

UNDERSTANDING OTHER MINDS

Perspectives from Autism

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Oxford New York Tokyo
OXFORD UNIVERSITY PRESS

1993

An introduction to the debate

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This book focuses on a psychological theory of autism that has generated considerable interest in the past decade. It is known as the *theory of mind hypothesis of autism*. By 'theory of mind' is meant the ability of normal children to attribute mental states (such as beliefs, desires, intentions, etc.) to themselves and other people, as a way of making sense of and predicting behaviour. The theory of mind hypothesis of autism holds that in children with autism, this ability fails to develop in the normal way, resulting in the observed social and communication abnormalities in behaviour. We felt that this hypothesis deserved to be subjected to close and critical scrutiny, by leading authorities in the fields of psychology, psychiatry, and related disciplines, for several reasons.

First, if autism is indeed caused by a failure to develop a theory of mind, then studying autism might hold the clues to how this important ability is normally acquired so effortlessly. Secondly, studying autism from this perspective might show us what happens to a child when this ability is not available in the normal way. Thirdly, this hypothesis has been surrounded by fascinating debate about the role of affect and the nature of the cognitive mechanisms involved in supporting a theory of mind. These debates are important because resolving them will teach us about the relevant *processes* in development and pathology. Finally, we felt that subjecting the theory to scrutiny might help to reveal both its strengths and shortcomings, so as to guide future research in the field of autism.

For all of these reasons, we put together a book to debate the theory of mind hypothesis of autism. Most of our contributors presented their chapters in draft form at a two-day workshop in Seattle, in April 1991, with a set of key questions to guide our discussions: How do children acquire a theory of mind? What are the developmental origins of this ability, and what is its evolutionary history? Is autism a syndrome that is best understood in terms of a primary impairment in this capacity?

WHAT IS AUTISM? A NOTE ON DIAGNOSIS

Kanner's (1943) description of the syndrome of autism is a classic example of the contribution of clinical observation to psychiatric taxonomy. In his clear prose, he described a group of children who had impoverished or absent social relations from the very first years of life, and with language (when it was present) which was distinctively deviant. Although there have been modifications, Kanner's diagnostic criteria have proved remarkably robust and have been echoed in all subsequent psychiatric classification systems. Thus, thirty years after Kanner, Rutter (1978) reviewed the major studies and highlighted four essential features of autism: impaired social development; delayed and deviant language; insistence on sameness; and onset before 30 months. A similar set of features formed the basis of the diagnostic criteria in the American Psychiatric Association taxonomy in the 1980 edition of the Diagnostic and Statistical Manual (DSM-III), and in the World Health Organization taxonomy in the (1987) International Classification of Diseases, 9th Edition (ICD-9 1987).

To provide a more developmental approach, and in order to encompass the broad range of individuals with autism, the definition of autism was elaborated in the next edition of the Diagnostic and Statistical Manual (DSM-III-R 1987). Thus, although the same three features are retained, DSM-III-R provides a range of diagnostic items for each of these. For example, for the social impairment, it ranges from marked lack of awareness of others (for those with the most severe social impairments) to gross abnormalities in peer relations (for those who are least impaired). The next planned revisions of diagnostic criteria will appear in DSM-IV and ICD-10, both due to be published in the mid-1990s.

Changes in diagnostic criteria are not merely of academic interest: they have implications for which individuals receive the diagnosis of autism. For example, DSM-III and ICD-9 criteria encompass most of the children whom most clinicians would categorize as having autism. In contrast, DSM-III-R criteria are broader and include some individuals whom some clinicians might feel fall outside the usual domain of the concept.* The shifting boundaries of the diagnostic criteria for autism reflect a fundamental problem for virtually all psychiatric disorders: the absence of an independent and fully accepted diagnostic 'gold standard' (Volkmar and Cohen 1988a). Given this limitation, the diagnosis of autism is remarkable for the general agreement among clinicians, over decades and across nations. There are paradigmatic cases of autism about which all experienced clinicians would agree. This is reassuring in relation to the use of categorical diagnosis as

* Using clinical diagnosis as the standard of comparison, DSM-III-R appears to have increased sensitivity and decreased specificity (Volkmar *et al.* 1987).

an anchor in research studies on particular mechanisms, such as those described in the present volume.

There is, however, one major diagnostic issue which deserves special note in relation to autism research. If one collected all the individuals who are diagnosed as having autism in one room, probably the most striking fact would not be their similarity, but how vastly different they are among themselves (Volkmar and Cohen 1988b). Included among individuals with autism are three-year-old children and senior citizens, people with profound mental handicap and university graduates, adults who barely have a word of expressive vocabulary (and almost undetectable receptive language) and adults who read encyclopaedias for recreation and speak with pedantic exactitude. Some individuals with autism are self-destructive, while others are over-conscientious about their physical well-being. There are individuals with autism who memorize road maps and train schedules, and others who couldn't make sense of either.

To counter the potential research problems associated with such variability, the majority of studies discussed in this book focus on high-functioning individuals with autism. By 'high-functioning' we mean individuals with only moderate or mild intellectual impairment. In this respect, they constitute the upper 25 per cent of the population with autism (Rutter 1978). The selection of this subject group reflects a research strategy which enables us to identify autism-specific impairments independently of the effects of mental handicap in general. Ultimately, it will be important that research focusing on this group of individuals with autism should be extended to the full range of people with the condition.

A BRIEF HISTORY OF THEORY OF MIND

The literature on the development of a theory of mind has grown exponentially over the last ten years. Studies on children's developing understanding of the mental world arguably began with Piaget (1929). He claimed that children younger than seven years of age were unable to make the ontological distinction between the mental and physical realms. The discussion about the ontogeny of an understanding of minds was reopened in 1978 with the publication of Premack and Woodruff's seminal paper: 'Does the chimpanzee have a theory of mind?' Premack and Woodruff described a series of experiments that suggested to them that their famous chimp Sarah, who had knowledge of a symbol system, was able to predict and interpret a human's actions in terms of mental states such as intentions. They argued that Sarah's success indicated that she had a theory of mind. Commentaries on this paper, especially by Dennett, Pylyshyn, and Bennett, pointed out that it is not until one demonstrates an understanding of false belief (where

the mental state conflicts with reality) that one can unequivocally attribute a theory of mind to an individual, human or otherwise.

Within a few years, developmental psychologists began devising ingenious experiments to tap children's understanding of false belief, using the ideas suggested by Dennett and others. Wimmer and Perner (1983) published their important study of three- and four-year-olds' understanding of false belief, involving the now famous Maxi and the chocolate scenario. In this task, an object (a bar of chocolate) is unexpectedly moved whilst the main protagonist, Maxi, is out of the room. The child is then asked to predict where Maxi thinks the chocolate is, or where he will look for it. The main findings, which have been replicated many times, are that only older three-year-olds and over can pass this task. This study set in motion a flurry of research investigating young children's knowledge of false belief, other mental states, and related cognitive and linguistic achievements (see Astington *et al.* 1988; Butterworth *et al.* 1991; Frye and Moore 1991, and Whiten 1991, for recent collections of papers).

The first extension of this line of work to the study of autism which utilized Wimmer and Perner's (1983) false-belief test was carried out by Baron-Cohen *et al.* (1985). They used this test in order to ask the question 'Does the autistic child have a theory of mind?' This study, and subsequent replications, provided strong evidence that children with autism have a specific impairment in their understanding of false belief.* Given that it had been argued in the philosophy of mind and language (Dennett 1978; Grice 1975) that a theory of mind was *necessary* for social understanding and communication, it seemed plausible that a deficit in this area might account for at least two of the core symptoms in autism.

Earlier, Hobson (1981) had proposed the theory that children with autism have a primary problem in the development of a concept of other persons, specifically in coming to understand that people have minds. His approach was to investigate the understanding of expressions of emotion by children with autism, which grew out of his view that affective impairments (especially a relative lack of empathic responsiveness to others) could lead to impairments in conceptual development. The 1985 paper of Baron-Cohen *et al.* placed the emphasis on a primary *cognitive* deficit, and the debate about the primacy of affect or cognition in this domain continues to fuel new research ideas.

* Inevitably, many contributors in this book make reference to this early study. Whilst this may create some redundancy, each chapter uses this simply as a starting point for their own empirical and theoretical directions.

THE DEBATES

In this volume there are several fascinating theoretical debates that resurface with vigour between contributors, each time from a different angle. Here we mention the key issues, indicating in which chapters they are taken up:

The first set of debates focuses on underlying processes and developmental origins of a theory of mind: Does a theory of mind require a capacity for metarepresentation? If so, what is meant by metarepresentation (Leslie and Roth; Perner)? Does a theory of mind, or metarepresentation, arise *de novo* in the second to third year of life, or are there infancy precursors to either or both of these (Wellman)? If there are infancy precursors, what are these? Imitation (Meltzoff and Gopnik)? Joint-attention (Baron-Cohen; Mundy Sigman, and Kasari)? Narrativity (Bruner and Feldman)? Affective sensitivity (Hobson)?

The second set of debates focuses on what consequences one would expect if a theory of mind was impaired: What would the effects be on language and communication (Tager-Flusberg; Loveland and Tunali) and on social development (Lord)? Is an inability to deceive a cardinal example of theory of mind failure (Sodian and Frith)? And what are the clinical implications of such deficits (Baron-Cohen and Howlin)?

The third set of debates focuses on alternative theories of the data from autism: Is task performance better understood in terms of executive control systems? If so, do deficits in the latter make better sense of the lack of imaginative play in autism, than the metarepresentation theory of autism (Harris)? Which symptoms of autism are successfully explained by the theory of mind hypothesis, and which cannot be (Klin and Volkmar)? Is the notion of a theory of mind a mistaken notion? If so, is it more appropriate to emphasize the development of self? (Samet); or social desire? (Mayes, Cohen, and Klin).

A final set of debates centre on what can be learnt about autism and the development of a theory of mind from the study of non-human primates (Gómez, Sarriá, and Tamarit; Whiten), or from philosophy of mind (Samet), or from a psychoanalytic perspective (Mayes *et al.*).

THE THEORY OF MIND HYPOTHESIS OF AUTISM: A PARADIGM CASE IN THE APPLICATION OF DEVELOPMENTAL PSYCHOPATHOLOGY

This volume exemplifies the significance of the field of developmental psychopathology, a field that uses theories and research on normal populations to advance our understanding of atypical children, and in turn acknowledges the influence that the study of atypical populations can have

on our understanding of normal development (Cicchetti 1984; Sroufe and Rutter 1984).

As our brief historical review shows, it is straightforward to recognize the influence of developmental psychology, and more broadly cognitive science, on the evolving theoretical and empirical work in the field of autism during the past ten years, and these are widely represented and acknowledged in numerous chapters in this volume. The other side of the equation—the contribution of the study of psychopathology to our understanding of normal development—can, with hindsight, also be discerned. Indeed, in having influenced theories of normal development it stands out as exceptional. Without the study of autism it is debatable whether the field would have been focusing on the significance of joint-attention in the development of a theory of mind, for example, or would have considered the modularity of a theory of mind in neuropsychological terms. Indeed, even the link between theory of mind and pretend play owes much to the associated deficits uncovered in autism. Finally, the burning questions of the primacy of affect and cognition in the development of a theory of mind can be seen as strongly influenced by the parallel debates about the primary impairment in autism.

ORGANIZATION OF THIS BOOK

In Part I, we begin with introductory chapters that review the development of a normal theory of mind, and the core social abnormalities characteristic of autism, since it is these that the theory of mind hypothesis set out to explain. Parts II and III then take up the central debates. Part II includes chapters that advance the theory of mind hypothesis of autism, all taking a cognitive approach, though there is by no means unanimous agreement among the contributors in this section on the nature of the deficit in autism. In Part III, a range of critical perspectives on the cognitive approach to the theory of mind hypothesis are presented. In Part IV, the debates are broadened still further to include philosophical, evolutionary, psychoanalytic, and developmental theories of autism and the theory of mind. In the final chapters, the implications of the theory of mind hypothesis of autism for clinical issues and for future research are considered.

We hope that this volume will provide an impetus for future work that will bring us closer to a more complete psychological understanding both of autism and of the normal development of a theory of mind.

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3

Social development in autism: historical and clinical perspectives

FRED R. VOLKMAR AND AMI KLIN

Autism has captivated the imagination and research endeavour of investigators in disciplines as diverse as ethology and neurophysiology. In the search for the 'Rosetta stone' of social development, many researchers have studied autism with the intent of unravelling the very essence of human social relatedness and culture. Many decades ago, a similar endeavour brought about the once fashionable anthropological quest for 'the savage in a state of nature' (Zingg 1940). Such a savage, it was thought, would show us which aspects of social and cultural behaviours were innate and which were acquired. The search for isolated humans living outside society led to the description of so-called 'feral children', who allegedly grew up in the wild, reared by mammals other than man (Gesell 1949; Maclean 1977). These descriptions were blends of small amounts of fact and large amounts of fancy; it appears that the great majority of feral children were congenitally abnormal children deliberately abandoned in the wild to die (cf. Lévi-Strauss 1949; Bettelheim 1967).

