Response inhibition in monolingual and bilingual children with and without SLI

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Abstract

Research has shown that bilingual children show similar difficulties in their early stages of acquisition of language to monolingual children with Specific Language Impairment (SLI) (e.g. Crago & Paradis, 2003). The fact that both bilingualism and SLI impact on language makes it problematic to use language measures to identify SLI in bilingual children. Recent research, however, suggests that children with SLI also present deficits in non-verbal executive functioning (EF), especially in the domain of response inhibition (e.g. Henry, Messer, & Nash, 2012; Im-bolter, Johnson, & Pascuale-Leone, 2006). To date, the accuracy of non-verbal inhibition tasks in diagnosing SLI has not been fully assessed. Such assessment is of particular interest in the context of bilingualism where language measures often fail to differentiate between the effect of bilingualism and the effect of SLI. Therefore, using a non-verbal measure for which a SLI disadvantage is found could solve this problem. Such a non-verbal measure should not show any bilingual effect and this is the case for response inhibition (e.g. Martin-Rhee & Bialystok, 2008).
The present study investigated the performance on response inhibition in four groups of children aged 6-8: 17 TD monolingual children (MOTD), 19 monolingual children with SLI (MOSLI), 19 TD bilingual children (BITD) and 13 bilingual children with SLI (BISLI). All children were French-speaking. All SLI children had been diagnosed on the basis of standard procedures in French. The bilingual groups started learning French around the age of 3, meaning that they had had 3 to 5 years exposure at the time of testing. A classic stop signal task was used to assess non-verbal response inhibition, i.e. the ability to actively suppress an overlearned response and replace it by a new but less automatic one. Children were shown a succession of left or right pointing arrows on a computer screen. In case of a green arrow, children had to press the left- or the right-button of the press pad according to the direction of the arrow as quickly as possible. When the arrow turned red, children were instructed to refrain from pressing the button. This corresponded to the inhibition-trials. The colour change from green to red (inhibition-trials) occurred in 25% of the trials and was unpredictable. The main dependent variable was the mean stop stimulus reaction time (SSRT), which gives an estimate of the time length for which children are able to inhibit a motor response. Large SSRTs indicate poor inhibition abilities.

The effects of bilingualism and SLI on the SSRT were assessed separately. We then evaluated the diagnostic accuracy of the stop signal task, by examining its sensitivity and specificity. Results revealed a negative SLI effect but no effect of bilingualism, suggesting that the stop signal task might potentially be a useful measure for discriminating a bilingual child with SLI. Diagnostic accuracy was assessed for the task on the basis of the SSRT scores. Because

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there was no effect of bilingualism, we assessed diagnostic accuracy across both groups. ROC curves identified the optimum cut-off score, i.e. a cut-off combining the highest sensitivity with an acceptable specificity. Taking this cut-off led to low levels of sensitivity and specificity, indicating that this task was not reliable for identifying or excluding a diagnosis of SLI.

Overall, results suggested that response inhibition could not be considered as a clinical marker of SLI. However, given the results at the group level, children with SLI seemed more at risk than their TD peers for poor performance in response inhibition. In other words, the absence of a deficit in response inhibition cannot exclude SLI. But the presence of a deficit in response inhibition can be an extra cue for a SLI diagnosis in both monolinguals and bilinguals.

References

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