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SOCIAL ENGAGEMENT IN PRESCHOOL CHILDREN WITH AUTISM

Dawn Wimpory

PhD

1995

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Summary

The nature of social engagement deficits in children with autism were explored through a series of linked studies. Guiding questions were as follows: i) Are the social deficits present in infancy?, ii) What strategies of adult-child communication facilitate social engagement in preschoolers? and iii) What are the long term effects of musically enhancing these strategies?

To address the first question, an interview schedule (the Detection of Autism by Infant Sociability Interview, DAISI) was developed. It was retrospectively employed with parents of children with autism, and parents of learning disabled children without autism as a control group. This revealed social engagement deficits in eye-contact, gestural body-language and interactive babbling, before 24 months. None of these was attributable to learning disability.

A subsequent study searched for clinical equivalents of the "scaffolding" role played by parents enhancing their normal infants' social and communicative performance. Videorecorded observations of clinicians and preschoolers with autism during one-to-one play-based assessments were analysed using an observation schedule developed for this study:- Coding of Active Sociability in Preschoolers with Autism (CASPA). This revealed relationships between clinical strategies and episodes of social engagement which confirmed and extended previous research. Facilitative strategies included musical-motoric activities together with self-repetitive communicative turns and/or turns that followed the child's focus of attention.

Single case studies were then employed to evaluate clinical interventions (Musical Interaction Therapy) based around the facilitators of social engagement identified by CASPA. Onset of therapy was followed by improvements in social engagement related skills which were sustained for over a year after therapy. The emergence of child acts of teasing and pretend play during and following the period of Musical Interaction Therapy extended beyond the empirical findings of previous interventions. Theories of development in autism were discussed in the light of data from these studies.

CONTENTS

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Chapter One

SOCIAL ENGAGEMENT IN PRESCHOOL CHILDREN WITH AUTISM

Introduction to the Thesis

As indicated in the title, the thesis' focus is on early social engagement in autism. The aim is to determine the evidence for early social deficits and immediate and longer term facilitators of sociability. The underlying rationale is to study naturally occurring social engagement rather than communicative skills (which may be more sophisticated and may have been trained). The literature review and studies which follow are therefore selectively limited to relevant aspects of social engagement. They do not extend beyond to more sophisticated aspects of (preverbal) communication, such as pragmatics, nor to more general aspects of autism. The methodologies employed reflect the intended orientation towards genuine social engagement by the use of naturalistic observations rather than experimental tasks (as advocated by Dunn, 1991 and Lord, 1991).

This chapter conveys the clinical picture of autism using diagnostic criteria supplemented by a case-study of one of the participants in the subsequent studies, a typical preschool child with autism. It also introduces the assessment tools used within the thesis. This introduction is followed by an outline of the development of social engagement in preschoolers with and without autism, with special reference to reciprocity. The individual subjects with autism, control subjects and methodological approaches of the thesis are then outlined in Chapter Two. A series of studies on social engagement in preschool children with autism follows (Chapters Three to Seven).

The empirical work of the thesis comprises a series of linked studies, each employing between one and ten of a cohort of eleven preschoolers with autism. Chapter Three introduces a retrospective parental interview developed for investigating social engagement in infancy, the Detection of Autism by Infant Sociability Interview (DAISI). This explores the nature of social engagement difficulties during infancy by focusing on ten subjects with autism and ten without autism but with learning difficulty.

Chapter Four reviews previous observation instruments for the assessment of interactive aspects of social engagement with preschoolers who have autism. This chapter also introduces a schedule for Coding of Active Sociability in Preschoolers with Autism (CASPA) which was developed for empirical work in Chapter Five. CASPA is employed in Chapter Five to identify contexts and adult strategies facilitative of social engagement with subjects with autism (N = 10). The effects of live music support on maternal use of a therapy incorporating these strategies are then established using two single case studies of preschoolers with autism (in Chapters Six, Seven and Eight).