Although there are no reliable cases of children having grown up outside society, there are, due to a tragic accident of nature, children with autism, who live in society, but who for some as yet ill-understood reasons, cannot profit much from the social stimulation provided by loving and caring parents. Efforts to understand the roots of their social impairment have been as difficult as our predecessors' quest for 'the man without culture'. As our predecessors failed to understand that man is biologically a social and cultural animal, we as yet have failed to understand what exactly this biology consists of (Volkmar 1987). The social disabilities of autistic individuals remain the most striking, and probably the least understood, aspect of the autistic syndrome.

Social encounters with autistic individuals illustrate the severity of their social deficits, as well as the complex issues posed by developmental changes and the heterogeneity of the syndrome. Young autistic children may fail to respond differentially to a strange person and may act as if other people, including their parents, are of little or no interest. This is in stark contrast to their often exquisite sensitivity to the inanimate environment, as they may

become profoundly distressed in response to minor deviations or changes in seemingly trivial routines. The older autistic child or adult may, on the other hand, approach others in odd or idiosyncratic ways, typically making use of stereotyped and one-sided patterns of social interaction (Howlin 1986; Volkmar 1987).

This chapter provides a general summary of both the history of research on autistic social dysfunction and the available clinical evidence regarding its characterization. The role of a normative developmental framework must be emphasized, since it highlights the distinctiveness of social disabilities in autism, as well as the various points of continuity with more normative developmental processes.

HISTORICAL BACKGROUND

Research in autism has undergone several major shifts over the nearly five decades since Kanner's initial (1943) report of the syndrome. Although the importance of disturbed social relationships (autism) for syndrome definition has continually been emphasized, the various shifts in research emphases and in conceptualizations of the disorder have, somewhat paradoxically, impeded research on just these aspects of the disorder.

Kanner's initial (1943) report emphasized the centrality of social dysfunction as a pathognomonic feature of the disorder; moreover, by contrasting the limited social skills of his first cases with social skills which normally emerge very early on in development, Kanner was careful to place this observation explicitly within a developmental context. Although Kanner's phenomenological description of the condition has proved to be remarkably enduring, other aspects of his report suggested false leads for research. For example, while his initial report emphasized the apparently congenital nature of the disorder, it also noted both the unusual degrees of personal achievement of the parents and their unusual interactional styles with the child. At the time, of course, there was little understanding of the potential contributions of a deviant child to deviant parent-child interaction (see for example, Bell and Harper 1977); subsequent reports emphasized the role of experiential factors in pathogenesis. Such notions were congruent with the then current emphasis on psychodynamic factors in psychopathology, and suggested that children developed the disorder as a result of a confusing, perplexing, and noxious psychosocial environment. Thus, descriptions of 'refrigerator mothers' were common, and the emphasis was on very fundamental disturbances in 'object relations' as central aspects of syndrome pathogenesis and for remediation (see for example Bettelheim 1967, and Mayes *et al.* this volume, Chapter 20). Accordingly, the early emphasis was on removing the child from the deviant environment and providing

a comprehensive psychotherapeutic programme to remedy the presumed deficits. Additional sources of confusion arose regarding the independent validity of autism as distinct from other conditions, notably childhood schizophrenia; other aspects of Kanner's original report suggested that the disorder was not associated with 'organic' conditions nor with mental retardation. Essentially, the two decades following Kanner's original report were devoted to clarifying these issues.

Given the early emphasis on psychodynamic factors, it is understandable that early reports based on clinical work with autistic children tended to view all behaviour of the child as imbued with considerable intentionality and intrapsychic meaning. For example, deficits in performance on traditional IQ tests were viewed as reflecting 'negativism' rather than basic cognitive disturbances, and echolalia was viewed as an attempt by the child to avoid social-communicative interaction.

Various lines of evidence, including longitudinal data, were helpful in establishing the centrality of social deficits for the definition of the syndrome and for clarifying the role of experiential factors in pathogenesis. It became apparent, for example, that parents did not exhibit particular deficits in child care nor in parental psychopathology (McAdoo and DeMyer 1978). Similarly, it became clear that even very adverse experiences early in life do not typically lead to autism (Fein *et al.* 1986). Although the emphasis on social deficits had initially suggested some role of psychosocial factors in pathogenesis, it became more reasonable to view the child, rather than the parents, as the source of dyadic deviation. Similarly, longitudinal information such as the frequency of seizure disorders in autistic individuals, their relatively consistent and poor performance on tests of intelligence, and the frequent association of autism with a host of medical conditions was more congruent with a definite, if ill-defined, 'organic' etiology.

The growing consensus on the validity of the syndrome led various investigators to propose categorical definitions (for example Rutter 1978). Such definitions, consistent with Kanner's original report, emphasized the primacy of social factors, at least for purposes of syndrome definition. Typically, however, theoretical models of the condition continued to emphasize other aspects of development as 'primary' for purposes of syndrome pathogenesis. Disturbances in such varied aspects of development as perception (Ornitz and Ritvo 1968), language (Rutter *et al.* 1971), cognition (Prior 1979), and arousal (Richer 1976) were presumed to be central in the development of the condition. Thus, although viewed as 'primary' for purposes of syndrome definition, disturbances in social development were viewed as secondary to other processes. Several lines of evidence, and one major assumption, were consistent with this view.

Firstly, it was clear that some social skills emerged over the course of development (see for example Howlin 1986; Volkmar 1987), so that, for

example, patterns of differential social behaviour to familiar adults observed (see for example Donnellan *et al.* 1984; Sigman and Ungerer 1987; Rogers *et al.* 1991). This observation seemed consistent with the notion that cognitive, rather than social factors, were 'primary'. Secondly, several carefully conducted observational and experimental studies clearly suggested that social responsiveness in autistic individuals could be increased by various means such as increased adult attention, peer modeling, etc. (Churchill and Bryson 1972; McHale 1983; Charlop *et al.* 1983; Volkmar *et al.* 1985). Finally, an implicit 'cognitive primacy hypothesis' (Cairns 1981) was often assumed; such an hypothesis assumes that children's cognitive abilities are the primary determinants of their behaviour, and tends to de-emphasize the importance of social aspects of development. The resurgence of interest in social development in autism over the past decade, and particularly during the past five years, has reflected an increased awareness of the limitations of these arguments.

While some social skills do develop, these are invariably highly deviant and both quantitatively and qualitatively abnormal, even in the high functioning individuals (Howlin 1986; Volkmar 1987; Mundy and Sigman 1989). Clearly the fact that *some* social interest and some social skills develop need not, necessarily, imply that cognitive factors are 'primary'. Similarly, the fact that certain cognitive skills may be relatively preserved, although this does suggest that cognitive factors are less important to syndrome pathogenesis. The observation that some social skills emerge may just as parsimoniously be taken to suggest the importance of attempting to disentangle precisely those aspects of social development that are most uniquely disordered in autism (Rogers and Pennington 1991).

The potential importance of social development is also suggested by the considerable body of work on infant sociability. Social transactions appear to provide the framework for subsequent communicative and cognitive skills, for example symbolization (see for instance Bates *et al.* 1979; Piaget 1962; Wolf and Gardner 1981). The strength of these processes is suggested by the development of selective attachments even in children who are severely neglected and/or abused (Egeland and Sroufe 1981), as well as in children with other very severe developmental disabilities, for example Down's syndrome (Berr *et al.* 1980). As Hobson (1989) notes, it appears at least as reasonable to assume, along with Kanner, that the fundamental problem in autism is indeed a lack of 'affective contact' (see also Hobson in this volume, Chapter 10). Accordingly, the explication of disturbances in specific developmental processes (Ungerer 1989) and the attempt to provide more truly operational definitions of autistic social dysfunction have assumed increased importance.

SOCIAL DEVIANCE AS A CENTRAL DEFINING FEATURE

Both categorical and dimensional definitions of the condition have emphasized the centrality of social dysfunction as a hallmark of autism. Rutter's (1978) synthesis of Kanner's original report and subsequent research proved highly influential. Rutter (1978) suggested that the social development of the autistic individual was deviant even when developmental factors (mental age) were taken into account. Despite the general agreement on the centrality of social deficits in syndrome definition it has proved somewhat difficult to derive simple, readily applied procedures for operationalizing this diagnostic construct. For example, DSM-III (APA 1980) accorded autism 'official' diagnostic status in the American psychiatric system for the first time; by definition individuals with infantile autism had to exhibit 'pervasive' social deficits, i.e., presumably to exhibit them in most situations and contexts. This definition proved most applicable to younger children, and was problematic in relation to older and higher-functioning individuals, who exhibited rudimentary, if highly deviant, social skills.

To address this problem revisions of this definition were undertaken in DSM-III-R (APA 1987). These revisions were much influenced by a rather broader view of the condition (see for example Wing and Gould 1979) and, not surprisingly, resulted in a rather broader diagnostic concept (Volkmar *et al.* 1988). Despite the apparent differences between various categorical approaches to diagnosis of the condition, it does appear (see for example Siegel *et al.* 1989) that it is the social criteria which, taken individually, most robustly predict diagnosis.

In contrast to the categorical approach to diagnosis, an alternative approach has relied on assessment of dimensions of dysfunction. This approach has been exemplified by various instruments explicitly developed for assessment of individuals with autism (see Parks 1983 for a review). Such instruments also emphasize social deficits as defining features of the autistic syndrome. In theory such approaches have numerous advantages over categorical diagnostic criteria, in that dimensional approaches may more adequately and accurately characterize social dysfunction in autistic individuals.

Unfortunately, several factors have complicated the development and use of such instruments. In the first place, there is a tremendous range of syndrome expression, and the instruments developed have understandably tended to focus on selected subgroups of the autistic population. Secondly, the developmental problems of many autistic individuals are such that they cannot be directly interviewed; accordingly, instruments typically rely either on direct observation of behaviours or on parental or teacher report, thus raising issues of reliability, instrument development, and instrument standardization. Instrument development is complicated by the nature of developmental deviation—for example, since highly deviant behaviours are

sampled, issues of standardization can be problematic. This issue would not of course, apply to instruments which were truly normative in nature. Finally it is unclear precisely which aspects of social development are most characteristically disordered of the many that are.

Although a considerable body of research exists on the nature of social development of infants and young children, relatively few truly normative instruments for assessing social skills exist. Several recent studies have employed a newly revised assessment instrument, the Vineland Adaptive Behavior Scales (Sparrow *et al.* 1984). These scales use a semi-structured interview administered to parent or caregiver of the individual (child or adult), and provide assessments of communicative (receptive, expressive, and written) and social (interpersonal relationships, play and leisure time, and coping) skills based on a very large, normative sample representative of the United States. A series of studies using this instrument (Volkmar *et al.* 1987; Freeman *et al.* 1988; Loveland and Kelly 1988) have documented that, consistent with Rutter's (1978) definition, social skills in autism are indeed deviant relative to mental age. Similarly, we (Volkmar *et al.* 1990) have extended this approach by developing a series of regression equations, based on the Vineland standardization sample, which predict social and communicative skills on the basis of mental age and other relevant variables. When applied to autistic and non-autistic developmentally disordered samples, social skills in autistic individuals were typically more than two standard deviations below the scores predicted on the basis of mental age alone. Individual item analyses (Klin *et al.* 1992) have also revealed that autistic children typically fail to exhibit a range of social behaviours which are normatively exhibited within the first year of life; the absence of such behaviours was striking even when effects of associated mental retardation were controlled.

CLINICAL ASPECTS OF SOCIAL DEVELOPMENT IN AUTISM

Developmental perspectives

Social development in autism is of a kind both qualitatively and quantitatively deviant from that seen in other childhood disorders (Rutter and Garmezy 1983). Although clinical descriptions of the autistic child have historically emphasized 'autistic aloneness', this view is probably most applicable to younger and more severely impaired individuals. Although failures in language development are typically the presenting concerns of parents at the time of first diagnosis, these usually have been preceded by early, and profound, social deviance. While available data are generally based on parental retrospection and must, accordingly, be viewed with some caution,

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Unfortunately, several factors have complicated the development and use of such instruments. In the first place, there is a tremendous range of syndrome expression, and the instruments developed have understandably tended to focus on selected subgroups of the autistic population. Secondly, the developmental problems of many autistic individuals are such that they cannot be directly interviewed; accordingly, instruments typically rely either on direct observation of behaviours or on parental or teacher report, thus raising issues of reliability, instrument development, and instrument standardization. Instrument development is complicated by the nature of developmental deviation—for example, since highly deviant behaviours are

sampled, issues of standardization can be problematic. This issue would not of course, apply to instruments which were truly normative in nature. Finally it is unclear precisely which aspects of social development are most characteristically disordered of the many that are.

