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THESES OF PH.D. DISSERTATION

*The prognosis for school-age in children with autism –  
the role of early pattern of abilities and of behaviours related to  
naive theory of mind*

by

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## 0. MOTIVATIONS AND AIMS

Although the scientific autism research has only a past of forty years, there have been published an enormous amount of empirical papers on this disorder. It is beyond doubt that past and present research on autism could be productive partly because clinical experience has had a strong impact on theoretical understanding. It is also true, on the other hand, that the continuously developing toolkit of diagnosis and intervention relies partly on theoretically oriented research and its results. The interaction between research and clinical knowledge is complex and mutual.

My own clinical work of fourteen years has served with the same conclusion: efficient support is possible only if based on solid empirical facts. Intuition coming from clinical experience is, of course, indispensable, but even that must be tested systematically.

This clinically motivated dissertation has the aim of demonstrating that developing adequate tools for diagnosis, treatment and prognosis can be made complete only by relying on results from scientific research. This is so even if an *evidence-based approach* requires meticulous work. Here I designed both the literature review and the empirical work to emphasise the conjunction points of clinically focused and theoretically oriented issues about autism, as well as the productivity of the interaction between the two approaches.

## I. AN UP-TO-DATE VIEW OF AUTISM SPECTRUM DISORDERS – AN OVERVIEW

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The first chapter of the dissertation is an overview of the fundamental facts about autism and autism spectrum disorders, including some historical aspects, the present-day consensual concept of autism, epidemiology, basics of aetiology, and the main principles of efficient intervention. This review serves also as framework for later literature review and the interpretation of empirical findings.

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Although autism has been described as a child psychiatric syndrome in the mid-20<sup>th</sup> century only, it has most probably been with humankind from the rise of our species (Happé, 1994). This syndrome shows coherence and homogeneity at the same time. Coherence is grasped and the autism triad, behavioural areas which are clearly impaired already before age 3 (reciprocal communication, reciprocal socialisation, and flexible organisation of behaviour – Rutter, 1970; Wing & Gould, 1979). Heterogeneity is striking, however, if the particular manifestations are considered – hence, a spectrum view of autism has been widely accepted to date. On the one extreme of this spectrum there are severely impaired cases without any language, while on the other extreme there lie cases with milder forms of autism, with good intellectual abilities and linguistic skills (Wing, 1996).

It is also important to see that this condition is much more frequent than once believed; the number of recognised cases keeps increasing at a rate of 3-4% per year, and the estimated prevalence is above 0,5% (Frombonne, 2003).

Diagnosis is based exclusively on information of behavioural features, at the moment, which must come from various sources, ages and situations. There exist sophisticated standardised diagnostic and screening tools (e.g. Le Couteur et al., 2003; Lord et al., 2003), by the aid of which diagnosis is more reliable and – especially valuably for research – data from various research sites become more comparable.

Psychogenic factors are certainly not among etiological causes giving rise to autism. Data from various methodologies make the conclusion that autism comes from dominantly genetic causes quite a firm one. It is also evident that in some cases (non-psychogenic) exogenous factors play some role, too. Heterogeneous etiological factors seem to lead to a complex neurobiological impairment – so autism is most probably not a case of a single focal neural injury. One of the key open issues about autism is the precise causal-temporal pattern of neurodevelopmental anomalies, and their relation to symptoms (for a review, see Volkmar et al., 2004).

Until the etiological background becomes clear, biological treatments may play just a minor role in the treatment of autism. At the moment, the most efficient way of intervention is an early, complex, behaviourally-focused, structured educational-developmental approach, which comes in various forms (Howlin, 2002).

## 2. COGNITIVE PSYCHOLOGICAL EXPLANATIONS OF AUTISM

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The second chapter of the dissertation is a discussion of the cognitive background of autism, with a special focus set onto the naive theory of mind impairment and its possible early manifestations, serving as a specific starting point for my empirical studies. In the present summary I shall focus on the aspects of the issue which have a direct relevance to the empirical work, so executive and central coherence impairments are ignored here (but not in the dissertation).