One of the Musical Interaction Therapy studies includes two year follow-up measures and has recently been accepted for publication by the Journal of Autism and Developmental Disorders (Wimpory, Chadwick & Nash, in press; see Appendix IX). Chapter Nine reviews and integrates all the studies of the thesis in the light of previous evidence and theory.

An Introduction to Autism including Diagnostic Criteria

As indicated by the diagnostic criteria that follow, autism is a neurodevelopmental disorder (Golden, 1987) where cognitive, social and communicative difficulties are manifest. The autistic spectrum ranges from mild to severe manifestations (Wing, 1981). Individuals throughout the intelligence range may be affected; at least 75% have additional learning disability (Bryson, Clark & Smith, 1988). Approximately four to fifteen people in every ten thousand are affected by autism (Baron-Cohen & Bolton, 1993).

There is "overwhelming evidence that autism has major biological roots" (Dahlgren & Gillberg, 1989). This includes evidence of a significant genetic component to aetiology (Le Couteur, 1988), a 3:1 male to female ratio, a tendency to develop epilepsy in adolescence and a dominance of non-right handedness (65% in autism in contrast to 12% in a normal population, cf. Wing, 1988). There is no bias in the distribution of autism across social class groups (Tsai et al., 1982).

Autism was first identified by Leo Kanner (1943) who understood it to be a disorder involving impairment in affective contact between the child and others. Later conceptualisations took a more cognitive perspective (eg. Rutter, Bartak & Newman, 1971) although social relatedness is now a primary focus of autism research (eg. Hobson, 1994a; Walters, Barrett & Feinstein, 1990). Deficits in social engagement, including social reciprocity, are a central focus of this thesis. These aspects of development are given particular consideration in the review of diagnostic criteria, empirical studies and theoretical accounts that follow.

DSM-lll-R criteria for Autistic Disorder (299.00, American Psychiatric Association - APA, 1987) are compatible with those advocated by British clinicians (Newson, 1977; Rutter 1978) which Newson (1978, p. 4) summarises for ease of comparison as follows:

"Rutter's reformulation of his four essential points (1978):

1. Delayed and deviant language development which has certain defined features and is out of keeping with the child's intellectual level.

2. Impaired social development which has a number of special characteristics and is out of keeping with the child's intellectual level.
3. Insistence on sameness, as shown by stereotyped play patterns, abnormal preoccupations, or resistance to change.
4. Onset before the age of 30 months.

Newson's modification of Rutter's 1971 schema (Newson, 1977); all four criteria to be met:

1. Impairment of language and all modes of communication, including gesture, facial expression and other 'body language' and the timing of these.
2. Impairment of social relationships, in particular a failure of social empathy.
3. Evidence of rigidity and inflexibility of thought processes.
4. Onset before 30 months."

As detailed in Appendix I, DSM-III-R criteria are preceded by discursive consideration of the "qualitative impairment in reciprocal social interaction ... characterised by a failure to develop interpersonal relationships and by a lack of responsiveness to, or interest in, people" (APA, 1987, p. 34). Rutter comments that "more than anything else it is the reciprocity of social interchange that is missing in autism" (Rutter, 1978, p. 525; 1983). Newson's diagnostic criteria (1977, 1987) alone specify an impairment in the timing of communicative behaviour ("social timing"). The thesis' focus on social engagement deficits in autism gives particular consideration to social reciprocity.

The phrases employed within the established diagnostic criteria for autism are relatively non-specific. Clinical experience is required to clarify, for example, what evidence counts as "rigidity". Notes from the author's own clinical files (including parental quotes) are therefore employed in the following section to exemplify and illuminate these terms. A single case study is given to show the manifestation of moderate to severe autism in a preschool child with autism. It employs clinical observations and parental interviewing and thereby demonstrates the need for assessment measures beyond the basic diagnostic criteria.

Sample Case Study: John - a Preschooler with Autism

Introduction and Details of Diagnostic Procedure.