Although a considerable body of research exists on the nature of social development of infants and young children, relatively few truly normative instruments for assessing social skills exist. Several recent studies have employed a newly revised assessment instrument, the Vineland Adaptive Behavior Scales (Sparrow *et al.* 1984). These scales use a semi-structured interview administered to parent or caregiver of the individual (child or adult), and provide assessments of communicative (receptive, expressive and written) and social (interpersonal relationships, play and leisure time and coping) skills based on a very large, normative sample representative of the United States. A series of studies using this instrument (Volkmar *et al.* 1987; Freeman *et al.* 1988; Loveland and Kelly 1988) have documented that consistent with Rutter's (1978) definition, social skills in autism are indeed deviant relative to mental age. Similarly, we (Volkmar *et al.* 1990) have extended this approach by developing a series of regression equations, based on the Vineland standardization sample, which predict social and communicative skills on the basis of mental age and other relevant variables. When applied to autistic and non-autistic developmentally disordered samples, social skills in autistic individuals were typically more than two standard deviations below the scores predicted on the basis of mental age alone. Individual item analyses (Klin *et al.* 1992) have also revealed that autistic children typically fail to exhibit a range of social behaviours which are normatively exhibited within the first year of life; the absence of such behaviours was striking even when effects of associated mental retardation were controlled.

CLINICAL ASPECTS OF SOCIAL DEVELOPMENT IN AUTISM

Developmental perspectives

Social development in autism is of a kind both qualitatively and quantitatively deviant from that seen in other childhood disorders (Rutter and Garmezy 1983). Although clinical descriptions of the autistic child have historically emphasized 'autistic aloneness', this view is probably most applicable to younger and more severely impaired individuals. Although failures in language development are typically the presenting concerns of parents at the time of first diagnosis, these usually have been preceded by early, and profound, social deviance. While available data are generally based on parental retrospection and must, accordingly, be viewed with some caution,

it is typically the case that parents report very early deviance in the development of quite basic interpersonal skills (Ornitz *et al.* 1977), including failure to make eye-contact and to use gaze to regulate interaction, failures to engage in the social games of early infancy, a preferential interest in the inanimate, as opposed to the social environment, and a relative failure in developing the typically robust patterns of differential attachments to parents (Mundy and Sigman 1989). In stark contrast to what occurs in normally developing infants, the human face appears to hold little interest or have little salience for the autistic child (Volkmar 1987). Typical forms of early non-verbal interchange are deviant, so that, usually, very early emerging forms of 'intersubjectivity' (Trevvarthen 1979; Stern 1985) are absent, and young autistic children do not display a differential preference for maternal speech (Klin 1991; 1992). Affected children may not seek physical comfort from parents, and may be difficult to hold (Ornitz *et al.* 1977).

Some social skills develop over time, so that by the ages four or five some evidence of differential social responsiveness to familiar adults is exhibited (see for instance Sigman and Ungerer 1984), although the quality of such behaviours is usually highly deviant (Mundy and Sigman 1989). Similarly, differential patterns of vocalization or facial expression may be observed, although, typically, these tend to be rather idiosyncratic (Ricks 1979). Evidence of visual self-recognition may be observed (e.g. Dawson and McKissick 1984), although usually associated affective responses appear to be absent or deviant (Spiker and Ricks 1984).

Social skills continue to develop as autistic children enter later childhood and adolescence. However, social responsivity remains a source of considerable disability even for higher-functioning autistic children, whose attempts at social interaction fail as a result of their difficulties in pragmatic communication and empathy and their failures to integrate various sources of information relevant to interaction (Langdell 1978; Baron-Cohen *et al.* 1985). Normal peer relationships do not develop, and even when some social relationships develop these tend to be with adults rather than with other children (Volkmar 1987). Even very low-functioning autistic adolescents appear capable of processing at least some forms of socially relevant information (Volkmar *et al.* 1989a), although their poor capacity to use such information remains a source of significant disability (Hobson 1989), and aspects of non-verbal communication such as gaze (Volkmar and Mayes 1990) and facial expression (Yirmiya *et al.* 1989) are highly deviant.

In adulthood a range of social outcome is observed. In a majority of cases individuals continue to exhibit marked deficits in social skills, and never become capable of sustaining an independent existence (DeMyer *et al.* 1981). Even in the very highest-functioning autistic adults, residual social impairments are observed. Such higher-functioning individuals are self-described 'loners', who may exhibit a desire for social contact, although they are

typically incapable of it (Kanner *et al.* 1972; Bemporad 1979; Volkmar and Cohen 1985). In many instances, such individuals are aware of their disability, and develop a number of coping strategies, typically revolving around learning concrete rules for mediating social interaction (Kanner *et al.* 1972). This observation is of some interest for the theory of mind hypothesis (Baron-Cohen *et al.* 1985), since it suggests some rudimentary 'metacognitive' skill (Beal and Flavell 1982).

Social subtypes

Given the marked range of syndrome expression observed in autism, it is not surprising that various attempts have been made to identify specific subtypes of the condition. Early distinctions, for example between 'primary' and 'secondary' autism (absence/presence of associated medical conditions) have now been largely abandoned. Subsequent attempts to subtype have been related to clinical features such as age of onset, associated biological findings (for instance, hyperserotonemia), and IQ. Clearly, individuals with higher IQs are more likely to be verbal and to have better long-term outcomes (Rutter and Garmezy 1983), although the prepotence of IQ as a predictor is not specific to autism. More recent attempts have used various methods to identify specific subtypes based on patterns of cognitive skills (see for example Fein *et al.* 1985), historical and behavioural data (Siegel *et al.* 1986), and social features (for example Wing and Atwood 1987).

Wing's subtypology (Wing and Atwood 1987) is based on clinical identification of three distinctive patterns of social interaction observed in an epidemiological study of the condition (Wing and Gould 1979) and clinical work. Three subtypes are proposed: (1) *aloof* individuals avoid interaction actively; (2) *passive* individuals passively accept social interaction but do not seek it; and (3) *active but odd* individuals accept social interaction but interact in an odd or eccentric fashion. Wing and her co-workers have provided descriptions of the three subtypes, and attempts to elaborate more specific criteria for these subtypes have been made (for example Wing and Atwood 1987; Prizant and Schuler 1987). This system is of considerable interest, since it makes use of an essential diagnostic feature, is applicable to individuals of different ages and with different levels of associated mental retardation, and has potential implications for clinical management as well as research.

Empirical data employing this classification scheme have not, however, been common. In one study (Volkmar *et al.* 1989b) clinicians were noted to be able to classify autistic cases into the three subtypes with relatively high reliability, and the three subtypes were observed to differ on a number of relevant measures. The 'aloof' group was younger and more developmentally delayed than the active but odd group; the 'passive' group was intermediate

between these two extremes. However, it appeared that the differences between the three types predominantly reflected mental age. The observation that some aspects of social interaction are related to overall developmental level is not, of course, unexpected; but it does suggest a potential line of inquiry focusing on those aspects of social development which remain uniquely impaired in autism throughout development.

Effects of mental age

Kanner's early (1943) impression that autistic individuals had normal intellectual potential has now clearly been shown to be incorrect (Sigman *et al.*, 1987). Although patterns of IQ distribution vary somewhat between centres (Volkmar and Cohen 1988), it is clear that the majority, and perhaps as many as 80 per cent, of autistic individuals function within the range of mental retardation. Accordingly, observed social deficits must be interpreted within the context of any associated mental retardation (Rutter 1978).

While it is clear that social skills (as variously defined and examined) are related to mental age in important respects, it is also the case, consistent with Rutter's 1978 definition, that observed social deficits are not solely a function of mental retardation. Such deficits are observed in autistic adults of normal intelligence (Volkmar and Cohen 1985), and are also observed when explicit metrics of social skills are employed (Volkmar *et al.* 1987). Moreover, while deficits in symbolic thinking and abstract reasoning are clearly established (Sigman *et al.* 1987), differences in sensorimotor aspects of intelligence seem much less striking (Morgan *et al.* 1989). In reality, issues of assessment are complex, particularly in very severely retarded and mute autistic individuals. But even in such instances social skills are less than would be expected given the very early ages at which basic social processes are observed. The developmental context remains important, however, in interpreting various hypothesized mechanisms of social dysfunction. As Hobson (1989) suggests, it appears more helpful to regard the social disturbance as one which has various manifestations over the course of development, but which remains a source of significant disability throughout life. As described elsewhere (see Klin and Volkmar, this volume, Chapter 15), this issue has particular relevance to the theory of mind hypothesis.

NEUROBIOLOGICAL PERSPECTIVES

Considerable evidence in favor of an underlying, if somewhat enigmatic, organic factor or factors responsible for the pathogenesis of autism now exists. This evidence is impressive in terms of its variety—for example, persistence of primitive reflexes; delayed development of hand dominance,

increased frequency of seizure disorder, and so forth. Various pathophysiological models have been proposed which locate the 'site' of dysfunction at various points within the central nervous system or in specific neurotransmitter systems (for example, Panske 1985). Unfortunately no single 'site' of dysfunction is consistently observed, none of the proposed mechanisms have proved readily testable, and none sufficiently account for observed social deficits. Given the early plasticity of the central nervous system and the marked alterations in its structure occurring over the first years of life, it is possible that CNS alterations in autism are reflected in changes in aspects of the fine structure of the brain rather than in specific, readily localized, neuroanatomic sites or in specific neurotransmitter systems.

On the other hand, neuropsychological studies do provide some evidence which suggests the importance of a focus precisely on the social aspects of autism. As Fein *et al.* (1986) note, the assumption of a primary disturbance in social relatedness may provide a more fruitful approach for neuropathological models, since such a procedure might more parsimoniously account for observed neurocognitive deficits. For example, isolated areas of cognitive strength in typical neuropsychological profiles might more parsimoniously be understood as reflecting areas in which social skills have relatively less importance.

The biological bases, and broader evolutionary bases, of social skills have not been sufficiently encompassed by existing research on the social deviance of autism, given that, speaking teleologically, human beings are social creatures for important reasons (Brothers 1989). Various behaviours, for example attachment, imitation, identification, and co-regulatory behaviours are important for both infant survival and ultimate reproduction. As with other primate species, human infant sociability appears to be an evolved characteristic important to infant survival (Freedman 1974; Richards 1978); it is possible that the dearth of apparent cases before Kanner's first description of the syndrome reflects some aspect of differential lack of survival of autistic infants who were, presumably, at greater risk for early death. Ultimately, of course, the capacity to use shared symbol systems is central to the development of culture and the ability for us to function within the context of a long and rich interpersonal and societal history. Unfortunately, the underlying neurobiological basis of this sociability remains unclear (Kling and Stelkis 1976; Fein *et al.* 1986). Clearly, research in this area is impeded by various methodological problems, the lack of good animal models of the condition, and our rather limited understanding of central nervous system aspects of social functioning.

ISSUES FOR RESEARCH

Although research on the social aspects of autism has increased dramatically in recent years, various problems complicate the interpretation of available research studies. These problems include differences in definition of the syndrome, the small samples of subjects typically studied, aspects of developmental change in syndrome expression, etc. While the study of certain subgroups—for example, verbal subjects—is understandable, it is also important to realize that results obtained are not necessarily applicable to other subgroups. Similarly, various matching procedures are typically used to derive required control and contrast groups; unfortunately most matching procedures typically involve matching on some aspect of cognitive, rather than social, skill. In general, the lack of adequate metrics for studying social development has been a severe impediment in research, since the most relevant issue relates to finding just those social skills which are uniquely impaired in autism.

Although young autistic children might be expected, in some sense, to present the 'purest' examples of the disorder, difficulties in diagnosis and ascertainment make such samples difficult to recruit. Various factors act to delay case detection (Siegel, *et al.* 1988), and investigators interested in the earliest aspects of social development have typically been forced to rely on retrospective information, with all the problems inherent in such data. However, the study of such children remains an area of considerable interest, since deficits in older children and adults presumably reflect even more complex interactions of various factors.

Experimental procedures may be highly artificial or may induce unintended confoundings; and the ecological context of relevant social behaviour may be underappreciated (Lytton 1973). The theoretical bias of the investigators—for example belief in the primacy of cognitive or linguistic factors in the pathogenesis of the syndrome—further complicates the interpretation of much available research. An additional problem has been the tendency to equate capacity with actual use. For example, although autistic children listen to sounds as much as mentally retarded children, they fail to exhibit preferential listening to the mother's voice (Klin 1991; 1992); although they may be able to use perceptions of the human face accurately in solving specific problems, the human face may lack general salience to them (Volkmar *et al.* 1989a); and although very-high-functioning autistic adults can be taught to solve specific social problems, their ability to abstract more general rules for social interaction remains significantly impaired.