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### *Current cognitive explanations of autism*

By the beginning of the 1990's, three cognitive hypotheses have been delineated in order to explain the symptoms of autism, and have been supported by empirical data: the *naive theory of mind hypothesis* (Baron-Cohen, Leslie and Frith, 1985), the *executive dysfunctioning hypothesis* (Ozonoff, et al., 1991), and the *weak central coherence hypothesis* (Frith, 1989). Though originally these hypotheses were interpreted as rival ones, in the more recent years findings show the cognitive background of autism more complex than once believed; and this calls for a re-evaluation of the once dominating single-factor model of the cognitive basis of autism.

### *The naive theory of mind hypothesis*

It's an essential basis of our social competence that we are able to attribute mental states to others, and to explain, interpret and predict behaviour as causal consequence of these mental states. The mechanism underlying this ability seems to have an innate

basis. Following Premack & Woodruff (1978) we call this ability “naive theory of mind”. Leslie (1987) argued that pretend play is an early behavioural manifestation of this ability. Retrospectively, therefore, it may seem quite plausible to attempt to explain autism in terms of a developmental impairment in theory of mind – as social and communicative impairments dominate the symptomatology, and impoverished pretend play is also a prevalent manifestation of autism.

This theory has been tested and supported in hundreds of studies applying various experimental and other techniques (for a review, see Györi, 2004). These results have had an important impact on practice, but they have raised new questions as well.

### *(1) Does the impairment in naive theory of mind explain the entire behavioural pattern of autism?*

The naive theory of mind impairment hypothesis seems to give a quite efficient explanation of the symptoms in the fields of reciprocal socialisation and reciprocal communication. Baron-Cohen and his colleagues (1985), first formulating this hypothesis, assumed that the impairment in naive theory of mind indirectly explains behavioural rigidity and stereotypic, repetitive tendencies as well. The few studies aimed at evaluating this specific causal hypothesis, however, has brought quite ambiguous results, mostly failing to find a significant relationship between the depth of theory of mind impairment and severity of stereotypic and repetitive symptoms (Turner, 1997; Frith & Happé, 1994).

### *(2) Is theory of mind impairment universal in autism?*

It is an open issue if all individuals with autism spectrum disorders show an impairment in naive theory of mind. It is possible that a developmental delay (Baron-Cohen, 1989) and/or compensatory strategies (Happé, 1994; Györi, 2004) underlie the fact that there exist individuals with autism who pass – sometimes even quite complex – theory of mind tasks (see Dahlgren & Trillingsgaard, 1996, Györi, 2004). It is also possible, however, that theory of mind is non-impaired in a subgroup of individuals with autism spectrum disorders.

### *(3) Is impairment in naive theory of mind a specific characteristic of autism?*

The answer to this question is a decisive no. Now it is well-documented that there is theory of mind impairment in schizophrenia (e.g., Corcoran et al., 1995); Williams syndrome (Tager-Flusberg & Sullivan, 2000), and in individuals with general mental handicap (e.g., Yirmiya et al., 1998.) Although these findings clearly suggest that the impairment in naive theory of mind as a single causal factor is insufficient to explain autism specifically, it is also true that this impairment arises more dramatically in the population with autism, suggesting a kind of “relative specificity”.

*(4) Is theory of mind impairment the primary deficit in autism?*

Focusing first on the sceptical hypotheses, suggesting that it is not the theory of mind impairment which is the primary psychological deficit in autism, one may conclude that no alternative hypothesis has been supported by strong empirical data so far. On the basis of findings from joint attention behaviours, imitation and pretend play it appears that it is only joint attention behaviours that show significant correlation to naive theory of mind (Charman et al., 2000). The causal background of this relationship, however, has not yet been clarified, so various causal patterns are still empirically possible. Although pretend play is intuitively a strong candidate for being an early manifestation of naive theory of mind, no strong empirical data support this specific connection. Imitation, in turn, shows a relationship to language development but not to theory of mind development. Though some authors take predictive relationships as strong evidence for a causal link between assumed precursors and naive theory of mind (e.g., Charman et al., 2000), I believe that decisive conclusions should be only drawn on the basis of direct relationships.

*Summary*

There is little doubt today that in order to explain autism, one has to take into account naive theory of mind impairment, executive dysfunctioning, and weak central coherence as well. It is highly implausible today that one single cognitive deficit could explain all the behavioural manifestations of the syndrome. It is possible that various subgroups of the autism spectrum are to be explained by various patterns of cognitive impairments, but no such subgroups have been convincingly identified so far. The causal relationship between these three core cognitive impairments is a central issue. Available evidence, however, do not support any reduction either within them, or to a fourth, not-yet-known cognitive factor.

