Summary of chapters
Chapter 1. General introduction

The general aim of this thesis was to develop and validate the Interactive Drawing Test (IDT), a new test for measuring reciprocity in children and adolescents from the age of six to 18, with an Autism Spectrum Disorder (ASD).

Measuring impairments in reciprocity in the process of diagnosing ASD is important as impaired reciprocity is a prime defining feature of the diagnostic criteria for ASD. Individuals with ASD, especially high functioning ones, are observed to strongly vary in clinical presentation of impairments in reciprocity, ranging in quantity from a total absence to adequate levels of all relevant behaviours, but also in the quality of the reciprocal behaviour. Current available diagnostic instruments often assess reciprocity indirectly, e.g. by means of questionnaires, and foremost focus on a presence vs. absence dichotomy establishing the mere presence or absence of reciprocal behaviour. This limits a clear perspective on the nature and degree of reciprocal deficits in individuals with ASD. To provide the clinical field with a more sensitive assessment tool, we developed the Interactive Drawing Test (IDT). The specific features of the IDT are not covered by any of the currently used assessment tools. The chapter concludes by introducing the chapters of this thesis.

Chapter 2. The Interactive Drawing Test (IDT)

The first section of this chapter describes how the foundation was laid for the design of the IDT by selecting the most important characteristics of reciprocal behaviour and using the normal developmental phases of reciprocal behaviour in TD children as a yardstick for reciprocal behaviour. These theoretical notions combined with research findings on social-emotional skills of individuals with ASD that contribute to reciprocity provided the basis for developing the IDT test procedure and for selecting the scales of reciprocal behaviour. Reciprocal behaviour always entails participating in a dynamic process of often spontaneously interacting and sharing of two or more people with equal, similar or complementary exchanges. This interactive process includes finely timed and mutually attuned turn-taking and steadily increasing dynamics as the interaction unfolds.

The last section of chapter 2 describes the IDT as a standardised test for measuring the quality of important aspects of reciprocal behaviour in real-life spontaneous interactions between a child or adolescent and an examiner. In the IDT, drawing is used as the shared activity of the child and the examiner. The test is suitable for children and adolescents in the age range of six to 18. The procedure resembles the unstructured and unpredictable aspects of real life interactions with others, which often require spontaneous reciprocal behaviour. The IDT objectively measures specified reciprocal responses that can be expected of a child from the age of six and older by means of four scales of reciprocal behaviour: reciprocal turn-taking, reciprocal interaction, reciprocal interaction in other’s initiative and reciprocal flexibility. Higher and possibly more subtle levels that may be expected only later in childhood or adolescence are not tested with the current version of the IDT.
An extensive manual with explicit instructions how and when to elicit reciprocal interactions, an instructive video for administration and a web-based training are available to support standardised administration and scoring of the IDT.

Chapter 3. Measuring reciprocity in high functioning children and adolescents with autism spectrum disorders

This chapter reports on a pilot study that introduces the IDT and tests its sensitivity. Children and adolescents with high functioning autism spectrum disorders (HFASD, n = 24) and a control group with typical development (TD, n = 25) were invited to participate in this study. The most important outcome of this study was that HFASD participants in contrast to the TD group, showed less reciprocal behaviour and preferred to draw their own objects instead of drawing together and contributing to the experimenter’s drawing objects. They also showed less reciprocal flexibility. The performance on the IDT was independent of estimated verbal IQ but there seemed to be an age effect. However, given the sample size of this study, both effects must be confirmed in larger samples. Based on results of the pilot study, very basic aspects of reciprocal behaviour and supporting social skills wherein differences between groups were not found significant, were not selected as part of the scales for the definite version of the IDT. The findings of this study suggested that the IDT is a promising instrument to assess reciprocity.