The theory of mind hypothesis (Baron-Cohen *et al.* 1985) has the considerable advantage of focusing increased attention on the fundamental nature of social deficits in autism. It is also clear that at least some of the observed social deficits (for example in gaze behaviour) might stem from a

lack of theory of mind, and that even autistic individuals with lower levels of this capacity lack the ability to make more complex, i.e. 'second order' belief attributions (Baron-Cohen 1989). The failure of verbal autistic individuals to exhibit these basic capacities seems reasonably clear; what is less clear is whether the hypothesis can sufficiently account for social deficits in their entirety and through the tremendous range (in age and developmental level) of syndrome expression (see Klin and Volkmar, this volume, Chapter 15; and Lord, this volume, Chapter 14).

Kanner's original (1943) notion was that the social deficits of autism were congenital in nature. Unless the origins of a theory of mind are to be traced back to birth, the nature and severity of these very early deficits cannot be accounted for. The issue of possible precursors of theory of mind capacities clearly represents an important topic for future research. Many basic processes (for example attention, perception, cognition) are involved, even in what otherwise appear to be very early emergent social activities. Similarly many different processes are subsumed under overarching terms like social development, and there has been a tendency to equate certain aspects of social development (for example, affective development) with social development as a whole. In some sense this latter process would be equivalent to equating performance on one selected kind of cognitive skill, for instance visual-spatial orientation, with the entirety of cognitive development. It is clear that the social world differs in a host of ways from the non-social environment: which is to say that, given that relationships with people, rather than things, are involved, issues of affective expression and understanding, cultural and personal context, and the fact that other people (rather than other things) are being understood, are all factors involved in reciprocal social interaction.

Despite the general consensus on the centrality of social deficits in the definition of autism, it is precisely this aspect of the syndrome that has been until recently the focus of the least systematic research. The recent resurgence of interest in this topic is, accordingly, particularly welcome. Studies in this area have successfully redirected our attention to Kanner's original hypothesis about the nature of social development in autism.

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Narrative language in autism and the theory of mind hypothesis: a wider perspective

KATHERINE LOVELAND AND BELGIN TUNALI

Understanding of other people, awareness of their knowledge, beliefs, and affective states, is essential to normal human communication (Bates 1974; Rommetveit 1974). The 'theory of mind' model asserts that these interpersonal factors in communication rest upon an ability to develop a mental representation for the contents of other people's minds, or *metarepresentation* (Leslie 1987). People with autism have been hypothesized to have difficulty developing metarepresentational ability (Baron-Cohen *et al.* 1988).

Although the metarepresentation explanation can be criticized on theoretical grounds (Hobson 1989a,b, this volume, Chapter 10; Loveland 1991; Loveland and Tunali 1991; Mundy and Sigman 1989; Mundy, Sigman, and Kasari, this volume, Chapter 9), it seems clear that autistic people do have problems in this area: that is, they make errors when asked to predict what other people know, believe, or feel (Baron-Cohen *et al.* 1985; Perner *et al.* 1989). What are the implications of such a deficit for language-use? In this chapter we discuss the implications of the autistic difficulty in understanding other persons for a specific kind of language-use: narrative language.

Narrative language consists of extended, organized discourse by a speaker or writer. It has been widely studied in young normally-developing children (see, for example, Applebee 1978; Stein and Trabasso 1981; Pellegrini 1984; Galda 1990; Lucariello 1990; Kontos *et al.* 1986), usually in the form of stories. However, it can be studied only in a few people with autism; most simply do not have sufficient language. Accordingly, there are also studies that are about narratives by autistic people.

Baron-Cohen *et al.* (1986), as part of a study of autistic children's theory of mind, had subjects tell the stories depicted in sets of ordered pictures. Although they did not examine the structure, accuracy, or pragmatic aspects of the narratives, they did find that autistic children were less likely than other children (including more severely impaired children with Down syndrome) to talk about characters' mental states. Similarly, Tager-Flusberg (1989) reported that, in extended transcripts of spontaneous discourse,

autistic children rarely talked about mental states, and seemed to have difficulty relating events to emotions. Tager-Flusberg and Quill (1987) had autistic subjects tell stories about a set of pictures. They examined structural characteristics of the stories, and found that, compared to stories by normal comparison subjects, stories by autistic children were shorter, less complex, and contained more errors in grammar and word-choice; Scopinsky (cited in Bruner and Feldman, this volume, Chapter 13) also found stories by autistic subjects were shorter and grammatically simplified in comparison with stories by normal subjects of similar age.

Other studies have found pragmatic deficits (see Tager-Flusberg, this volume) in the narrative language of autistic persons. Baltaxe and Simmons (1977) analysed the bedtime monologues of an autistic girl. They found that these reflected only a hearer's perspective, in contrast to the bedtime monologues of normal children, which characteristically imitate a dialogue between two persons (speaker and hearer). This difference may suggest a difficulty managing changes in point of view, as in the well-known problems of autistic persons in using I/you pronouns (Loveland and Landry 1986). Similarly, Baltaxe (1977) found that the conversational discourse of high-functioning autistic adolescents reflected numerous pragmatic deficiencies, including confusions in speaker/hearer point of view, rudeness, difficulty determining what is relevant, and other problems that suggest a failure to appreciate the listener's needs; Bruner and Feldman (this volume, Chapter 13) found that autistic subjects are able to take turns and respond in a conversational context, but are unable to extend the conversation by adding new, relevant information to previous comments.

Loveland *et al.* (1990a) studied pragmatic aspects of story re-telling (from a puppet show or videotape) in subjects with autism or Down's syndrome. Both groups produced narratives that were deficient in grammar, organization, and other structural characteristics. However, autistic subjects also produced considerable bizarre and irrelevant speech, and they tended to accompany their re-tellings with uninformative gestures, which resembled a moving puppet, but did not add to the story. Moreover, some autistic subjects told stories that indicated they understood the puppets mainly as moving objects, rather than as characters in a story. These subjects seemed to be deficient not only in awareness of the listener's needs, but also in a cultural perspective underlying the telling of stories (viz, the knowledge of what a story is) (cf. Heath 1986; Bruner and Feldman, this volume, Chapter 13). Similarly, Bruner and Feldman (this volume, Chapter 13) report studies in which autistic subjects used fewer pragmatic markers (time, place, etc.) than other subjects when telling a story, and also seemed to lack a grasp of how to *narrate*, as opposed to merely *describe*, a series of events.

It is difficult to draw conclusions from the existing studies relating to

narrative language in autism, because of the variety of methods, purposes, and data examined. Thus, there is a need for a framework in which to examine autistic narratives.

KINDS OF NARRATIVES

In our view, the narrative should not be considered only as a text or a sample of speech collected and analysed for its content. Rather, we treat the various types of narratives as kinds of *communicative acts* (Searle 1969). This viewpoint permits us to examine not only the content of narratives, but how they function for the speaker and listener. Because the speaker and listener are continually engaged in both social and informational exchange, the narrative must take place within the context of their relationship. This relationship entails some degree of *intersubjectivity* (Rommetveit 1974), such that the speaker and listener share not only a common language code, but also knowledge of the topic discussed, of the world at large, of social and cultural conventions for communication, and of each other as persons and as individuals. Because narratives are an extended form of discourse that ordinarily proceeds without conversational interruption (Roth 1986), they have usually been considered apart from the social and cultural context in which they occur (though not always: cf. Heath 1986; Pellegrini and Galda 1990).

In this chapter we also construe the term 'narrative' more broadly than is usually done. Most studies of narrative language have focused on story-telling. However, there are several other forms of extended, organized discourse that have structural or functional characteristics in common with story-narratives. We find it useful to compare these to story-narratives in terms of their implications for persons with autism.

Based on these theoretical considerations, we propose the following categories as a basis for analysis and further research:

1. *Story-narratives*. This is the most frequently studied category, and is what is most often meant by 'narrative'. A story-narrative is expected to be an organized series of causally-related event-descriptions that deal with some topic or lead to some point. Ordinarily, stories are supposed to have a beginning, a middle, and an end, recognizable characters, and some plot conflict that is resolved. Of course, not all attempts at story-telling meet these criteria. Studies of young children's stories show that they begin by stringing together sets of statements that lack causal relations (Applebee 1978: 'heaps' and 'sequences'). Only after several years' practice do children begin to produce adult-like narratives.

Stories may be either fictional or anecdotal; the requirements to produce

original fictional narratives are different from the requirements for producing an original anecdote. Whereas the anecdote concerns what *was*, the fiction concerns what *might be*. Fiction requires the deliberate manufacturing of events and/or characters (imagination). Both fictions and anecdotes require an understanding of event causality (Kemper and Edwards 1986) and of linguistic tools for describing events (Duchan 1986). In both cases the narrator must select and organize information to be presented to the listener. However, in the anecdote, the information is already given, although the teller must determine which items are important ('... At the zoo we saw the giraffes. Then we got some hot dogs and ate them.'). In the case of fiction, the characters and/or the events involving them must be entirely constructed by the teller.

Stories, whether fictional or anecdotal, may be either original, or re-tellings of stories originated by others. In the case of re-tellings, much of the distinction between fiction and anecdote disappears, since the teller need not construct the fiction. An intermediate case occurs when the teller makes up a fiction concerning an established character or event ('Tell me a story about Robin Hood ...'). Jokes are an example of re-tellings that must be executed within stylistic constraints to be effective; they are easily ruined by someone who 'gets the timing wrong' or otherwise distorts the parameters necessary for the effective telling of a particular joke.

Stories may also be spontaneous or elicited. Truly spontaneous stories are produced at the pleasure of the teller. Elicited stories are produced on demand, most commonly in response to something such as a picture that serves as a focus. Many studies of narrative story-telling have been done in this way (for example, Tager-Flusberg and Quill, 1987; Baron-Cohen, *et al.* 1986). This technique has the virtue of insuring some degree of uniformity of content among the narratives of different tellers, enabling the experimenter to make comparisons more directly. However, it does not reveal whether the subject can make up a story 'out of whole cloth'.

2. *Script narratives.* These are narrative accounts of generalizations about events: the way things 'usually happen' (Nelson 1986; Fivush and Slackman 1986). An example would be, 'Every morning when I get up, I take a shower and brush my teeth. Then I dress and go downstairs to eat breakfast ...'. Although there is nothing to prevent a person from saying things like this spontaneously, it would be difficult to collect many of these from the spontaneous speech of any group, because they are rather uncommon. Usually, then, they are elicited.

The script narrative bears an interesting relationship to the anecdote. Like the anecdote, it is based on real events of a personal nature. Unlike the anecdote, however, it represents information about the common structure of many events recurrent over time, rather than the specifics of one

series of events in particular. Like story-based narratives, the script narrative should be organized and should have a recognizable topic.

3. *Informative/didactic narratives.* These are narratives that are produced in order to convey specific information to someone. A spontaneous example might be giving detailed instructions ('I want you to go to the hall closet, and open the large wooden chest at the back under the Christmas wrappings. Inside, under some sweaters you will find your winter coat. Look in the pockets for your brother's brown gloves with the leather patches.'). An elicited example might be giving directions to someone who has asked. Another type of informative narrative is the speech, sermon, or lecture. Like story-based narrative speech, informative narratives are expected to be organized and to lead to some point (although, of course, not all of them do). However, unlike stories, they do not usually consist of causally-related event descriptions.

4. *Recitations/performances.* These occur when an individual recites learned narrative speech, for instance, the Pledge of Allegiance, the alphabet, a TV commercial, Bible verses, or other material that is well learned at the time it is uttered. Such recitations and performances are common. However, their appropriateness is closely linked to the specific social and cultural context in which they occur. For example, reciting the alphabet may be appropriate in the classroom, but not in church. The recitation or performance differs from the story-based narrative, in that it need not consist of an organized series of event-descriptions. Moreover, its content need not be understood by the narrator for the recitation or performance to be successful. Thus, recitations and performances are distinctly different in both content and function from story-based narratives.

THE EFFECTS OF AUTISM ON NARRATIVES

On the basis of what is known about the specific difficulties of person with autism in communication and social behaviour, we can make predictions about the difficulties posed for them by different types of narrative language. In doing so, we present examples of narrative language in autism that have not been previously presented.

1. *Recitations and performances.* The least difficult should be recitation and performances, because these are memorized verbatim and do not necessarily require understanding of content. Moreover, they do not require the speaker to select or organize the material. However, the speaker must choose when and where they will be produced; the same performance that is entirely appropriate or permissible in one setting might be quite inappropriate in another.

Some people with autism are adept at producing recitations and performances. There is nothing inherently abnormal about having them in one's repertoire, since many non-disabled children and most adults have some (such as the Pledge of Allegiance, the Lord's Prayer, etc.). However, some autistic people have well-learned narratives of this nature that are different from those of normal people, not only in that they are produced at inappropriate times and places, but in that they are of unusual, idiosyncratic content, and thus may or may not have, for the speaker, the meaning they hold for other people. An example would be the child who memorizes favourite commercials and repeats them at odd moments. Such speech is often labelled 'delayed echolalia'; but that does not mean it is necessarily empty or meaningless for the speaker. Like immediate echolalia, delayed echoing can function meaningfully for the autistic speaker, on a social/pragmatic level as well as a semantic level of communication (McEvoy *et al.* 1988).