At almost four years old, John was accompanied by his parents and Health Visitor to his county's Child Development Centre for a multi-disciplinary team assessment. Here he was seen by a Speech and Language Therapist, Community Nurse, Community Paediatrician and the author in her capacity as Principal Clinical Psychologist for county-wide services for children with autism. The latter then visited John at home to continue interviewing his parents and to observe him in his natural environment.

John and his parents returned to the Child Development Centre a week later for an intensive play-based assessment. This involved the author playing with John for almost two hours in a large playroom. Two additional Speech and Language Therapists made active contributions at the close of this assessment with respect to the evaluation of the child's language comprehension. They also videorecorded the assessment so that John's parents could watch the proceedings live in an adjoining room accompanied by John's Community Nurse and a Paediatrician specialising in communication.

John's Infancy (from retrospective parental report)

(Re: Social relationships, all modes of communication and flexibility of thought processes.)

John's parents could stop him crying as a baby by picking him up and rocking him whilst he watched out of the window. They could not have soothed him by talking to him alone, "talking was not enough, it had to be physical. We used to try baby talk to him but he didn't really take any notice" except that he "would laugh if you went up to him and said boo!" John never cooed as a baby and it was not possible to have babbling "conversations" with him in the way that had been easy with his older brother during infancy. Unlike his brother, "there was no need to entertain John" in the way that babies usually demand. Looking back, the boys' parents are now realising that babies are *usually* socially demanding and that John was unusual in this respect.

As a baby, John preferred to amuse himself independently: "he didn't want joining in of any sort." However, when his parents came to his cot "he'd stand up ..." (and) "... you could tell by his expression that he was happy you were there but there was no exaggerated greeting like there had been with his brother". Whilst John seemed pleased by his parents' arrival, there was no indication that he was aware that they could "read" his facial expressions. He did not raise his arms to request being picked up, nor did he use or respond to a pointing gesture. There was a temporary period when John would wave his arm but it is not clear that this movement had gestural significance.

Unlike most other infants under eighteen months, John did not enjoy lap games. Whereas other babies like to initiate and spontaneously participate in these, John's mother had to hold his hands to try to prompt him to participate. He would be vigorously wriggling away despite her requests of "You do it". John also differed from other babies who show, offer, give and take objects in the company of others. Furthermore, he did not use his direction of gaze to direct others towards things which interested him (referential looking).

At approximately seventeen months, "it was as if John stopped developing". He would repeatedly make straight line arrangements and became very distressed if these were disturbed. He also began to flap his arms and flick his fingers and would repeatedly turn the pages of books. His parents had the impression that John was scanning the pictures but he would not allow others to join in with him. From eighteen months John became so "scared of baths" that two people were needed to bath him. When John learned to walk he spent half the time doing so on his toes.

"By two years old he was like a visitor in our house. We would come for a cuddle and he didn't want to know ... he stopped looking at you ... and vanished upstairs when people came." As a result of this traumatic change John's parents felt as though "he wasn't really one of our family"; they felt they were losing him. John failed to perform appropriately on a developmental test at eighteen months. His Health Visitor's report states: "speech limited and won't follow instructions". From then on John's parents became increasingly worried and then "panicked" when he reached two years without having made positive changes.

During John's phase of social withdrawal, he apparently failed to use his face to communicate. "It was as if he was comatose like a zombie". His toddlerhood also differed from that of other toddlers in that he did not engage in acts of teasing nor did he get angry when he was upset. John's subsequent spoken words were not used communicatively. When he used these few individual words, he would "not necessarily" be looking at another person, neither did he retain these words. Typically he might appear to have acquired three words in three months but then never use them again. At two years John had a fever-induced convulsion. His parents' impression was that following this, "he warmed up gradually and started making noises" (babbling) for the first time.

John's development at the time of play-based assessment, aged 48 months.

(Re: Social relationships, all modes of communication and flexibility of thought processes.)