3. AUTISM AT VARIOUS AGES – THE ISSUE OF PROGNOSIS

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The first part of the *third chapter* shortly summarises the symptoms of autism at various ages. The second, more detailed part of the chapter I review the direct precedents of my studies in the literature – that is, those studies which were aimed at developmental changes and their prognostic factors in autism, with an eye on follow-up methodology.

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*Autism at various ages – a cross-sectional view*

The behavioural patterns specific to autism change a lot with development. While in pre-school years impairments in reciprocal social interactions and reciprocal communication dominate the symptoms, later significant transitions take place, and in adulthood obsessive and ritual tendencies may become more dominant, additional

medical problems may arise, and also the individual may become aware of his/her atypical personality, that leading to further difficulties. Attempts to predict developmental changes and their outcome on the basis of cross-sectional data have brought a quite limited success. Beyond neural maturation, intellectual abilities and language-use have proven to have prognostic power.

*Prognostic factors*

Focusing on long-term follow-up studies we find that the relatively consistent variables that predict adulthood prognosis, general outcome, and adaptive behaviours are early non verbal IQ and the level of receptive language. These factors, however, allow only rough estimations:

(1) Early IQ below 70 predicts worse outcome, but early IQ above 70 does not necessarily brings about good outcome in adulthood (Rutter, 1970; Lotter, 1974; Gillberg & Steffenburg, 1987; Howlin et al., 2004);

(2) level of early receptive language predict later level of linguistic skills (Mawhood et al., 2000);

(3) early linguistic skills (functional speech arising before age 5 and the level of receptive language) predict later overall outcome (Rutter, 1970; Lotter, 1974; Gillberg & Steffenburg, 1987; Mawhood et al., 2000); at the same time, however, adults with Asperger syndrome with no childhood language delay show no advantage in overall outcome above subject with autism showing early delay in language development (Howlin, 2003).

It is important to note that in most studies on the predictive relationship between childhood assessment results and overall adult outcome there were no other measures available beyond non-verbal IQ and receptive vocabulary. The relatively strong relationship between these and adult outcome is of course important, but one may expect that more detailed data on early functioning may serve with more refined prognostic relationships.

More recent and more short-term clinical follow-up studies (Freeman et al., 1999; Szatmari et al., 2003; Szatmari et al., 2000; Starr et al., 2003) early assessment was supplemented by detailed mapping of symptomatology and adaptive skills by standardised measures. Beyond confirming the above-mentioned predictive factors, some further relationships have been revealed:

(1) school-age communication skills are best predicted by early non-verbal IQ and early linguistic skills, while daily self-supporting skills are best predicted by full IQ (Freeman et al., 1999; Szatmari et al., 2003; Szatmari et al., 2000; Starr et al., 2003);

(2) school-age adaptive skills show no relationship to early IQ scores (Freeman et al., 1999), but predicted by linguistic skills and non-verbal IQ (Szatmari et al., 2003; Szatmari et al., 2000; Starr et al., 2003);

(3) none of the early-measured factors proved predictive of changes in overall patterns of symptoms (Szatmari et al., 2003; Szatmari et al., 2000; Starr et al., 2003).

Clinically motivated follow-up studies so demonstrated that early assessment results show a significant relationships to later outcome. One must note, however, that our predictive-prognostic potential has increased just slightly since the first follow-up studies were published (Rutter, 1970; Lotter, 1974). It is still unclear what predicts – if anything – developmental changes in the fields of the autism triad, as well as the crucially important expressive and receptive language skills.

It seems quite plausible to turn to findings from theoretically motivated follow-up and longitudinal studies, especially because early theory of mind related behaviours may play decisive role in predicting later clinical picture, especially on social and communicative reciprocity:

(1) level of linguistic skills appears to be predicted by early joint attention behaviours (Mundy et al., 1990; Rosenthal Rollins & Snow, 1998; Sigman és Ruskin, 1999; Charman et al., 2003; Charman, 2003), and imitation (Charman et al., 2000 2003; Charman, 2003; Stone & Yoder, 2001);

(2) the relationship between linguistic measures and quality of early play activity is still not clear (Sigman és Ruskin., 1999; Charman et al., 2000; 2003; Charman, 2003);

(3) at least two missing from among imitation, proto-declarative pointing and pretend play at the age of 18 months predict a diagnosis of autism spectrum disorder beyond 3 years of age (Baron-Cohen et al., 1992; Baron-Cohen et al., 1996);

(4) imitation and declarative joint attention at the age of 20 months predict milder symptoms for the age of 42 months (Charman et al., 2003, Charman, 2003);

(5) performance on tests of naive theory of mind seems to be predicted by early receptive and expressive linguistic skills and early joint attention behaviours (Steel et al., 2003; Charman et al., 2000).