A good example of someone with a repertoire of performances was our patient R.K., a male child with autism and moderate mental retardation. His animated renditions of nursery songs and commercials (aged eight) and his impersonations of people seen on television (aged eleven) all had a highly stereotyped, overlearned quality. Nevertheless, he received a great deal of social reinforcement for them, and he produced them often and on demand. For R.K., these performances served as a social outlet, through which this very disabled child could receive attention and approval. Interestingly, the performances were much more extended than any original utterances he was able to produce.

2. *Re-tellings of stories or other material.* Re-tellings should be somewhat more difficult for the person with autism than recitations and performances, even though the material to be narrated is not original. For re-tellings, in addition to memory demands, there is ordinarily a need to make references clear, to interpret the meaning of the material, and convey it to the listener clearly. These task demands can be highly challenging for the person with autism who is poor at anticipating and accommodating to the listener's needs (Baltaxe 1977; Loveland *et al.* 1989; Loveland *et al.* 1990a).

The difficulties presented by re-telling a story are illustrated by the following example from M.R., a sixteen-year-old, high-functioning male with autism who was a participant in our study of narrative story-telling (Loveland *et al.* 1990a). About an hour after a viewing a videotaped skit, the story of which he had been asked to narrate for a listener, he spontaneously re-told the story to his mother during a free interaction session. Mother had not seen the videotaped skit, which was about a thief who tries to steal money from an office but is driven off by a secretary wielding an umbrella. Mother's responses are in parentheses:

I saw that there was a kid stealing someone else's wallet.
 (There was?)
 Yeah, and they, she had an umbrella.
 (Was it make-believe or did it really happen?)
 It really happened. Why do you have to hit an umbrella you take the money?
 (What?)
 Why do you have to hit the umbrella?
 (Who hit an umbrella?)
 That was the lady did.
 (Who had the umbrella?)
 The robber . . . the robber was taking the money.
 (From who?)
 From the secretary.
 (And what did the secretary do?)
 They hit umbrella.
 (She hit an umbrella?)
 Yeah, she had to hit into a kid . . . a thief.
 (Oh, a thief. Did the secretary have an umbrella?)
 Yeah, she did.
 (Okay. Did she hit the robber?)
 Yeah, she did.
 (With her umbrella?)
 Yeah.
 (Okay.)
 Why did they have to hit him?
 (Why do you think?)
 So someone won't take the money away.
 (Yeah.)
 Did you find R. [M.'s surname] in the phone-book?

This attempt at a narrative quickly breaks down because the listener does not understand. M.'s mother asks increasingly specific questions in the course of the interaction, ending in yes/no questions, as she begins to see what he is describing. His meaning is obscured by distortions of grammar ('they hit an umbrella') and a failure to specify the referents of pronouns among other problems. His assertion that the story 'really happened' is also remarkable, since it seems to betray a lack of awareness that this was a fiction. He asks several times (apparently) why the thief was hit with the umbrella, although he later supplies the obvious answer that it was

prevent the money from being taken. It is hard to know the source of his confusion about this event, although it may indicate a failure to understand characters' motivations. At the end, M. abruptly changes topics to ask about whether his mother saw their surname in the phone book they examined earlier; the phone book is a special interest for M., although his parents try to discourage him from it. No attempt is made to shift topics gracefully or with regard to the listener's interests.

3. *Anecdotes and informative/didactic narratives.* These may be more difficult for autistic persons than performances or re-tellings, because the speaker must convey information that was gained through experience (for example, telling what happened this morning when you went to see the doctor; explaining how to play a game). Both require that the speaker should determine what information it is important to present, organize the information in a coherent way, select verbal means to convey the information so that it will be understood, and accommodate to the needs of the listener. This is in contrast to re-tellings, in which the content and organization are already given for the speaker.

The following is a spontaneous, original anecdote, produced by M.R. several minutes after being told that someone else's wallet was stolen, as part of an experiment involving ability to respond appropriately to another person's distress (Loveland and Tunali 1991).

You know, my dad's car got taken off. The names of his car got taken off. And then the car . . . they glue on. He had to have the police come. The wire got cut down. His car, he had to go to the car shop. It's fixed now. It was on Labor Day. I left my bike in; my brother's bike I left it in.

This anecdote is remarkable in a number of respects. First of all, it is not at all clear exactly what happened to M's father's car (was it stolen, or only damaged, or both?). The pertinent information simply is not given. Instead, M. displays word-finding problems ('the names of his car' = licence plates? model name? other?), poor use of anaphora ('they glue on?'), poor grammar ('got taken off'), and lack of transitions to clarify relationships among parts of the narrative ('I left my bike in . . .': how is this related to the rest of the story?). The lack of cohesive devices, in particular, contributes to incoherence.

It is unusual to encounter written narratives by autistic people. Written narratives differ from spoken ones in that the speaker (i.e. the writer) does not have the opportunity to interact directly with the listener (reader). Thus, the writer must anticipate the reader's needs with greater precision. Volkmar and Cohen (1985) reported a narrative written by Tony W., a young adult with a history of autism. The authors did not discuss the narrative in terms of its linguistic or pragmatic aspects, but focused instead on its implications for diagnosis and prognosis. Tony W. wrote an original

statement describing his experiences as a child and adolescent with autism. It is a vivid depiction of his feelings and thoughts during this period. Interestingly, although Tony W. wrote in some detail about his own feelings and thoughts, he did not mention those of anyone else. His narrative is largely interpretable to the reader, but it is also deficient in grammatical organization, word choice, spelling, and punctuation. A sequence of even loosely connected ideas are run together in long paragraphs. Lack of transitional pronoun references, and poor grasp of idiomatic usage make the statement difficult to follow.

Informative/didactic narratives by autistic people are also rare. In a recent study of referential communication in autism and Down's syndrome (Loveland *et al.* 1989), we asked autistic subjects to explain to a naive listener how to play a simple board game. The following is a didactic narrative by M.D., a high-functioning 27-year-old male with autism. The listener's comments, which were limited to very general prompts during this part of the observation, are in parentheses:

You have these animals. If you get these and then you can get on this one [point]. Then you can keep this animal here [points]. If you get on this one [points], animal, you get to keep the animal. You do here or here [points], you have to back. And here you get a shortcut [points]. . . . How old are you?

(Tell me more about this game.)

You just . . . whenever you land right here [points], you get it.

Of the ten possible essential pieces of information about the game, M.D. conveys only three: that landing on certain squares means the player gets a toy animal, or has to go back, or takes a shortcut. He leaves out important information such as the use of the spinner and the game pieces, where to start and finish the game, the fact that players take turns, and so on. At the end of his first attempt, he changes the topic abruptly ('How old are you?'). After further prompting, he is unable to give any new information, although he does return to the topic. It is worth noting that when much more specific prompting was introduced (for instance, 'Tell me what this is for?', while holding the spinner) M.D. was able to supply the remaining information.

Another participant in the same study, E.R., produced a didactic narrative that was also impoverished in content, but was also different in some respects. E.R. was a high-functioning 22-year-old male with autism.

First I put the moose on here [places animal on board], and then the goat on here and then the camel over here, and then the kangaroo over here, and then the bear over here, and then the alligator over here, and then the giraffe over here, and then the hippo over here, and then the elephant over here, and then the jaguar over here and then the elk over here, and finally the lion over here. It's easy.

(Tell me some more about this game.)

I'll take the yellow one. Play the game.

(What else?)

When we're winning you play the game. But if you lose, you're out of the game [throws arms up]. I take the yellow one. Take the green one. You go over here [traces path]. You see, I go first [points to self].

E. R.'s first attempt to explain the game is remarkable for its perseverance. He simply places every animal on the board in order, narrating his actions as he goes. When prompted further, he produces a little more information: that game pieces must be selected and that players take turns. He also inserts material that is only marginally relevant, and is certainly not informative ('When we're winning you play the game . . .'). Like subject M. D., however, E. R. gave most of the remaining information when specific prompts were supplied.

M. D. and E. R. were among the most able autistic subjects in our study, and their didactic narratives were consequently among the best. Even so, they had marked difficulty selecting, organizing, and presenting to someone else information that they knew. They also tended to include material that strayed from the topic or was uninformative or repetitive. Their narratives contrasted with those of the Down's syndrome subjects, which were much more informative, even with little prompting (Loveland *et al.* 1989).

4. *Script narratives.* Script narratives may be harder still for the person with autism, because they involve generalization over many events and selection of the most relevant information. They may be particularly vulnerable to distortion by the autistic person's selective, idiosyncratic, and poorly acculturated view of the world (Loveland, 1991; Loveland and Tunali 1991; Bruner and Feldman, this volume, Chapter 13).

Though there are many studies of script narratives in young normal children, we know of none in persons with autism. The following narrative, by one of our clinic patients, was collected in the attempt to elicit a script narrative. S. W. is a ten-year-old child with Pervasive Developmental Disorder whose intellectual functioning is in the Borderline range. He has an obsessive interest in hotels, and has memorized the locations of all the hotels of several hotel chains in major Texas cities and along interstate highways. His therapist (BT) asked him to describe a 'typical' holiday routine for his family. Instead, S. W. began by describing what he planned to do *that* Christmas, and quickly changed to discussion of his favourite topic, hotels.

(What do you usually do for Christmas?)

This year I'm gonna go to my cousin's. His name is Warren . . . We're going to go up there after Christmas and Granny and I will take a special vacation. We're gonna go to a hotel in Beaumont and we're gonna spend the night. . . . Me and

my granny . . . I love doing that! . . . I always love doing that stuff . . . g to travel . . . That's great! That's my favorite thing! . . . I love travel! I say 'I to travel' but I can't do it every time [raises his hands in the air]. Granny has s up two 20s for the Best Western. We like this! It's called the Jefferson Inn. in Beaumont . . . remember, the Gulf coast! The Hotel 6 there compared to one in Baytown . . . It's *ugly*! [grimaces].

(It is?)

Yeah! . . . It's yellow-painted . . . but the one compared to Baytown . . . it's m much better . . . that used to called . . . [grimaces] . . . it's . . . much, much be

This attempt to elicit a script narrative did not succeed. S. W. tal instead about what he planned to do at the present time, not what he usu did. He then switched to a different topic entirely, abandoning the quest asked by his therapist. It may be that S. W. is unable to generalize ac events in the way the construction of a script narrative requires. It r also be that S. W. lacks awareness of the kind of narrative structure t is conventional for the type of answer he was called upon to give. extended discourse he did produce displays the unusual and idiosyncr view S. W. has of what is important and interesting: his idea of trave to visit and compare different hotels.

5. *Original story narratives.* Original story-telling should be most diffic for the person with autism, because it involves a great deal of choice with structuring limits. It requires a knowledge of cultural conventions for c tent and style, the ability to construct and coherently connect meaningf causally-related, but non-factual, events, the ability to organize these eve into a recognizable story (for example, there is a beginning, a middle, and end, not just a description), as well as a grasp of necessary language toc

As of the time of writing, we have not seen any examples of truly origi story-telling by autistic persons, i.e., specimens not elicited by pictures other props. However, problems similar to those we predict for origi stories are evident in the following spontaneous re-telling by T. B. (aged te during one of his individual therapy sessions. T. B. has a diagnosis Pervasive Developmental Disorder, and is very high-functioning (Full-sca IQ 128). T. B. has a large number of tapes of 'Tom and Jerry' cartoon which he watches for several hours every day. He has numbered each carto (a total of 250) and memorized the cartoon numbers and titles, and t content of each. The following narrative is from a session in which decided to share with his therapist some of his favourites. The therapis responses are in parentheses:

This one is called 'Flirty Birdy . . . Number 92, tape 3. This is where Tom tr to make a sandwich out of Jerry and this big bird tries to take it from Tom a then the only way Tom can get Jerry back from the bird . . . [laughs] . . . Do y know what happens then? [sounds excited]

(Tell me.)

Tom acts like Toots . . . That's how it ends [laughs].

(Who is Toots?)

Toots is the girl cat . . . but that doesn't mean Toots is in this one. Tom just acts like Toots . . . yeah . . . no, he acts like a girl bird.

(What does Tom do?)

I don't know . . . Tom doesn't eat Jerry. He just tries to help some baby birds. Tom does all the stuff for baby birds. [Begins to look upset.] That's the end of this one. I'll tell you about the next one now.

The opening of this narrative effectively introduces a topic, beginning with a title and a statement of the essential conflicts involved in the plot. However, the narrative breaks down when T.B. tries to explain how the conflicts are resolved. He first provides a resolution ('Tom acts like Toots . . . That's how it ends.') that is unclear to the listener, although it is completely satisfactory to him. When she questions him further, he elaborates but reveals some uncertainty in his own understanding of the events in the cartoon (did Tom behave like a female cat or a female bird?). It remains unclear, at that point, how the character's actions resolved the plot. When the listener asks for more information, T.B. becomes frustrated and changes the subject.

The following narrative is from the next therapy session with T.B. and the same therapist.

