

Executive functions in language-minority children with specific language impairment

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1. Background

The cause of the language problems in SLI is unknown but recent evidence suggests that they might be secondary to more general cognitive processing limitations¹. Some studies indicate that executive functioning might be deficient in SLI².

This study was conducted to:
(1) seek further evidence for executive function deficits in children with SLI.
(2) to determine which executive processes might be affected in bilingual children with SLI.

This cross-cultural research presents data on bilingual and monolingual children from low income families in Luxembourg and Portugal who all speak Portuguese as their first language.

2. Methods

The data from 81 children from three different groups was analyzed:

- 15 Portuguese-Luxembourgish-speaking children from Luxembourg with SLI (Bi-SLI)
- 33 typically developing Portuguese-Luxembourgish-speaking children from Luxembourg (Bi-TD)
- 33 typically developing Portuguese-speaking monolinguals from Portugal (Mo-TD)

	Bi-SLI (n = 15) [†]	Bi-TD (n = 33)	Mo-TD (n = 33)
Age	8 years	8 years; 2 months	8 years; 1 month
Sex (% of boys)	87	45	48
Socioeconomic status ³	32 (e.g. cleaner, craft worker)	35 (e.g. cleaner, craft worker)	36 (e.g. cleaner, craft workers)
Nonverbal IQ ⁴	106*	107*	108*

[†] All children had received a formal SLI diagnose from specialized health professionals following the clinical criteria from ICD-10⁵. The diagnose was confirmed by a range of standardized language measures in Portuguese⁶. All the children scored below the 10th percentile on these measures. Children also scored on average 6.2 SD below the mean on a Portuguese nonword repetition task (range -10.1 to -2.25 SD).
* Standard score (M = 100; SD = 15), all of the children achieved a standard score above 85

None of the children were diagnosed with hearing problems, epilepsy, autism spectrum disorder, or ADHD. Participants for whom a problem in terms of attention control was reported were excluded.

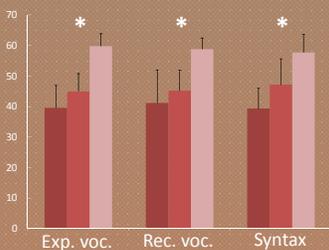
Children completed a range of measures tapping expressive and receptive vocabulary, syntactic comprehension, verbal working memory (digit span & counting recall), visuospatial working memory (dot matrix & odd-one-out), and cognitive control (sky search & flanker). Bilingual children completed the language measures in both their languages (L1-Portuguese & L2-Luxembourgish).

Matching:
first language,
ethnicity (Caucasian),
chronological age,
socioeconomic status &
nonverbal intelligence

3. Results

■ Bi-SLI ■ Bi-TD ■ Mo-TD

➤ LANGUAGE PORTUGUESE (L1)

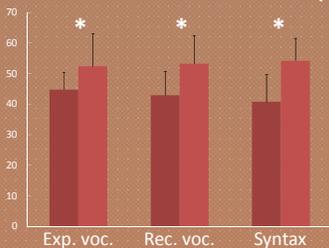


L1 Expressive vocabulary
 $F(2, 78) = 92.68; p = .00; \eta^2_p = .70$
(Bi-SLI = Bi-TD) < Mo-TD

L1 Receptive vocabulary
 $F(2, 78) = 49.61; p = .00; \eta^2_p = .56$
(Bi-SLI = Bi-TD) < Mo-TD

L1 Syntactic comprehension
 $F(2, 78) = 37.50; p = .00; \eta^2_p = .49$
Bi-SLI < Bi-TD < Mo-TD

➤ LANGUAGE LUXEMBOURGISH (L2)

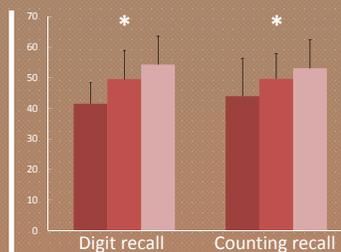


L2 Expressive vocabulary
 $F(2, 78) = 6.70; p = .01; \eta^2_p = .13$
Bi-SLI < Bi-TD

L2 Receptive vocabulary
 $F(2, 78) = 13.98; p = .00; \eta^2_p = .23$
Bi-SLI < Bi-TD

L2 Syntactic comprehension
 $F(2, 78) = 30.19; p = .00; \eta^2_p = .40$
Bi-SLI < Bi-TD

➤ VERBAL WORKING MEMORY



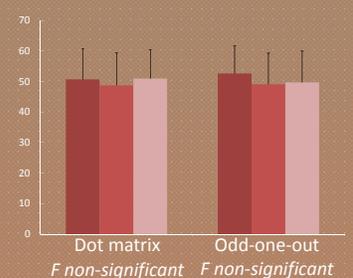
Digit recall
 $F(2, 78) = 10.57; p = .00; \eta^2_p = .21$
Bi-SLI < (Bi-TD = Mo-TD)

Counting recall
 $F(2, 78) = 4.78; p = .01; \eta^2_p = .11$
Bi-SLI = Bi-TD = Mo-TD

Sky search
 $F(2, 78) = 3.15; p = .04; \eta^2_p = .08$
Bi-SLI = Mo-TD, Bi-SLI = Bi-TD, Mo-TD < Bi-TD

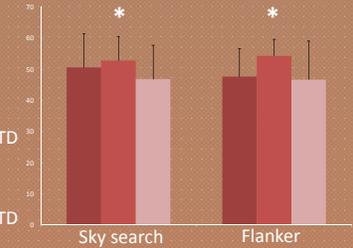
Flanker
 $F(2, 78) = 5.86; p = .00; \eta^2_p = .13$
Bi-SLI = Mo-TD, Bi-SLI = Bi-TD, Mo-TD < Bi-TD

➤ VISUOSPATIAL WORKING MEMORY



F non-significant F non-significant

➤ COGNITIVE CONTROL



4. Conclusion

The study provides no evidence to suggest that children with SLI present domain-general deficits in executive functioning. Children in the Bi-SLI group performed equally well to the TD groups on visuospatial measures of working memory but manifested a deficit in verbal working memory. Visuospatial working memory difficulties might not be specific to SLI but represent a correlate of comorbid impairments. SLI might be a disorder of multiple underlying deficits and executive dysfunction might constitute one of many risk factors that can compromise language learning.

The Bi-TD group showed an advantage over the Mo-TD group on measures of cognitive control consistent with the position that a bilingual experience stimulates the development of executive functions that are involved in dealing with conflicting information⁷. Studies with monolingual children with SLI are needed to determine whether bilingualism might represent a protective factor against cognitive limitations in SLI.

CLINICAL IMPLICATIONS: Relative to Mo-TD children, the Bi-TD group was disadvantaged on language assessments but not on digit recall. Digit recall also differentiated children with SLI from the TD groups and might represent a promising diagnostic tool to determine whether low scores on language assessments are attributable to a child's sociolinguistic background or to the presence of a neurolinguistic disorder.

5. References

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