Summarising the somewhat confusing results of these studies it is striking that only a few of them was aimed at testing the relation ship between early naive theory of mind abilities, their precursors, and clinically crucial later adaptive skills and symptomatology. Several aspects of this relationship have not been investigated, and on important aspects – like the relationship between joint attention and naive theory of mind – there are findings only from one study (in this case, Charman et al., 2000).

#### 4. INVESTIGATING THE ROLE OF EARLY NAIVE THEORY OF MIND RELATED BEHAVIOURS IN DETERMINING THE SCHOOL-AGE PROGNOSIS IN CHILDREN WITH AUTISM

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In the *fourth chapter* I present my follow-up studies aimed at identifying further factors that may predict communicative and social skills, and the severity of symptoms. It may help the clinician predict school-age outcome, to inform parents about the expected development, and to plan intervention more accurately. Thus, our starting point is clinical, but our methodology is theoretically based.

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##### *Hypotheses*

- (1) It is generally assumed that there is a significant relationship between the results of early measurements and later performance.
- (2) Early IQ level predicts later IQ level.
- (3) Early non-verbal IQ predicts later level of behavioural adaptation.
- (4) Early level of receptive language predicts later level of linguistic skills, adaptive skills, and performance in tests of naive theory of mind.
- (5) Presence of joint attention behaviours at the time of early assessment predicts better linguistic skills.
- (6) Presence of naive theory of mind skills at the time of early assessment predicts better performance in later testing of naive theory of mind.
- (7) Early-present naive theory of mind related behaviours predicts milder symptoms and better adaptive levels in the fields of social reciprocity and communicative reciprocity.

##### *Study I: naive theory of mind related early behaviours in autism*

##### *Specific hypotheses in Study I*

- (1) children with autism underperform controls in joint attention behaviour and pretend play;
- (2) there's no difference between the two groups in mirror self-recognition;
- (3) children with autism show less “self-admiring” behaviours in front of mirror than controls do;
- (4) pretend play shows significant relationship to joint attention behaviours in both groups;
- (5) “self-admiring” behaviours show significant relationship to theory of mind related behaviours (pretend play and joint attention behaviours) in both groups.

##### *Method*

##### *Subjects*

22 children with autism (20 boys, 2 girls), selected from a pool of 202 children of the adequate age.

	means	range
age	67,45 months	36 – 86 months
non-verbal IQ	91,86	62 – 122
non-verbal mental age	61,68 months	37 – 90 months

**Table 4. 1. A few summary data of the total autism group from Study I.**

#### Control subjects

15 non-autistic children (10 girls and 5 boys); 13 with typical development, 2 showing IQ scores in the mildly impaired range; selected from a pool of 50 children, on the basis of best fit to the subjects with autism.

#### Matching

The pairwise matching was done on the basis of biological age ( $\pm 4$  months) and non-verbal IQ ( $\pm 5$  points).

#### Procedure

Both pre-testing (40-60 min.) and data-gathering (30-60 min.) took place in individual sessions. Target behaviours were video-recorded and coded by an independent rater blind to diagnosis. See Table 4.2. for details of procedure.

tools	reference	goal
<i>Leiter non-verbal performance scale</i>	Leiter, 1979	non-verbal IQ (also for matching)
<i>Peabody PVT</i>	Dunn, 1959 Csányi, 1974	receptive language (vocabulary)
<i>Observing spontaneous play activity</i>	Hadwin et al., 1996; Charman & Baron-Cohen, 1997	identifying forms of spontaneous play
<i>Elicited functional play</i>	Hadwin et al., 1996; Charman & Baron-Cohen, 1997	assessing ability of functional play if prompted
<i>Elicited pretend play</i>	Hadwin et al., 1996; Charman & Baron-Cohen, 1997	assessing ability of pretend play (object substitution) if prompted
<i>Spontaneous joint attention</i>	-	amount of spontaneous initiation of joint attention
<i>Elicited joint attention</i>	on the basis of Baron-Cohen et al., 1992	assessing co-ordination of gaze and joint attention behaviours if prompted
<i>Mirror self recognition</i>	Gallup, 1970; Amsterdam, 1972; on the basis of Bertenthal & Fischer, 1978	manifestations of mirror self-recognition
<i>Behaviours in front of mirror</i>	on the basis of Amsterdam, 1972	identifying patterns of behaviours in front of mirror