This is called 'Jerry's Diary' . . . Tape 3, number 105. This is where . . . this is first Tom tries to be mean to Jerry because Jerry came out of his mouse-hole . . . then he listened to the radio and said . . . the radio said to Be Nice To Animals week . . . and then Jerry, I mean Tom did a lot of stuff to Jerry. You'd think that he was being nice to Jerry and guess what . . . ?

(Tell me.)

Tom was reading Jerry's diary and all this funny stuff happened [laughs] . . .

(What kind of funny stuff?)

It had parts of a cartoon I haven't seen . . . I mean it's not on any of our tapes . . . Here are parts of 'Yankee Doodle Mouse', which is number 37. This also has parts of a cartoon called 'Serenade' . . . That's the one I have put on a separate tape . . .

(I see . . . tell me what happened.)

And then Jerry, no . . . Tom tries to give Jerry a pie so Jerry can eat it . . . he throws it in Jerry's face [laughs] . . . Yeah, that's how it ends. It is funny [laughs], isn't it?

This narrative also begins well, with an introduction of the title and topic. However, here the basic plot conflict is not clearly identified, although some events are mentioned. These events are strung together but are not linked into a coherent sequence that makes sense for the listener. Nevertheless, T.B. finds the story both interesting and amusing. At several

places he laughs and talks about how funny the story is. Even though he has not provided enough information for the listener to share the joke, he clearly expects her to find it as funny as he does. An ending event for the story is mentioned (Tom hits Jerry with a pie), but it is not explained how this might resolve the plot.

Both these narratives reflect problems similar to those observed in earlier examples, such as lack of organization and clarity, poor grammar, intrusions, and incoherence. These problems persist, even though the speaker in this case is both intellectually and linguistically far more able. This individual is well-acquainted with the idea of a *story* and with some of the conventional elements of the story: beginning, middle, and end. To some extent he succeeds in conveying these elements. However, in both narratives he displays a marked failure to anticipate the listener's needs for information. He also tends to describe events without conveying their relative importance or marking their relationships; something about what Bruner and Feldman (this volume, Chapter 13) call *the act of storytelling* seems to be missing. T.B.'s narratives also suggest that he may himself have an impoverished understanding of the content of the cartoons he is trying to describe; when asked to explain or elaborate, he does not really succeed. His explanations suggest he does not fully understand characters' thoughts or motivations; rather, he simply reports their actions. Further, T.B.'s interest in the Tom and Jerry cartoons assumes a larger significance for him, as part of an elaborate private fantasy system. Not only has he memorized each of the cartoons, he has made it clear that he expects the therapist to share his interest and understanding of them, and to have memorized them as well. This entirely unrealistic expectation appears symptomatic of a larger difficulty in appreciating how meaning is shared.

SUMMARY

On the basis of the foregoing analysis and the little evidence available, we can make some predictions about what future studies of narrative language in autism might find. Autistic narratives will reflect, first of all, disordered *language*, (see Tager-Flusberg, this volume, Chapter 7) such as difficulties in grammar, word-finding, and semantics, and a failure to use language tools such as cohesive devices to mark organization. They will also tend to differ in *content* from normal persons' narratives, including more bizarre, irrelevant, or inappropriate material that may reflect an idiosyncratic world-view. The narratives will also include pragmatic errors reflecting a poor understanding of the *listener's knowledge-state* (as for example when the speaker refers to things or persons unknown to the listener without giving adequate explanation) and of the *listener's affective state* (for example

inattention to gestural and facial feedback from the listener). Similarly, we expect them to reflect poor awareness of the *thoughts of characters* in the narrative, and poor understanding of *characters' affects and motivations*. Finally, we would expect the narratives of autistic people to reflect a poor appreciation of the *social and cultural context* in which narration is taking place (for example, failure to understand what makes a joke funny, or how fiction differs from non-fiction).

WHICH PROBLEMS ARE SPECIFIC TO AUTISM?

It is apparent that we would expect autistic persons' narratives to be deficient in several important areas: language itself, social/pragmatic constraints, awareness of the listener's needs, and understanding of the thoughts, feelings, and motivations of story characters, and of the social and cultural context of narration. It is tempting to conclude that these deficiencies reflect directly upon the central deficits of autism. However, some of these characteristics also show up in the narratives of school-aged children with language-learning disabilities (LD).

Although LD and non-disabled (ND) peers have similar ability to recall the order and structure of presented stories (see for example Weaver and Dickinson 1982; Loveland *et al.* 1990b), LD children do recall less information (Graybeal 1981; Hansen 1978; Loveland *et al.* 1990b), and they may have more trouble comprehending and drawing inferences from the stories (Oakhill 1984). Immature narrative styles in LD children have also been reported by several authors (for example Westby *et al.* 1984; Feagans and Short 1984; Liles 1985), who have found 'descriptive' rather than storytelling responses to pictures, reduced complexity, and poorer use of cohesive devices.

LD children asked to produce an original story also have difficulty. LD children's stories are reported to be similar to ND peers' stories in terms of story grammar characteristics, but less informative about characters and settings (Roth 1986). They are also less explicit about the middle part of the story, in which the character(s) attempt to respond to the central conflict of the story, suggesting that LD students are poorer at determining what the listener must know in order to understand the story.

LD children may also have trouble identifying and portraying the feelings and motivations of characters in a story. Westby (1985) argued that some LD children, particularly younger ones, have difficulty understanding feelings, and that somewhat older LD children have trouble understanding how feelings arise as a result of events. Similarly, other investigators have found that LD children are less able to interpret accurately the emotions and gestures of others (Bryan 1978; Gerber and Zinkgraf 1982; Saloner

and Gettinger 1985; Vogel 1974, 1975). In some cases, difficulty interpreting affect may be related to specific patterns of underlying neuropsychological deficiency (Ozols and Rourke 1985; Loveland *et al.* 1990b), such as that associated with Arithmetic Disability.

LD children seem to be poorer communicators than ND peers when narrating a story or teaching, not only on the linguistic level (i.e. within the narrative itself), but also from the standpoint of social awareness. Feagans (1982) found that when an adult listener pretended not to understand the child's re-telling of a story, LD subjects were less able to rephrase the information for the listener. Feagans and Short (1986) had similar findings in a referential communication task. Other authors have found LD children to be poorer at providing and revising information for a listener in conversation as well (Bryan and Pflaum 1978; Donahue *et al.* 1980; Noel 1980; Spekman 1981).

Taken together, these findings suggest that people with autism are not alone in having difficulty with aspects of narratives such as effective use of language, understanding and portraying characters' affect and motivations, and awareness of the listener's needs. One conclusion to be drawn from this evidence is that difficulty understanding other persons, at least as it affects communication, does not appear to be limited to autism. In fact, this narrative deficiency may simply reflect developmental delays, since young children and mentally retarded persons are reported to have most of the same difficulties understanding others. Thus, although some aspects of the narrative deficiencies found in autism are consistent with the theory of mind explanation, they are not particularly supportive of the idea that deficits in understanding other persons are unique or central to autism.

Are there any characteristics of narrative language that *are* specific to autism? The little evidence that is available does not permit firm conclusions; however, we can suggest some directions that may be fruitful for further investigation.

It could be that autistic narrative deficits in understanding others are limited to difficulty understanding the cognitions of characters or listeners, as opposed to a broader difficulty understanding all internal states, including feelings, motives, and perceptions. This position has been argued by exponents of the metarepresentation model (Baron-Cohen *et al.* 1986; Baron-Cohen, this volume, Chapter 4). Studies of narrative language in LD and other developmentally disabled children have not focused on understanding cognitions *per se*, and thus we do not know whether this difficulty is present in those groups. On the other hand, there is not yet sufficient evidence to show that the deficiency shown by autistic persons is so narrowly circumscribed. Further research is needed to explore the boundaries between the understanding of cognitions and the understandings

of other states, such as affective states, by autistic persons. It may be that these areas of understanding are not sharply divided, either in narrative performance or in development (Loveland 1991).

There are also aspects of autistic narratives that seem to require an explanation that goes beyond a failure of interpersonal understanding. There is reason to think that autistic persons do not fully share in the social and cultural context in which narration ordinarily takes place (see Bruner and Feldman, this volume, Chapter 13). As the examples of narrative language given in this chapter illustrate, autistic people tend to assign unusual and idiosyncratic meanings not only to words, but also to objects, persons, and events. In some cases, the very notion of a story, or of characters in a story, seems to be lost (Loveland *et al.* 1990a). These aspects of narrative language in autism reflect an apparent failure of acculturation, and perhaps also an incomplete appreciation of what might be called the 'human point of view'.

Loveland (1991) proposed an ecological approach to the development of autistic people using the notion of *social affordances* (Gibson 1986 [1979]; Reed 1988; McArthur and Baron 1983; Good *et al.* 1989). She suggested that autistic people are deficient in the ability to perceive the functional meaning (affordances) of those aspects of their environment that involve social and cultural information. Early failure of attunement to such meaningful aspects of the world as others' facial expressions may form a basis for later failure to share cultural attitudes and expectations. Thus, for example, the failure of some autistic people to grasp conventional aspects of the narrative, such as story form, the pragmatics of storytelling, or even the notion of 'story' may be an outgrowth of a more basic difficulty in grasping the meaning of non-linguistic human events that are normally a part of the infant's awareness of the social world. Looking at the relationship of narrativity to acculturation from a slightly different point of view, Bruner and Feldman (this volume, Chapter 13) argue not only that autistic narratives reflect a lack of acculturation, but that the failure of narrative modes of thinking in autistic people contributes to a more general failure to understand the world in conventionalized ways. It may therefore be that there is ordinarily a reciprocity between acculturation and narrative language, such that each normally supports the other in development; in the case of autism, this reciprocity is impaired, contributing to deficiencies in both areas.

The study of narratives in autism is very new. What little evidence we have suggests that autistic narratives are deficient on many levels, and that these deficiencies are potentially consistent with a number of different explanations. It is clear that not only the structure and content of narratives, but also their social and cultural context should receive more attention in future research.

Acknowledgement

This work was supported in part by grant number DC 00357-06 to the authors from NIDCD.

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Theories of mind and the problem of autism

JEROME BRUNER AND CAROL FELDMAN

This chapter is intended to fulfil three objectives. The first is to look critical at some current views about the 'theory of mind' upon which we base our judgements and appraisals of intentional states in others. This critical look focuses particularly upon how cultural and social factors may shape the way in which human beings experience and represent the intentional states of others, and indeed of themselves—people's beliefs, desires, intentions, and the like. This part of the paper is principally the responsibility of the first author. The second part of the chapter, for which the second author is principally responsible, deals specifically with what it is that might conceivably produce that form of deficit that is seen in autistic children—their impaired ability to carry on ordinary social interactions, particularly in conversation. It will be plain later, however, that such a deficit cannot easily be attributed to this alleged inability to appreciate mental states in others or for that matter, in themselves. We shall take the position in the third and final section, for which both authors are jointly responsible, that at least part of the deficit derives from the inability or unwillingness of autistic children—high- and low-level alike—to be able to represent culturally canonical forms of human action and interaction by the vehicle of narrative encoding.

KNOWING ANOTHER MIND

What do we mean when we say that 'somebody shows signs of believing that a person or thing in their world is acting under the influence of an intentional state.'* Let me take some controversial examples first. I begin with some old experiments by Scaife and Bruner (1975) and by Butterworth and Castille

* I am forswearing the ways of the 'intentional stance' proposed in Dan Dennett's book of that name. When people 'believe' that others are deliberately withholding information from them, they do not think of it 'as if' it were so. And while a sceptical philosopher might find it amusing to do so, I am not in the least impelled that way. People *have* notions about other minds, and sometimes risk their lives over them. I would like to repay them in kind by seriously acknowledging that fact.

The theory of mind deficit in autism: some questions for teaching and diagnosis

SIMON BARON-COHEN AND PATRICIA HOWLIN

In his scholarly review of the psychological literature on autism, Rutter (1983) included an account of his own clinical experiences with adults with autism. He wrote:

Several [adults with autism] have commented that they are distressed by their inability to understand what other people are thinking or feeling. One young man who has attended the clinic for a quarter of a century since he was first referred as a non-responsive non-speaking child put it most vividly when he came back a few years ago asking for help with his difficulties. He complained that he 'couldn't mind-read'. He went on to explain that other people seemed to have a special sense by which they could read other people's thoughts and could anticipate their responses and feelings; he knew this because they managed to avoid upsetting people whereas he was always putting his foot in it, not realizing that he was doing or saying the wrong thing until after the other person became angry or upset. (p. 526).

