g. working memory, in addition to rapid stimulus perception). This general deficit could be due to a slow processing of information (Hayiou-Thomas, Bishop, & Plunkett, 2004), to a reduced general capacity (Leonard, 1998; Miller, Kail, Leonard, & Tomblin, 2001), or both (Leonard et al., 2007).

Following this hypothesis, the relationship between the processing deficits, language production problems and literacy difficulties in children with SLI is hard to disentangle. A Development Causal Model that takes into account the mutual interdependence between cognitive and linguistic deficits may shed some light to this issue (Morton & Frith, 2001; Scarborough, 2009) (see Fig. 1). According to this model, reading difficulties in children with SLI might be considered as an extension of their previously existing language problems. Thus, their language profiles would change with the acquisition of new skills, while previous abilities would remain underdeveloped. Hence, children with SLI might show different patterns of difficulty at distinct developmental stages. These difficulties might not only be caused by a common factor affecting the