Language and executive functioning in children with ADHD
Parigger, E.M.

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**Introduction**

People often have a fairly stereotypical view of children with attention-deficit/hyperactivity disorder (ADHD). This general impression is based on their behavioral symptoms. However, there is more to ADHD than these symptoms. In fact, there is some evidence from research that these children also have problems with language. These seem to occur in particular in the domain of pragmatics, linked to social aspects of language. For example, children with ADHD have difficulties with telling a story coherently, so that they introduce protagonists using only pronouns - assuming that the listener knows who they are talking about. There has been relatively little work done on the grammatical abilities of children with ADHD, but they do not seem to have major problems, in contrast to children with specific language impairment (SLI). There are very few studies that have compared the language problems of these two groups of children. Studies that have been done have also used rather general language instruments so that no detailed contrastive profile of the two clinical groups has emerged (Geurts 2008, Redmond 2004, 2005, 2011). It is the aim of this study to examine the language abilities of ADHD children in more detail and to compare them to SLI children.

Children with ADHD are known to have problems in executive functioning, an umbrella term for various higher order cognitive processes, responsible for goal-directed behavior. Previous research
has indicated that motor inhibition is most notably affected in these children (e.g. Pennington and Ozonoff 1996). In contrast, executive functioning in children with SLI has only recently become a topic of interest, although the diagnosis presupposes that there is no known aetiology for the language problems. Current research is, however, indicating that this group of children can have difficulties with executive functioning. It is not at all clear that such difficulties, if they exist, are responsible for their language problems. This study will examine executive functioning in both ADHD and SLI children to examine where possible overlap and differences lie.

As suggested above, it is possible that there is a link between executive functioning and language. This link has to date not been empirically demonstrated in typically developing children. Work on SLI children has concentrated more on empirically showing a relationship between the two areas rather than seeking an explanation for their language problems in executive dysfunctioning. On the other hand, Tannock and Schachar (1996) have proposed that both the behavioral and the pragmatic language problems of children with ADHD are caused by the same underlying deficits in executive functioning. This study will explore the relationship between language and executive functioning, both in children with ADHD and in children with SLI.

The research to be reported is based on both group comparisons and within-group or individual analyses. We will thus be able to make both quantitative and qualitative comparisons.

The organization of this thesis is as follows. Chapter 2 will provide a general introduction to ADHD and SLI, followed by an overview of previous research on language of children with these diagnoses. The overlap of these disorders will also be briefly discussed. The group with SLI will be presented first since they function as a benchmark for the ADHD group with respect to language.
Chapter 3 will start with a general introduction to executive functioning and then summarize work to date on this aspect of children with ADHD and children with SLI. Here, children with ADHD are discussed first, since their problems with executive functioning are more well-known. The relation between executive functioning and language will also be explored. The chapter concludes with the research questions and general hypotheses.

Chapter 4 will present the research method. Three groups of children will be studied: the SLI and ADHD groups will be compared to a typically developing group of the same age, that is 7- and 8-year-olds. The instruments and procedure used are described in detail as well as the statistical analyses.

The results are presented in Chapters 5, 6 and 7. Each of these chapters aims to answer one of the three research questions (also see Section 3.4). Chapter 5 presents the results on language, covering both pragmatic and grammatical abilities. Chapter 6 reports the results on executive functioning, more specifically inhibition, working memory, planning, cognitive flexibility and fluency. All are measured non-verbally. Chapter 7 then explores the relationship between the results related to language on the one hand and executive functioning on the other hand.

Finally, in Chapter 8, the findings of the study will be discussed and general conclusions will be drawn.