This account, by coincidence, picks up on the key impairment upon which this volume focuses: the theory of mind deficit, as it has since come to be known (see Baron-Cohen, this volume, Chapter 4 for a summary of the experimental findings relevant to this). Rutter's use of clinical description is, we think, a useful starting-point for setting this deficit into its everyday context. In this chapter, we begin by describing a set of examples drawn from our own clinical experience, so as to elaborate on Rutter's single case. We do this in order to delineate the wide-ranging expression of the theory of mind deficit. This also stands as a backdrop against which to ask clinically relevant questions: First, what are the implications of the research on autistic children's theory of mind for teaching? In particular, can mental-state concepts be taught? If so, how would this affect the broad range of deficits listed in the clinical examples below? Secondly, could this research have any application for the diagnosis of autism, both in infancy and later?

THE THEORY OF MIND DEFICIT IN AUTISM: EXAMPLES FROM CLINICAL EXPERIENCE

In the following examples, our clinical anecdotes are presented under various categories of 'theory of mind' error. These have been taken from case referred to the second author at the Maudsley Hospital.

1. *Insensitivity to other people's feelings*

Frederick is a twelve-year-old boy with autism. His parents were desperately anxious that he should be assimilated into his local secondary school, and were horrified to hear that in the first week he had approached the head teacher in Assembly and commented on how many spots he had on his face.

2. *Inability to take into account what other people know*

Jeffrey, an extremely able young man with autism who holds a responsible position in a computing company, is unable to appreciate that if he has witnessed an event, this knowledge may not be shared by others. He seems unable to comprehend that his experience is different to theirs, often referring to events without providing the essential background information necessary for his colleagues to understand what he is talking about.

3. *Inability to read intentions*

Samantha, a ten-year-old girl with autism attending a mainstream school, was deliberately teased by the children there, and frequently they would tell her to perform some unacceptable act, such as taking her clothes off in the playground. She was quite bewildered by the laughter that ensued (and the scolding by the teacher), believing that her compliance would result in them becoming 'her friend'.

4. *Inability to read the listener's level of interest in one's speech*

Robert, a twelve-year-old boy, also attending mainstream school, constantly irritated peers and teachers alike by his 'boring' monologues on the cubic capacity of Renault cars, structural details of the Severn Bridge, or albinism. He would discuss just these three topics at length with anyone, and was quite unable to recognize that his enthusiasm for these arcane topics was in no way shared.

5. *Inability to anticipate what others might think of one's actions*

Joseph, although having done very well in many areas of his development, obtaining a university degree and various diplomas in computing, continued to have problems understanding what others might think of his actions. In particular, he had no sense of personal space, and would also tend to ask very intimate questions. Difficulties arose shortly after he started a job with a computer firm. He still showed no sense of personal space, and would hover over the desks of female employees or lean up against them in lifts or queues, etc. After some weeks of this the secretarial staff demanded his dismissal on the grounds of 'sexual harassment'.

6. *Inability to understand misunderstandings*

Michael, a young man with autism, was dismissed from his job after an incident in which he had attacked the cloakroom attendant. He showed absolutely no remorse for this, having hit her with his umbrella 'because she gave me the wrong ticket'. Being in the habit of doing everything meticulously himself, he simply could not understand that others might make mistakes. Long afterwards he still expressed bewilderment that he had lost his job whereas, by rights, he was convinced the cloakroom attendant should have lost hers.

7. *Inability to deceive or understand deception*

John, a twenty-five-year-old man with autism, had a job working in a jeweller's. Because his boss knew that he was absolutely honest and that he could be safely trusted with large quantities of money or valuables, he had access to the keys of the safe. However, his failure to understand deception left him open to exploitation by others, and a new night-watchman took advantage of the situation. Being asked casually for the keys one night John readily handed these over, and when the night-watchman, the keys, and the contents of the safe had disappeared, he was charged with being an accessory to the robbery. Although these charges were dropped, he could clearly no longer be employed in such a position of trust again.

8. *Inability to understand the motives behind people's actions*

David, a twenty-year-old man with autism and of normal intelligence, but with considerable social difficulties, was offered employment by his uncle. Taking into account David's particular pattern of social behaviour the uncle had, sensibly, found a niche for David in a quiet corner of the accounts office. Rather than being grateful for his uncle's efforts, David was outraged to learn that he had not instantly been made a managing director of the company. He walked out of the job after only a few days, and thereafter harboured intense resentment against the one person who had tried so hard to help him.

These instances of different theory of mind errors by no means exhaust the kinds of problems caused by a dysfunction in the development of a theory of mind, but they are sufficient to convey how people with autism often just 'miss the point' of another person's action or speech. What are the clinical implications of this deficit? In the next section, we consider this question with regard to the teaching of social understanding.

TEACHING SOCIAL UNDERSTANDING

We begin this section by reviewing existing methods for teaching social and communication skills in autism, and consider what they achieve. We then outline a new study that is under way, which adopts an approach to social-skills teaching aimed at facilitating the acquisition of mental-state concepts.

Social and communication skills teaching

A variety of approaches to social and communication skills teaching have been applied to autism. Most of these go under the heading of 'training' or 'teaching', as it avoids the implication of simply building 'circus tricks'. In addition, teaching carries the implication of education, that is, changing the child's understanding and way of thinking, and not just changing behaviour. In reviewing existing teaching methods, therefore, we also consider how far each of these does indeed change understanding, not just behaviour.

Existing teaching methods include traditional behavioural techniques, such as advising caregivers, problem-solving, and role-playing techniques, group teaching, and the involvement of normal peers and siblings (see Schopler, Mesibov 1986; Groden and Cautela 1988; and Gaylord-Ross 1989). The approaches are summarized here:

i. Behavioural approaches

These employ techniques such as prompting, modelling, or shaping, together with differential reinforcement, to improve social and communication skills. They may concentrate on the teaching and development of socially appropriate behaviours, such as initiating or maintaining conversation, increasing eye-contact, gesture, and facial expressiveness (Brady *et al.* 1981; Matson *et al.* 1988; Fantusso *et al.* 1989). Other programmes have focused on the removal of socially unacceptable behaviours by teaching basic rules (for example, not taking off clothing in public, not talking to strangers, using inappropriate speech, etc). Teaching relaxation and self-control techniques, such as anger-management, has also been used to reduce difficulties resulting from confusion or anxiety in social situations (Favell 1983; Howlin and Rutter 1987).

ii. Advising caregivers

An alternative way of reducing the effects of the social deficit has been to educate caregivers about the specific ways in which autism affects social behaviour and development, and to advise them on methods of minimizing the problems that inevitably arise. The formulation of simple but explicit contracts with the person with autism, together with detailed timetables for work schedules, is used to ensure that basic rules are implemented and complied with and that tasks are completed within a set time or to a specified standard. Support of this kind seems particularly valuable when the goal is to maintain a person with autism in their school or job, when their social behaviour might otherwise have given rise to dismissal. It also provides important support for other members of the family (Howlin 1989).

iii. Role-play and problem-solving techniques

Role-play and drama techniques are sometimes used to teach new social skills (Dewey *et al.* 1988) or as a means of modelling and rehearsing strategies for dealing with difficulties (for example, teaching individuals with autism how to initiate and maintain conversations, or how to cope with teasing or anxiety, etc.). Video replay has also been used to provide feedback of, and attempt to reduce, abnormal behaviours such as inappropriate eye-gaze, facial grimacing, etc., which may cause other family members embarrassment, and affect social acceptance (Howlin and Rutter 1987). Because generalization to non-rehearsed situations is often limited, the teaching of more general problem-solving strategies is also used (Fagan *et al.* 1985; Plenis *et al.* 1987; Park and Gaylord-Ross 1989).

iv. Group treatments

The majority of studies of social-skills training of children with autism have been single-case investigations. Others, although involving larger groups, have provided only minimal data on the efficacy of treatment. Recently Williams (1989) used the social-skills training package developed by Spence (1980) with a group of ten children with autism. Three types of strategies were used (recreational games, role-play exercises, and modelling), with the emphasis being, on the development of effective social tactics rather than the learning of specific rules. This kind of programme represents an alternative to more rigid behavioural techniques.

v. The involvement of normal peers

A number of studies have explored the use of normal peers as 'social therapists' for children with autism (Strain *et al.* 1979; Brady *et al.* 1987). Most have focused on specific behaviours, such as the frequency of initiations, rather than on wider aspects of social interaction. Such approaches struggle with the difficulty of maintaining the enthusiasm of the normal children (Lord 1984), and with the difficulty of generalizing any changes to untrained peers (Breen *et al.* 1985). Schuler (1989) suggests that greater attention to the types of play activity involved may overcome some of these problems, by using more naturalistic interactions, and Lord's work confirms this.

What do such teaching techniques achieve?

Small sample-sizes and inadequate outcome measures have made it difficult to reach firm conclusions about the relative merits of these different procedures. The most common assessments used are *frequency* measures, focusing on decreases in perseverative or other inappropriate behaviours (Taras *et al.* 1988), increases in numbers of social interactions (Brady *et al.* 1987), or counts of specific behaviours such as smiles, eye-contacts, or utterances

(Fantusso *et al.* 1989; Matson *et al.* 1988). What has not been assessed is the pragmatic use of language and gesture (Howlin 1986).

Although there are a few programmes offering wider-ranging suggestions for developing social awareness and interactional skills (Mesibov 1984; Frankel *et al.* 1987), these tend to lack objective outcome assessments. Williams' (1989) group study, mentioned earlier, is an exception to this, but relies on 'non-blind' teacher-evaluations that may affect the reliability of results. The potential of group-training studies remains to be fully explored, but doubts have been raised, for example, about whether a group exclusively comprising individuals with autism can be effective in increasing social skills when the group as a whole is so handicapped. The involvement of normal peers in structured but naturalistic settings may offer greater promise (Lord 1984; Schuler 1989).

It is clear that in order to evaluate the effectiveness of current treatment procedures, more socially valid, objective measures of outcome are needed. Nevertheless, despite these provisos, many studies do indicate that it is possible to increase specific behaviours, such as eye-contact or frequency of social interactions, using behavioural procedures. These are not insignificant achievements, as they help individuals to *appear* more 'normal', and this may affect how other people react to them. However, no studies have investigated if, when these specific behaviours 'improve', there is also an associated improvement in social *understanding*.

The outcome from verbal communication programmes suggests a similar picture to that emerging from studies of social interaction (Howlin 1989). That is, there has been moderate success in reducing inappropriate speech, increasing spontaneous utterances, building up vocabulary, and improving syntax, but no demonstrable improvements in the individual's understanding of what lies *behind* the other person's speech: the intended *meaning*. Given that problems in social understanding seem so central to autism, it is surprising that this has rarely been a major focus of either intervention or assessment in social and communication-skills training for this population.

Since cognition guides behaviour, it is of interest to ask whether teaching key aspects of social cognition is possible, and if so, whether such teaching affects social behaviour. In the next section, we describe an ongoing study which attempts to teach mental-state concepts to children with autism (Hadwin, Baron-Cohen, Howlin, and Hill, in preparation). Whilst results are not yet available, we outline the framework we are using, in order to open discussion into these educational questions.

Can a theory of mind be taught?

Normal children do not seem to require explicit teaching in order to acquire a theory of mind. Indeed, they seem to develop this understanding irrespective of the particular form of parenting they receive (Avis and Harris 1991).

Whiten's (this volume, Chapter 17) thought-experiment into whether 'wild' children would develop a theory of mind pursues the same idea. However, it may be that a theory of mind can be explicitly taught to children who have failed to acquire it naturally. Such teaching might provide an alternative route into mentalistic understanding.

Consider the analogy with blind children learning to read: Braille gives an alternative way into the problem of learning to read written words. We are interested in whether there might be an alternative way into the problem of learning to 'read' minds. Clearly, this analogy is imperfect in at least one key respect: blind children have a sensory impairment, and also show some abnormalities in their language development, but there is no central cognitive deficit in their 'word recognition system'. Braille circumvents the sensory deficit, and since the necessary cognitive mechanisms for reading are not dependent on vision *per se*, reading can be achieved. In contrast, children with autism are postulated to have no sensory impairment, but to have a central cognitive deficit in their theory of mind. The task, then, in trying to teach them to employ a theory of mind, may be considerably harder than teaching a blind child to read, since changing understanding is involved.

The central questions our study is attempting to address are:

1. Can mental-state concepts be taught and, if so, which techniques facilitate this, how much teaching is necessary, and how long will such learning persist?
2. Are some mental-state concepts (for example, pretence, or desire) easier for children with autism to learn than others (for example, knowledge, and belief)? If so, are mental-state concepts only acquired in a strict sequence? That is, does acquisition of one concept (for example, pretence) *always* precede acquisition of another (for example, belief)? If so, is this because one is necessary for the other?
3. If mental-state concepts are acquired during understanding of particular examples of behaviour, do these generalize to allow the child to understand novel examples of behaviour? If so, are mental-state concepts that are acquired through explicit teaching used in the same way as those acquired more naturally?
4. Does acquisition of mental-state concepts lead to change in the child's own social and communicative behaviour, and, if so, which aspects of behaviour change?
5. Which factors might account for some children with autism acquiring mental-state concepts, and some not?
6. Finally, does teaching mental-state concepts have any incidental effects on the acquisition of concepts or reasoning?

