Evaluation of attention problems in children with autism and children with a specific language disorder

Abstract Children with autism and children with a specific language disorder show additional attention deficits. The literature on the neuropsychological investigation of attention in both groups of children suggests that the nature of their attention problems might be different. The purpose of this study is to examine the attention test profiles in these two groups of children with developmental disorders. Nineteen children and adolescents with autism, 17 subjects with a specific language disorder and 19 control subjects participated in the study. Non-verbal intelligence was normal for all subjects. The “Testbatterie zur Aufmerksamkeitsprüfung” was administered to all subjects. This instrument provides the possibility to examine a wide range of attention functions and executive functions. The results showed that the autistic individuals had deficits in executive functions, whereas the language impaired children had deficits in auditory sustained attention, in auditory selective attention, and in the domain of executive functions. It is concluded that although both groups of developmentally impaired subjects showed attention problems, the deficits are not the same in both groups. The different neuropsychological profiles probably reflect different mechanisms in the pathogenesis of the attention deficits in both types of developmental disorders.

Key words Autism – language disorder – attention – neuropsychology

Introduction

Autism and specific developmental disorders of speech and language are both described in chapter F8 “Disorders of psychological development” of the international classification scheme. In the introduction to this chapter it is stated that there is an impairment or delay in the development of functions closely related to biological, maturational processes of the central nervous system (33). Attention is a higher cerebral function and both children with autism and children with a specific language disorder have been described as having clear attention problems (4, 5, 17–19). Attention deficits have a major impact on the cognitive and the social development; hence, the accurate diagnosis of these problems is of immediate relevance for these children.

The actual models on attention emphasise that it is a complex function and suggest that different attention components are represented in distinct, widely distributed but interconnected cortical and subcortical sites, which collectively constitute an integrated network. It is proposed that each cortical/subcortical site represents a more or less specific aspect of attention. Selective attention mechanisms have been attributed to the parietotemporal cortex, executive aspects of attention such as planning, flexibility and working memory are considered to be frontal lobe functions, whereas
quantitative dimensions of attention such as alertness and the ability to sustain attention over a long period of time are proposed to be functions of subcortical sites (15). Moreover, according to the working memory model of Baddeley, attention is closely related to memory processes through the mechanism of the central executive processor (1).

The results of the studies focusing on attention deficits in children with autism are rather heterogeneous and there is still no clear picture about the nature of their attention problems. Ornitz suggested that overselective attention mechanisms might be the core deficits in children with autism (20). Burack also studied selective attention in autistic children and found that the performance of these children was more impaired by the presence of distracters than the performance of control children (6). Garretson and co-workers examined the ability to sustain attention in a group of autistic children and did not detect significant differences between autistic and control children on this task (9). Minshew et al. tested children with autism with a broad battery of different neuropsychological attention tests and found no differences between these children and the controls (13, 14). Courchesne and co-workers found that autistic children had considerable problems in rapidly and accurately moving or shifting the focus of attention from one source of information (e.g. auditory) to another (e.g. visual) but were not affected in the ability to simply maintain attention on only a single source. They suggested that the cerebellum might play a part in this attention deficit (8).

Several studies reported that autistic children had clear problems on tasks tapping executive functions. Pennington and Ozonoff reviewed the literature on executive functions in autism and other developmental psychopathologies (26). The authors concluded that deficits in executive functions were consistently found in autistic samples across many studies, using a wide variety of measures with subjects of all ages and functioning levels. Deficits in executive functions, however, were also present in ADHD children. The severity and profile of the deficits appeared to be different in both groups. There seems to be some evidence that the autistic children are specifically impaired on planning and flexibility aspects of the executive functions, whereas ADHD children have more inhibition problems (21–25). Recently, Russell et al. established evidence that autistic children are especially impaired on executive tasks requiring the subjects to follow novel rules and to make a non-verbal response. Their hypothesis is that children with autism are particularly challenged by executive tasks because they are unlikely to encode rules in a verbal form (27).

Studies on language impaired children concentrate on auditory perception and processing as well as on auditory short-term memory. The studies of Tallal et al. proposed that these children were impaired in perceiving rapid auditory stimuli and that this affected their speech perception. The authors trained language impaired children to associate two easily distinguishable tones with a specific keypress response. Once this association had been learned, sequences of two tones were presented and the subjects had to press the corresponding keys in the correct sequence. The results of these studies point to a clear impairment of these abilities in language impaired children and also make clear that there is an overlap between processing/memory function and attention (2, 12, 28, 29). Few studies report specifically on a more detailed analysis of attention deficits. Nicolay examined a group of school-aged language impaired children and age-matched controls with the Matching Familiar Figure Test and a vigilance-type task and found that the language impaired children had clearly more attention problems than the normal control children (16). Campbell stressed the importance of sustained auditory attention as a major factor in the development of receptive language skills (7). Kail reviewed several studies on language impaired children and analysed the reaction time of these children on a variety of verbal as well as on non-verbal tasks. His analysis demonstrated that language impaired children were consistently slower than the unimpaired children on all types of tasks. It was therefore postulated that the deficits of these children could not be attributed to a language-specific system, but reflect some general component of cognitive processing (10). Weyand and Willis studied executive function tasks in hyperactive children and language impaired children and found that both groups were equally impaired on these tasks (32).

The literature on the neuropsychological investigation of attention deficits in children with autism and children with specific language disorders shows that it is not clear which attention functions might be deficient in both groups of children. While there is a reasonable number of studies on the neuropsychological assessment of autistic children (6, 8, 9, 13, 14, 20–27), there are only very few papers reporting on language impaired children (7, 10, 12, 16, 32). Moreover, most studies use quite different paradigms to investigate a broad range of attention functions in different clinical groups, making it difficult to compare results and to decide whether the nature of the attention deficits is the same in both groups of developmentally disordered children.

The purpose of this study is to analyse and compare the attention deficits in children with autism and children with a specific language disorder on a broad range of attention tasks.