Automatization of basic calculation and reading skills in a small sample of adolescents with cerebral palsy

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Fluent reading and calculation skills are two basic skills at school and everyday life. Attaining these skills is an important goal during the first two school years. However, little is known about automatization of basic calculation and reading skills in CP children and adolescents. In the present study the aim was to describe the automatization of these basic skills in a small group of adolescents with CP. In our study, only half of the group had automatized reading and calculation skills.

Introduction

Cerebral palsy (CP) describes a group of disorders of the development of movement and posture, causing activity limitation, that are attributable to non-progressive disturbances that occurred in the developing fetal or infant brain, accompanied by disturbances of sensation, cognition, communication, perception, and/or by a seizure disorders (Bax et al., 2005). Although the term originally referred only to disorders of the cerebrum, lesions at other levels are frequently included (Spreen et al. 1995).

Associated intellectual loss has frequently been observed; 50 to 70 per cent of children with CP are mentally retarded (Spreen et al. 1995). The IQs of hemiplegic children have been the most extensively reported and they are on average 20 points below normal (Beaumont et al. 1996). Pueyo et al. (2009) established the percentage of persons with bilateral cerebral palsy who present neuropyschological impairment, and its relationship to perinatal data and motor signs. They perceived impaired vocabulary in 85%, language comprehension in 13-48%, visuospatial abilities in 60%, visuospatial in 90%, short term memory 21-58%, declarative memory in 47-67%, and praxis comprehension in 20%, with executive deficits in 58-74%. Yet little is known about automatization of basic calculation and reading skills in this group.

Aim of the study

In the present study the aim was to describe the automatization of reading and arithmetic skills in a small group of adolescents with CP.

Materials and methods

9 boys and two girls (age range 10-16 years) with different subtypes of CP participated in this study. Four attended to mainstream education and eight to special education. The computer-administered tasks were constructed and carried out using the NEURE program. In calculation tasks single-digit additions/subtractions were presented one at a time in a horizontal format on a computer screen and a child was instructed to press a large green button as soon as he knew the answer. After pressing the button a new item appeared and child was instructed to key or say the answer.

In a reading task child was instructed to read the sentence as soon as possible and press a large green button if the sentence was true and a large red button if the sentence was not true. Speed of calculation and reading were the median response time subtracted by the median time taken by the child to respond in a simple reaction time tasks.

Calculation and reading were considered to be automatized if the mean response time per item was less than 3000 ms. There were 70 sentences presented in 180 seconds, and automatized performance required 30 read sentences, when the reaction time per se was taken account.

Results

Half of the children had automatized reading and calculation skills. Either all reading, addition, and subtraction skills or none of them were automatized. One child with right hemiplegia, however, showed automatized arithmetic ability but non-automatized reading ability. Neither diagnosis, nor lateralization of the lesion explained the findings. Attending to mainstream education or special education did not categorize participants according to their automatized skills.

Conclusions

According to Jenks et al. (2007), the future independence of children with CP depends largely on their ability to perform non-physical tasks and therefore the potential impact of learning difficulties in these children seems greater than in many other populations. Pueyo et al. (2008), for one, note that cognitive assessment should form an essential part of CP studies. Severe neumotor disability and communication problems in people with cerebral palsy, however, make standard neuropsychological tests impossible (Beaumont et al. 1996, 211; Sabbadini et al., 2001), possibly leading to an over- or under-evaluation of their real abilities (Sabbadini et al., 2001). Due to these problems, Pueyo et al. (2008) remark that there is a clear need for an easy-to-administer test for use with participants representing varying degrees of motor disability and verbal impairment able to provide as much information as possible on their cognitive functions.

In the present study, computer-administered tasks were constructed and carried out using the NEURE program. In the arithmetic tasks, the testee could type the answer at her leisure after pressing the response button. In the reading task, no speech production was required. These applications diminished the effects of motor and communicative distinctions typical for CP patients to the responses.

In this age group, single digit calculation and word reading skills are expected to be automatized. Yet adolescents with CP showed different pattern of automatized skills. Automation is salient for its proved implication to learning disabilities common in this group, and awareness of this is important to teachers and psychologists working with CP children and adolescents.

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References:


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