**Table 4.2. Tools from Study I**

#### Statistical analysis

Robust tests (Kendall's tau, chi-square test, Pearson's  $r$ , t-test) were used in statistical analysis. In group comparisons only the matched sub-groups were involved. In within-group analyses the entire samples were involved.

#### Most important findings from Study I

##### Group comparisons – spontaneous and elicited play

There was not significant difference between the two groups in spontaneous play activity in its any form, and in elicited functional play. There was a significant difference in elicited pretend play ( $\chi^2 = 14.221$ ;  $p = 0.001$ ).

##### Group comparisons – spontaneous and elicited joint attention

Spontaneous joint attention arose very rarely in both groups, yielding no significant difference between groups. In elicited joint attention, however, the two groups showed significant differences in various aspects, including coordination with gaze, the aggregated measure of elicited joint attention being also significantly higher in the control group ( $\chi^2 = 20$ ;  $p < 0.001$ ).

##### Group comparisons – behaviours in front of mirror

None of the behavioural patterns shown in this situation distinguishes the two groups.

##### Group comparisons – complex, aggregated variables

The aggregative variable composed of measures of naive theory of mind related behaviours (spontaneous and elicited pretend play and joint attention) indicates that controls outperformed subjects with autism ( $\chi^2 = 9.879$ ;  $p < 0.043$ ). There was not such difference along an aggregated variable composed of functional and pretend play measures.

##### Within-group relationships between variables

There were significant correlations found between receptive vocabulary and mental age in both groups ( $r = 0.751$ ;  $p < 0.01$ ); and between spontaneous pretend play and chronological age in the autism group ( $r = 0.491$ ;  $p = 0.02$ ). No further important significant correlations were found.

#### Brief summary and discussion

(1) As a methodological conclusion it is important that observing spontaneous behaviours, a longer warming-up phase is necessary.

(2) The fact that I found no significant difference between the two groups in spontaneous pretend play but the autism group underperformed controls in elicited play raises the possibility that children with autism manifested previously learnt play

patterns in the spontaneous situation. This implies that the elicited play situation may better mirror their competence to play pretend play.

(3) My findings raise the question to what extent the spontaneous and elicited play situations invoke the same competences, and whether there is a difference between typically developing children and children with autism in this respect.

(4) In line with previous studies, I found that children with autism are best distinguished by the relative lack of gaze monitoring during joint attention behaviours.

(5) My findings confirm the hypothesis that children with autism are not impaired in mirror self-recognition, and patterns of spontaneous behaviours shown in front of mirror do not distinguish them from typically developing / non-autistic controls.

#### *Study II: follow-up study on the development of social and communicative competences*

The aim of my second study was to re-assess children with autism who took part in Study I, in order to reveal predictive relations between earlier measures and later adaptive social and communicative behaviours, symptomatology, language level, and naive theory of mind performance. I formed no particular hypotheses for Study II, as the goal was more descriptive, and not hypothesis-driven. The dissertation offers a detailed analysis of relationships between early and late measures as well as relationships between variables in Study II – here, however, I present only a *summary of predictive relationships between results from Study I and Study II.*

#### *Method*

##### *Subjects*

16 children with autism (15 boys and 1 girl) from the original sample of 21 took part in Study II.