Chapter 4: Reliability and validity of the Interactive Drawing Test: A measure of reciprocity for children and adolescents with Autism Spectrum Disorder

This chapter reports on a study that tested the reliability and validity of the IDT in a larger sample. The IDT was administered to children and adolescents with ASD (n = 131) and to a group with TD (n = 62). The IDT had excellent inter-rater reliability and moderate to good test-retest reliability. Convergent validity of the IDT was low. In line with the findings in the pilot study, participants with ASD were found to be capable of showing reciprocal behaviour. However, the most striking difference between the ASD and the TD group - independent of verbal IQ, age or gender - was the inability of individuals with ASD to frequently reciprocate another person’s initiative, making this definitively the most sensitive outcome of the IDT for autism. The probable causes of the modest outcome of some aspects of the psychometric testing are discussed in view of the lack of similar tests for comparison and in view of the focus of the IDT on spontaneously responding to an unfamiliar situation. Although we did not find an effect of verbal IQ and gender, the small number of girls and the lack of individuals with a intellectual disability in our sample warrants caution in generalising these results.
Chapter 5. Sex differences in the reciprocal behaviour of children with autism

This chapter reports on a study that compares sex differences in reciprocal behaviour in children/adolescents with ASD (32 girls, 114 boys) and in children/adolescents with TD (24 girls, 55 boys). Independent of gender, children with ASD showed clear limitations in reciprocal behaviour compared to children with TD, especially on the scale that measures how often reciprocal interactions are shown in the initiative of the examiner. Sex differences were found only in the ASD group: girls with ASD had higher reciprocity scores than boys with ASD. Girls with ASD may be more orientated towards the examiner and more motivated to interact socially compared to boys with ASD. The sex specific response patterns in ASD can inform and improve the diagnostic assessment of autism in females.

Chapter 6. Reciprocity in autistic and typically developing children and adolescents with and without mild intellectual disabilities

This chapter reports on a study that explores the differences in reciprocal behaviour of 35 children and adolescents with mild intellectual disabilities (MID, IQ 50-85): 15 with ASD (ASD-MID) and 20 with typical development (TD-MID). In the MID sample, the ASD –TD differences in general reciprocity and in reciprocal flexibility were not as obvious as found in normally intelligent children and adolescents. This indicates that intellectual disabilities likely influenced children’s performance on these aspects of reciprocal behaviour. However, in line with our previous findings (Backer van Ommeren et al., 2012, 2015, 2017), ASD-MID participants contributed less to the initiatives of their interaction partner compared to TD-MID participants. Even in MID individuals the negative effect of the defining autistic trait of being too self-oriented was the most distinguishing feature among ASD-MID and TD-MID participants. The IDT can contribute to the diagnostic process of ASD by identifying the effect of this autistic characteristic on reciprocal behaviour in children with MID.

Chapter 7. General discussion

This chapter draws general conclusions based on the reported studies, explores the merits and limitations of the IDT, discusses the theoretical and clinical implications and suggests new research topics. The IDT was found to be a valid and reliable diagnostic instrument for measuring deficits in reciprocal behaviour. The overall sensitivity of the IDT lingers mostly on the most sensitive scale: measuring reciprocal interactions in the examiner’s initiatives. This scale taps a fundamental autistic characteristic, the inclination to be foremost self-focused and the need to control situations. Other scales were less sensitive. This last finding combined with the fact that the IDT administration provides information on the functioning of the individual child/adolescent from a snapshot of only ten minutes, indicates that the IDT can only be used as part of the process of diagnosing autism.

The last section of this chapter elaborates on the issues of the deficit in reciprocity of individuals with ASD. Testing pivotal aspects of reciprocal behaviour with the IDT in a large
sample of children with ASD has provided the clinical field with more insight in the variety in deficits in reciprocity within the ASD group. Being female and/or having normal intelligence can positively influence reciprocal skills among children and adolescents with ASD. Underlying mechanisms such as motivation for social interacting, social cognition and conditions favourable for individuals with ASD, can play an important positive role in showing adequate reciprocal behaviours. It should be noted that the IDT assesses a basic level of reciprocal functioning. A few high functioning individuals with ASD did pass the test. Testing these individuals at a higher and more complex level with verbal and emotional reciprocal exchanges might still show limitations in reciprocity, also in these individuals.

Our findings suggest that the core deficit of reciprocity in individuals with ASD is impaired spontaneous reciprocal interacting which may be caused by an innate impairment in spontaneously and automatically processing of social-emotional information and may be influenced by an intrinsic lack of experiencing reciprocal interaction as rewarding. Then clinical implications are presented and new research topics suggested.

In conclusion, exploring how to link social interactions with experiencing positive feelings in individuals with ASD may hold the key to improving their reciprocal behaviour.