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Cognitive profiles of adults with high functioning autism (HFA) and Asperger syndrome

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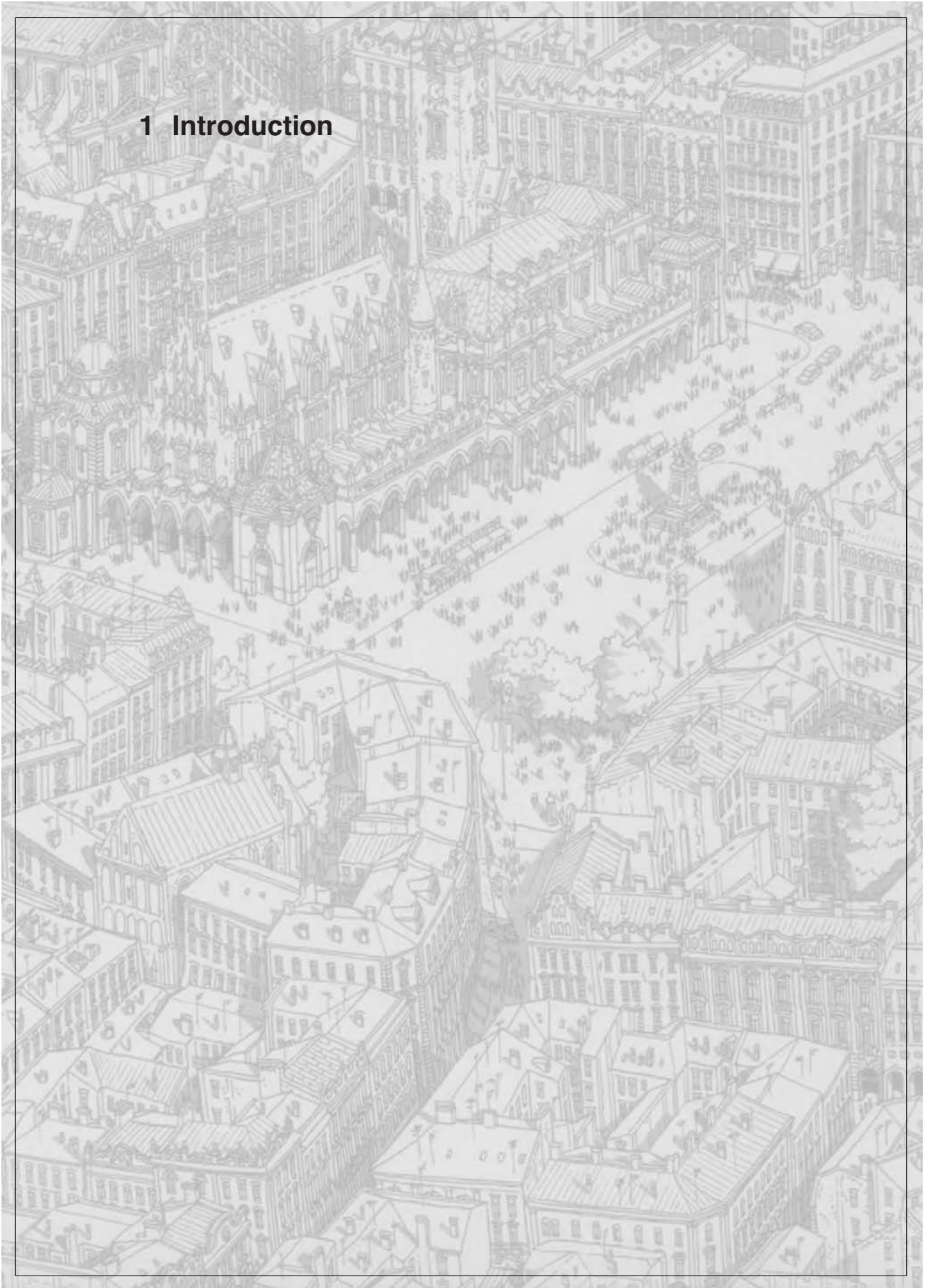
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1 Introduction





1.1 Aims and Structure

Autism is a neurobiological developmental disorder that first becomes apparent during childhood. It is a life-long condition. In research, autism is studied generally at three levels: the neurobiological, the cognitive and the behavioral level (Frith, 2003; Happé & Frith, 1996). At the neurobiological level, the genetics of autism is complex. Extensive research has revealed the complexity of the nature of autism, but as yet has failed to unfold the exact nature of the neurobiological factors associated with autism (Rutter, 2005).

At the behavioral level, autism is characterized by impairments in social interaction and communication and by restricted and repetitive behavior. Throughout the years, the behavioral symptoms and diagnoses of autism spectrum disorders (ASD) have become more coherent and less controversial (Happé & Frith, 1996, Volkmar & Klin, 2005). At the cognitive level, different theories have been proposed to explain the behavioral symptoms of autism and provide markers of possible brain dysfunction. The three leading cognitive theories in autism describe: the 'theory of mind' (Baron-Cohen et al., 1985; Happé & Frith, 2006), 'central coherence' (Frith, 1989, 2003) and 'executive functioning' (Ozonoff et al., 2005; Rumsey, 1985). Previous studies that examined these three areas in individuals with ASD focussed predominantly on children. However, research has shown that features of ASD can change during development (Howlin, 2005). Since only a few studies have assessed cognitive features in high-functioning adults with ASD, with contradictory results, it is not clear whether the above-mentioned cognitive theories are still applicable when individuals with ASD reach adulthood. If impairment in these cognitive areas should lessen or even disappear during the patient's lifetime, one or more of the three theories may not be as fundamental to autism as previously thought. This could change our view of ASD fundamentally.