##### *Procedure*

The three sessions of Study II took place 49-55 months after the sessions of Study I. Tools applied in Study II are shown below in Table 4.3.

tools	references	goals
<i>Mangyi-R</i>	Kaufman, 1979 (Lányiné 1995)	IQ measurement
<i>Vineland Adaptive Behavioural Scale (VABS)</i>	Sparrow, Balla & Chicchetti, 1984	level of adaptive behaviours, especially on the social and communicative domains
<i>ADOS</i>	Lord, Rutter, DiLavore, Risi, 1999	symptoms of autism
<i>TROG-H</i>	Bishop, 1983 (translated by : Á. Lukács)	assessing grammatical development
<i>Mangyi-R vocabulary subtest</i>		a measure of lexical development by active definitions
<i>verbal first-order false belief attribution tests</i>	Baron-Cohen et al., 1985; on the basis of Györi et al., 2007	assessing naive theory of mind performance
<i>non-verbal belief attribution tests</i>	on the basis of Györi et al., 2007	assessing naive theory of mind performance
<i>verbal second-order false belief attribution test</i>	on the basis of Baron-Cohen, 1989	assessing naive theory of mind performance on a more advanced level
<i>test of understanding irony</i>	on the basis of Györi, 2004	assessing naive theory of mind performance on a more advanced level

**Table 4.3. Tools used in the follow-up study (Study II)**

#### *Most important results from contrasting early and late measurements*

##### *Factors predicting school-age IQ*

School-age MAWGYI-R IQ showed the strongest relationship to early non-verbal IQ (by Leiter) ( $r=0.664$ ;  $p=0.005$ ).

##### *Factors predicting school-age level of adaptive behaviours*

There was no strong relationship between this variable and any of the early measures.

##### *Factors predicting school-age level of language skills*

It was only the early test of receptive vocabulary that showed a – actually weak – relationship to later grammatical development (as measured by TROG); ( $r= 0.496$ ;  $p=0.072$ ).

##### *Factors predicting severity of social and communicative symptoms at school-age*

I found a tendency-level correlation between the ADOS score in the social domain and the early appearance of spontaneous functional play ( $r=-0.471$ ;  $p=0.05$ ). Factors emphasised in the literature – joint attention behaviours, pretend play and receptive vocabulary – showed no significant relationships to ADOS scores.

##### *Factors predicting school-age performance in naive theory of mind tasks*

Neither verbal nor non-verbal false belief attribution test measures showed significant correlations with early naive theory of mind related measures or receptive vocabulary. There was a correlation between later understanding of simple irony and early elicited joint attention ( $r=0.575$ ;  $p=0.013$ ), as well as between later understanding of *simple irony* and early gaze co-ordination in joint attention ( $r=0.683$ ;  $p=0.008$ ). Later understanding of false irony showed correlation with early receptive vocabulary ( $r=0.631$ ;  $p=0.021$ ).

#### *Brief summary and discussion*

(1) In line with other findings, our data indicate the stability of IQ scores in autism; school-age IQ is predicted by early non-verbal IQ.

(2) Early receptive vocabulary does not show particular relationship to later measures of language skills – earlier findings are also ambiguous in this respect. Development in autism seems to show such an atypical pattern that prevent predictions from early linguistic measures to later language level – at least in the case of a long-term follow-up of a relatively homogeneous sample like this.

(3) I found no significant relationship between early joint attention behaviours and later linguistic measures. It is possible – as suggested by Charman and his colleagues (2000) – that this is so because naive theory of mind, joint attention related to it, and

language show a joint development only in an early phase of development, and later their trajectories gradually become separate. As the time-range of follow-up was longer than in most studies, the early association among these skills may have faded by separation of developmental pathways.

(4) The tendency-level correlation between early spontaneous pretend play and school-age daily adaptive behaviours may suggest that those children who are capable of observational-imitative learning in early childhood manifested in play situations may show better performance in simple, routine-based daily social situations.

(5) In line with the results of Sigman et al (1999) I found that the frequency of early spontaneous functional play showed a tendency-level correlation with the later ADOS score in the social domain. This may indicate, on the one hand, that those children with autism who are able to manipulate objects according to their functions have a bigger chance to be involved in situations where social learning and practicing social skills may take place. On the other hand, it is also possible that the higher level of early functional play is just an indicator of less impaired social reciprocity, without a direct causal link between early play skills and later social symptoms.

(6) In line with findings of Charman and his colleagues (2000) I found that early joint attention skills predict later complex understanding of mental states, as measured by simple irony task. This finding confirms the key role of joint attention behaviours in the developing understanding of mental states.

(7) I found a tendency-level correlation between early receptive vocabulary and later performance in false irony tasks. This is in line with the widespread view that language is an important medium of learning about minds. It may also indicate, however – but not in contradiction with the previous conclusion – that a relatively high level of early language opens a compensatory pathway for a non-typical way of solving tasks that involve mental states.