Preschool Social Relationships

John apparently became much happier with people over his fourth year although he still lacked age-appropriate social skills by 48 months. At this time he seemed untroubled by the company of unintrusive adults and his parents described him as "a fairly easy going child". He smiled readily whether or not people were present. His parents reported that "now he'll approach you and put his arms around you." He spontaneously attempted to cuddle both his Health Visitor and Community Paediatrician during his first visit to the Child Development Centre (aged 47 months). This was endearing but not quite socially appropriate.

During the play-based assessment, John made more eye-contact than is common for children with autism but less than is typical of normal children. His eye-contact often appeared to lack communicative intent. For example, he looked smilingly at his Speech Therapist whilst she offered him a toy spoon, However, he did not take it, nor did he use his facial expression nor eye-contact to communicate whether or not he wanted the spoon. This confirmed John's parents' observation that he was not able to use subtle facial expressions to convey curiosity, surprise etc. The clinician playing with him tried to prompt eye-contact during play with bubbles. She resisted blowing bubbles until John had glanced at her but John's attention was too fixed on the bubble wand itself. He occasionally looked at her and smiled when he was very excited, during the bubble blowing and during his own body-movement rituals, but he never communicated any message other than excitement. John appeared to find it almost impossible to make eye-contact during structured tasks, for example, at the table where the demands on him were more complex.

John responded appropriately to only one of the clinician's many attempts to prompt imitation of actions during the play-based assessment. When he was very excited by the sound of her hands slapping against the big ball he excitedly carried out the same action himself. John's father reported that John could pass a ball to and fro with another person "if it interested him". Although John obviously liked the play-based assessment ball, and the clinician was consistently responsive to him, he appeared unable to engage in turn-taking with it.

John seemed relatively comfortable with the clinician's company in the play-based assessment but he became increasingly resistant to her making demands. He never overcame his resistance to her attempts to make physical contact and engage him in rough and tumble play although he enjoyed this at home with his parents. During the latter, he was observed excitedly to slap his mother's face, apparently without any understanding that he might be hurting her. Although his parents reported that John would let them join his play by 48 months, they acknowledged that "he still prefers it on his own". The play-based assessment clinician reported feeling excluded, rather than included, in John's activities. John seemed undisturbed when she became passive for a period or later left him with other unfamiliar staff. He did not acknowledge the Speech Therapists who videorecorded his play-based assessment and neither did he communicate any feelings about having been separated from his parents. However, he was later observed to be very happy at home with his parents .

In the play-based assessment it was easy to detect when John was unhappy with the clinician's demands during play although he did not appear to communicate this deliberately. In contrast, prior to his fourth birthday, John apparently once looked at his father as if to communicate distress when his neck was accidentally caught in his zipper. His parents identify this observation as unique. When they told John to refrain from doing something at this age, he was apparently likely to repeat his actions and he might grin whilst doing so. However, his use of body language and directedness of eye-gaze did not indicate that he was repeating the act in order to tease his parents, as is typical of younger children. John's parents reported that he was "not particularly interested in children, he doesn't like it if they get too close" and apparently he would sometimes scratch them.

All modes of Preschool Communication

Understanding of body language.

John gave sustained eye-contact to the clinician when she copied his vocalisations and body movements during play-based assessment. However, he failed to follow her many other attempts to communicate with him nonverbally (by pointing, beckoning, waving etc.). An exception was when he took the hands she offered as he stood unsteadily on the slide. John's parents reported that they "haven't found that pointing works" in trying to communicate with John.

Use of body language.

John's mother reported that he would move his arm following his teacher's prompts for him to wave at the time of his fourth birthday. He apparently did this "in a funny way" without eye-contact and the Child Development Team were unable to prompt this for assessment.

During the play-based assessment, John was very interested in many of the toys (eg. the colourful bubble cylinder) but it seemed not to occur to him that he could communicate about these interests using gesture or vocalisation. His parents reported that he did not lift up his arms to request being picked up. He would "drag" them to an item of interest rather than use pointing.

Understanding of spoken language.