Therefore, in our research we examined theory of mind, central coherence and executive functioning in high-functioning adults with the autistic disorder and Asperger syndrome. By means of our studies, we aim to increase our knowledge about the characteristic features of autism and how they develop during the individual's lifetime. This can help us to understand the precise nature of ASD. Furthermore, it can result in better definitions of ASD in adults and therefore influence current frameworks for classification of autism spectrum disorders.

Before investigating the three cognitive theories in high-functioning individuals with ASD, we need to know the general intellectual capacity of individuals in the research groups.

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The level of intelligence can play an important role in performance in theory of mind, central coherence and executive functioning (Frith, 1994; Luckasson et al., 2002; Van Lang et al., 2006). For example, impairment in theory of mind has frequently been reported as being characteristic of the individuals with intellectual disability (Yirmiya et al., 1998). Therefore, for our research studies we only included individuals with a minimal full scale WAIS-III intelligence score of 80 (Wechsler, 1997).

Furthermore, research has shown that general intellectual capacity is related to the ability of individuals with ASD to outgrow or compensate for at least some of their weaknesses during development (Howlin, 2005). Information about the intellectual capacities can help us to determine which level of performance we can expect of our research groups in theory of mind, central coherence and executive functioning. It can also provide valuable information about the general strengths and weaknesses of our research groups.

Therefore, the first aim of the study was to investigate the intelligence profiles of adults with the autistic disorder and adults with Asperger syndrome, as presented in chapter 1.

1.2 Cognitive Theories of ASD

The aim of cognitive theories of ASD is to explain and understand the behavior of people with autism, in an attempt to find the underlying causes. Many different cognitive theories have been hypothesized, three of which have been the most influential: 'weak theory of mind', 'weak central coherence' and 'executive functioning deficits'. Our second aim was to study the relevance of these theories for high-functioning adults with ASD. To this end, we examined the differences between adults with HFA and Asperger syndrome and a neurotypical control group in each of these areas. More information regarding the three cognitive theories of autism will be outlined in the following paragraphs.

Theory of mind can be described as the ability of a person to attribute mental states to oneself and others and to predict the behavior of others based on their mental states (Premack & Woodruff, 1978). It has also been described as 'mind reading' (Baron-Cohen, 2000). The theory of mind account tries to explain the triad of social, communicative and imaginative impairments in autism (Baron-Cohen, 2000). Specifically in the area of theory of mind, there is growing evidence that high-functioning adults with ASD develop skills in order to compensate for or camouflage weaknesses (Baron-Cohen, 2000; Ponnet et al., 2004). Chapter 3 describes our study of theory of mind in adults with the autistic disorder and Asperger syndrome. The results for the ASD groups will be compared to those found for a neurotypical group in order to determine whether theory of mind impairment is still present when individuals with ASD reach adulthood.

Whereas the 'theory of mind' account can be seen as a theory with a narrow perspective because it is used mainly to explain social-communicative characteristics in autism, the theories for 'weak central coherence' and 'executive functioning deficits' can be described as theories with a broad perspective because they use an array of mental operations to explain the cognitive deficits in autism (Volkmar et al., 2004). The weak central coherence theory describes strengths in detailed information processing, combined with a failure to integrate information into a meaningful whole, which are characteristic of autism (Frith, 1989, 2003). This theory was developed to explain the circumscribed interests, the preoccupations and the distinct information processing style in autism (Frith, 1989, 2003). Throughout the years, the central coherence account has been modified into the suggestion that local, fragmented information processing can be seen as a cognitive style in individuals with ASD, which can be overcome in tasks that demand global processing (Happé & Frith, 2006; Wang et al., 2007). However, considering the contradictory results found for high-functioning adults with ASD, it is unclear whether the cognitive theory of a detailed information processing style is still relevant in adults with ASD. Strengths in local information processing, as have been hypothesized, can be used to the advantage of individuals with ASD, because they can help them compensate for their weaknesses. Furthermore, they can create possibilities in the search for educational and occupational opportunities. In chapter 4, we will examine whether and to what extent adults with the autistic disorder and Asperger syndrome have a detailed information processing style.

Executive functioning covers a wide range of skills that are involved in goal-directed and future-oriented behaviors (Ozonoff et al., 2005). Executive skills are essential in order to function in a changing world. They include planning, fluency, inhibition of a prepotent response, working memory, and cognitive flexibility (Pennington & Ozonoff, 1996). The theory of impaired executive functioning in autism is associated mainly with repetitive behavior and inflexibility in behavior (Lopez et al., 2005; South et al., 2007). However, recent evidence suggests that repetitive behaviors in ASD seem to lessen during the individual's life span (Seltzer et al., 2009). This stresses the importance of investigating whether the hypothesis of executive dysfunction is still relevant when individuals with ASD reach adulthood. For this purpose, we will assess verbal fluency in two adult ASD groups, since these tasks are widely used to assess executive functioning (Henry & Crawford, 2004). In chapter 5, the results of this study are outlined.

Although it is questionable whether the autistic disorder and Asperger syndrome can be seen as different conditions, many researchers state that these two disorders differ at least in degree of impairment (Klin et al., 2005a; Ozonoff et al., 2000b). For example, it has been argued that theory of mind impairment is less severe in individuals

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with Asperger syndrome compared to those with autism (Frith, 1991; Ozonoff et al., 1991b). Furthermore, differences in communication between the two disorders have been described (Klin et al., 2005a). Another marked contrast is verbosity in speech, which is distinct for those with the Asperger syndrome, whereas individuals with autism are often limited in speech (Klin et al., 2005a). On the basis of the above differences in symptom expression, we decided to differentiate between the two groups within our research population.

Finally, chapter 6 presents a summary of our findings. The results of the preceding chapters will be integrated and final conclusions will be drawn.