One approach: teaching underlying principles governing mental states

Our study attempts to analyse mental-state understanding into simple *principles*, and then considers if these principles can be taught through intensive training with many examples, using a variety of media. This approach makes the assumption that mental-state understanding can indeed be reduced to simple principles. For a normal child, these principles do not appear to be explicitly taught, and they may not even be explicitly represented; but the good performance on tests of mental state comprehension provides evidence that they understand such principles (Wellman 1990). For children with autism, since they do not seem to acquire them naturally, such principles may need to be made explicit.

Examples of such principles for some fundamental mental states (know, desire, and pretend) are given here:

1. *Perception causes knowledge. A person will know x only if s/he saw or heard about x.* (Example: Snow White doesn't know the apple is poisoned because she didn't see the woman the poison into it.)
2. *Desires are satisfied by actions or objects. If a person wants x, s/he will look for or obtain x. Conversely, if a person doesn't want x, s/he will refuse or avoid x.* (Example: Hansel and Gretel want their father, so they look for him. They don't want the witch to catch them, so they run away when she comes.)
3. *Pretence involves object-substitution or outcome-suspension. When a person pretends x, s/he does x without the usual objects or consequences, just for fun.* (Example: Alan holds a banana to his ear. He is pretending to talk on the telephone.)

These are just some of the principles that govern different mental states. Others can be easily articulated by examining our own 'common-sense' folk psychology. Wellman (1990) gives a good survey of these. Such principles can be developed into more complex forms (for example, when you deceive someone *you make them think something false*; or, when you want something, you don't *always* try to obtain it *directly*.) We assume that a first attempt at teaching a theory of mind to children with autism should begin by teaching the principles in their *simplest* form, in as concrete a manner as possible, using a large number of examples, with the aim that each principle is learnt and generalizes to new instances. The examples sketched above give an idea of the form such simple principles might take.

In our study, we focus on teaching a range of mental states in this way, including belief, desire, knowledge, pretence, deception, and emotion. The principles governing each mental state are taught using a range of techniques, including doll-play, drama, language, pictures, and even computer-graphics,

following Swettenham (1992), in order to maximize the possibility of one of these media being motivating for any given child. Only children with autism whose verbal mental age is above three- and-a-half years of age are being given this intensive tuition, as most of the techniques are derived from the developmental literature from normal three-year to four-year-olds. We are therefore not attempting to answer the question of whether mental-state concepts can be taught to children with a verbal mental age lower than this.

Aside from the questions listed earlier, we are also particularly interested to see if acquisition of a principle acts as a cornerstone in the construction of a *theory of mind*—that is, do mental-state concepts, if they are acquired, take on theory-like properties for the child, as Wellman (1990) has argued occurs with normal children? Some initial studies (Armstrong and Whiten 1991; Starr 1992; Stromm 1991; Swettenham 1992) suggest that, at least when the mental-state concept of belief is taught to children with autism, some progress is seen, although these studies are insufficient to answer many of the interesting questions outlined earlier. Similar studies with normal children suggest too that such teaching can lead to acquisition of the concepts of belief and knowledge at earlier ages than is usually seen (Taylor 1988; Swettenham 1992). Our own study involves the teaching of a range of different mental-state concepts. Those interested in further details of this study, and its results, should contact the authors directly.

THE THEORY OF MIND DEFICIT: IMPLICATIONS FOR DIAGNOSIS

The second area of clinical relevance we consider is to what extent the experimental work in autism and theory of mind may aid diagnosis. In addition, we consider how it may inform theories about precursors to theory of mind development.

Current diagnostic techniques are based exclusively on the presence or absence of *behavioural* criteria. DSM-III-R (1987) criteria, for example, specify precisely the numbers of items that must be present before the diagnosis of autism can be made. Thus, a total of at least 8 out of 16 symptoms must be identified, 2 or more of which must relate to social impairments, 1 or more to communication deficits, and 1 or more to the presence of obsessional or ritualistic behaviours. While this reliance on behavioural criteria has produced clearer operational rules for diagnosis (Rutter and Schopler 1987), it nevertheless raises a number of problems. For example, although it is relatively easy to identify delays or 'absences', it is much more difficult to judge when a behaviour is *qualitatively* abnormal. And since behaviours can resemble each other while having entirely

different cognitive bases, it also means that diagnostic systems that are exclusively behavioural in nature risk confusing apparently similar conditions.

It may be that these and other related problems could in part be overcome by using cognitive tests in conjunction with behavioural tests in diagnosis. Consider, for example, a child who is socially unresponsive. If we could determine the reason for the social unresponsiveness (is it due to anxiety, prosopagnosia, or an impaired theory of mind, etc.), this might add diagnostic precision. Performance on a series of false-belief and other neuropsychological tests could be useful in this way (Prior and Hammond 1990; Ozonoff *et al.* 1991). It should be emphasized, however, that this is present only a suggestion; at the time of writing no studies have attempted to include such specific cognitive (or neuropsychological) tests in psychiatric diagnosis. Nor have there been any studies on the sensitivity and specificity of theory of mind tests with different clinical populations, and these are much needed.

Of course, false-belief tests can only be used meaningfully with children whose mental age is above four years of age (Wimmer and Perner 1983; Baron-Cohen 1990). This does not rule out their diagnostic potential, but it reminds us that their role will be confined to relatively 'late' diagnosis. Since one aim of diagnosis should also be to improve early detection of disorders, it is of interest to consider if *precursors* of theory of mind deficits in infancy can also be used in early detection. In the next section we describe a recent attempt at this.

The use of 'theory of mind precursors' in detecting autism in infancy

Recent work has suggested that two possible precursors to the theory of mind deficit in autism are pretend-play impairments, and joint-attention deficits (see Leslie 1987; Baron-Cohen 1991; and see Chapters 4, 5, 9, and 18, this volume). In the case of pretend-play, this is identified as distinct from *functional* play, which is not specifically impaired in autism (Ungere and Sigman 1981; Baron-Cohen 1987). In the case of joint-attention behaviours, these include gaze-monitoring, 'showing' gestures, and pointing (Sigman *et al.* 1986; Mundy *et al.*, this volume, Chapter 9.) One specific type of pointing, *protodeclarative* pointing, seems particularly impaired in autism, while *protoimperative* pointing is not (Baron-Cohen 1989).

Two important questions are: (a) Are pretend-play and protodeclarative pointing really precursors to a theory of mind? How can such claims about precursor status be tested? and (b) If such precursors do predict development of a theory of mind, do they also predict cases of autism? Baron-Cohen *et al.* (in press) investigated the second of these questions by employing a new instrument, the *Checklist for Autism in Toddlers (CHAT)*, shown in Fig. 21.1. This was administered by General Practitioners or Health Visitors

THE CHAT		(Medical Research Council Project)
To be used by GPs or Health Visitors during the 18-month developmental check-up.		
Child's name:	Date of birth:	Age:
Child's address:		
SECTION A: ASK PARENT:		
1. Does your child enjoy being swung, bounced on your knee, etc.?	YES	NO
2. Does your child take an interest in other children?	YES	NO
3. Does your child like climbing on things, such as up stairs?	YES	NO
4. Does your child enjoy playing peck-a-boo/hide and seek?	YES	NO
5. Does your child ever PRETEND, for example, to make a cup of tea using a toy cup and teapot, or pretend other things?	YES	NO
6. Does your child ever use his/her index finger to point, to ASK for something?	YES	NO
7. Does your child ever use his/her index finger to point, to indicate INTEREST in something?	YES	NO
8. Can your child play properly with small toys (e.g.: cars or bricks) without just mouthing, fiddling, or dropping them?	YES	NO
9. Does your child ever bring objects to you (parent), to SHOW you something?	YES	NO
SECTION B: GP or HV OBSERVATION:		
i. During the appointment, has the child made eye-contact with you?	YES	NO
ii. Get child's attention, then point across the room at an interesting object and say 'Oh look! There's a (name a toy)! Watch child's face. Does the child look across to see what you are pointing at?	YES ¹	NO
iii. Get the child's attention, then give child a miniature toy cup and teapot and say 'Can you make a cup of tea?' Does the child pretend to pour out tea, drink it, etc.?	YES ²	NO
iv. Say to the child 'Where's the light?' or 'Show me the light.' Does the child POINT with his/her index finger at the light?	YES ³	NO
v. Can the child build a tower of bricks? (If so, how many?) (Number of bricks:)	YES	NO
¹ (To record YES on this item, ensure the child has not simply looked at your hand, but has actually looked at the object you are pointing at.) ² (If you can elicit an example of pretending in some other game, score a YES on this item.) ³ (Repeat this with 'Where's the teddy?' or some other unreachable object, if child does not understand the word 'light'. To record YES on this item, the child must have looked up at your face around the time of pointing.)		

Figure 21.1. The Checklist for Autism in Toddlers (CHAT). Reproduced from Baron-Cohen *et al.* (in press) with permission.

during the routine 18-month-old developmental check-up (taking about 20 minutes to complete).

As can be seen, this schedule checks for the presence of pretend-play and joint-attention behaviours, among other things. This study found that, while some of a group of randomly selected toddlers at 18 months ($n = 50$, age 17–21 months) still lacked protodeclarative pointing, and some lacked pretend-play, none lacked both. In this study, a group of siblings of already diagnosed children with autism ($n = 41$, age 18–21 months) were also screened with the CHAT, on the assumption that 2–3 per cent of them would, for genetic reasons, themselves develop autism (Folstein and Rutter 1988). The key point of interest is that four children in this *high-risk* group lacked both pretend-play and joint-attention at eighteen months, and these went on to receive a diagnosis of autism at the age of thirty months. Overall, of the 91 toddlers screened, the other 87 were free of any psychiatric problems at thirty months, and none of these 87 cases had failed on both pretend-play and joint-attention at eighteen months.

These findings offer support for the claims that pretence and joint-attention may be useful in the early detection of autism. A larger, epidemiological study is now under way (screening 20 000 eighteen-month-olds in the south-east of England) to evaluate the diagnostic and predictive power of these behaviours (Baron-Cohen, Swettenham, Cox, Baird, Drew, and Charman, in preparation.) Of critical importance is the fact that this larger study is also *longitudinal*—those infants at eighteen months who fail the CHAT will be followed up at the age of four to five, to determine if these behaviours do stand as precursors in the development of a theory of mind. Such a prospective, longitudinal design is essential in testing precursor relationships (Bradley and Bryant 1983).

CONCLUSIONS

The theory of mind hypothesis has been used as an explanatory tool for understanding fundamental cognitive deficits in autism. The present chapter explores some issues of clinical relevance from this work. In particular, it considers questions about whether mental-state concepts can be taught, the effects of such teaching, the role of such cognitive tests in diagnosis, and the investigation of early precursors of theory of mind deficit. Such clinical research is really still in its infancy; but we hope that this chapter may stimulate further research into these questions.

Acknowledgements

The authors were supported during the writing of this work by grants from the Bethlem-Maudsley Research Fund and the Mental Health Foundation.

In addition, the first author was supported by a grant from the Medical Research Council. We are grateful to Cathy Lord, Donald Cohen and Julie Hadwin for their comments on an earlier version of this chapter.

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Thinking and relationships: mind and brain (some reflections on theory of mind and autism)

MICHAEL RUTTER AND ANTHONY BAILEY

In 1985, Baron-Cohen, Leslie, and Frith reported evidence that autistic children lacked the ability to appreciate that other people's beliefs might differ from their own, and went on to argue that a theory of mind deficit might constitute the core of autism. Since their seminal paper, there has been a veritable explosion of research testing this hypothesis, the key findings of which are summarized in this volume. In many respects, one of the most notable features of the way in which the idea caught the imagination of a huge number of researchers is the extraordinary breadth of the field in which it excited immense interest. As this volume illustrates, the subject has attracted the attention of developmentalists quite as much as psychopathologists, and of social as well as cognitive investigators. It is no exaggeration to claim that theory of mind research has become almost an industry in its own right, with a resulting flow of books on the topic, as well as a flood of scientific papers. Why did the theory of mind hypothesis create such a stir, and what is its significance for the understanding of the nature of autism and of normal social development?

The reasons are not difficult to find. To begin with, autism is a psychiatric disorder with a wide range of symptomatology, and here was a suggestion that all of this might be explicable in terms of a single narrowly defined psychological process, albeit one with widely pervasive effects. For obvious reasons, the possibility of a simple explanation for all the complexity of autism had to be exciting. A particular attraction of the hypothesis was that it carried the promise that it might make sense of the *combination* of social and cognitive deficits in autism. Autism had been defined in terms of its distinctive and peculiar pattern of social impairment (Kanner 1943), and yet both psychological and clinical studies had emphasized the importance of cognitive deficits and abnormalities (Hermelin and O'Connor 1970; Rutter 1979). The theory of mind hypothesis was important because it claimed to account for the social abnormality in terms of a cognitive deficit.

These first two reasons perhaps explain why clinical investigators were so