Is there a generalized procedural deficit in children with Specific Language Impairment?

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INTRODUCTION

Previous studies (Lum et al., 2009; Tomblin et al., 2007; Ullman & Pierpont, 2005) have suggested that difficulties in the procedural learning system could contribute, in part, to the language difficulties observed in children with SLI. However, we have recently shown, with an adapted serial reaction time (SRT) task, that children with SLI are able to learn implicitly non-linguistic regularities (Gabriel et al., submitted). In this research, we wanted to determine whether children with SLI are able to learn an 8-elements probabilistic sequence into which irregularities are inserted. Assessing probabilistic sequence learning in children with SLI should help us to better circumscribe the language difficulties of these children.

STUDY

PURPOSE

- To explore the abilities of children with SLI to learn probabilistic associations within a visuo-spatial sequence..

HYPOTHESES

- Some aspects of the language difficulties in children with SLI could be related to deficits in probabilistic sequential learning.
- If so, performance of children with SLI should be impaired in comparison to children with NL on a probabilistic visuo-spatial sequence learning task.

METHODOLOGY

PARTICIPANTS

- **16 children with SLI**
  - Aged from 6 to 13
  - Monolingual French speakers
  - QIP (WISC IV) > 82
  - Language skills below 1.25 SD from the mean in 2 or more of 5 language areas
  - No neurological or auditory Disorders

- **16 children with NL**
  - No history of language disorders
  - Monolingual French speakers
  - Matched with children with SLI according to chronological age, QI performance, social level and gender.

MATERIAL

- Methodology inspired from the study of Schvaneveldt & Gomez, 1998
  - 13 blocks of a four-choice RT task: 12 learning blocks (B1 to B12) and 1 transfer block (B13).
  - An 8-element-long probabilistic sequence (31432412, a sequence into which irregularities are inserted) was repeated eight times.
- Creation of an adapted serial reaction time (SRT) task
  - Touch screen responding
  - The task was presented as a game in which the child had to catch a figure to free his/her friends.
  - The SRT task lasted approximately twenty minutes.
  - Median response RTs and for correct responses were calculated for each block, as is common practice in studies using the SRT tasks (Nissen & Bullemer, 1987).
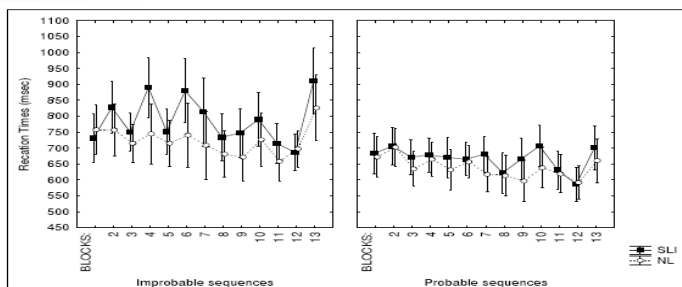
EXPERIMENTAL DESIGN
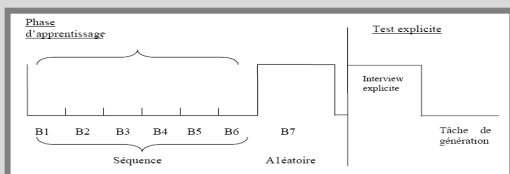
ADAPTED SRT TASK
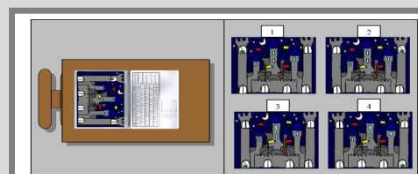
RESULTS

Mean reaction times (RTs) for each block for children with SLI (square) and children with NL (circle) during the adaptation of the SRT task with a probabilistic sequence (for probable and improbable sequences): Blocks 1–12: structured; Blocks 13: transfer.

RTs
- No significant Group effect, $F < 1$
- Significant <u>Block effect</u>, $F(1, 28) = 26.48$, $p < .001$
- No Group x Block interaction
- Significant <u>Probability effect</u>, $F(1, 28) = 52.92$, $p < .001$
- No Group x Probability interaction

Correct responses (logarithmic transformation)
- Significant <u>Group effect</u>, $F(1,28) = 8$, $p < .05$
- Significant <u>Block effect</u>, $F < 1$
- No Group x Block interaction
- Significant <u>Probability effect</u>, $F(1, 28) = 8.06$, $p < .05$
- No Group x Probability interaction

DISCUSSION

- SLI were able to learn probabilistic sequences as fast as children with NL:
  - they responded as fast as NL;
  - they responded faster for probable in comparison with improbable locations.
- SLI were able to learn probabilistic sequences as accurately as NL:
  - they made less correct responses than controls, but the learning effect was similar in both groups;
  - they made more correct responses to probable than to improbable locations, as NL.

→ The core of the impairment in SLI could be not linked to difficulties in non-linguistic regularities learning.

→ Indeed, SLI could benefit to the same extent as NL from efficient procedural learning mechanisms to discern certain non-linguistic regularities in the input, even if these regularities are more complex.

References:
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