Although John stopped playing to listen to a passing fire engine during the play-based assessment, he was generally unresponsive to the clinician's spoken language in social play. In a more formal situation following the play-based assessment, John was asked to select items from eight everyday objects and then eight pictures. He did so successfully for three of the eight objects but none of the pictures. Although his attention quickly lapsed, his language comprehension appeared greater in this formal situation than during the more natural preceding interactions. The latter were rich in cues (body-language, tone of voice etc.) which John appeared unable to use. John's parents reported that although occasionally he would follow an instruction, he was not able to fetch a familiar item from another room on request.

Use of language.

By 48 months John was very vocal and he would sometimes vocalise whilst looking at others although he mostly did so whilst not looking at anyone. John seemed interested when the play-based assessment clinician responded to each of his vocalisations by briefly playing a soft trumpet. However, he did not appear to vocalise intentionally in order to prompt more of this. Home observations also gave the impression that John did not understand the communicative value of vocalisation.

John used a variety of double-syllable babble with varied intonation in the play-based assessment. His vocalisations included imitations of the sounds, intonation and even words heard in others' speech. For example, "di di", "bye-bye", "ha ha" and clicking noises. However, these had an echolalic quality and tended to be mechanical repetitions rather than genuine communication. They lacked the communicative facial expressions that usually accompany the imitation of young children. John's mother reported that although he would come to her when hurt, he would not be able to communicate about how he had been hurt. He was upset when hurt accidentally during the play-based assessment and this showed on his face although he made no physical or eye-contact with his clinician.

During the play-based assessment John used the following words or word-like sounds in appropriate contexts: "gen" (sometimes meaning again), "bu" (bus), "wei" (hooray), "whee" (as he came down the slide) and "bye bye". He only occasionally used these words with eye-contact and sometimes also said them out of context. John's parents' observation that "he has said the odd word" gives a more accurate impression of the use John made of this vocabulary at four years. During the play-based assessment he habitually used the same vocalisation with no apparent meaning.

John's parents' observations also indicated that he associated particular word-sounds with particular situations rather than understood them with their conventional meaning. For example, he temporarily used the word "hooray" when he wanted the toilet. This is the word his mother regularly used when John used the toilet appropriately. His parents were particularly puzzled by the fact that John would say something once and then not again. They recognised that "he's too good ... he's innovative ... at managing (independently) without speaking". John did not appear to be aware of having a communication problem. If it were possible to ask him, John's parents believe that the only problem he would have identified would be his inability to manipulate precisely the tiny play figures and cars that he repeatedly arranged together.

Preschool Flexibility of Thought Processes

John still liked to line up objects but, by his fourth birthday, he could tolerate his arrangements being disturbed. Prior to this he used to size-grade and colour-sort within these arrangements. John's attention to play-based assessment toys was usually fleeting rather than sustained. His persistent need to hold something with which to fiddle, appeared to prevent him from fully exploring an object other than by mouthing or sniffing. He coped 'too well' on his initial visit to the Child Development Centre when a only very limited range of toys was made available. Rather than play with toys, he repeatedly jumped with excitement, flapped his arms and flicked his fingers, vocalising and watching his fingers closely as he did so. These activities seem to both reassure and excite John.

At four years old, John was "a creature of habit"; he did not like ordinary changes that involve toys or eating or drinking. For example, he insisted that he had a teat-cup, not a feeder cup, nor an ordinary one. Furthermore, he repeatedly changed the plastic clothing of his playmobile people and positioned them at a set table on chairs. John repeated this with novel materials during the play-based assessment. He then became fixated on watching the alignment of the plates on the table, using peripheral vision before "jumping" a toy man up doll's house steps. This latter behaviour alone was appropriate in response to the many pretend play opportunities offered during the play-based assessment.

John's parents recognised that his play with miniature objects at home was repetitive rather than genuinely imaginative. He was apparently more tolerant of changes made by familiar, rather than less familiar, others. For example, he would apparently tolerate his mother removing a toy person he habitually positioned in his toy bus but he was very distressed by his teacher doing this at home. Apparently John would select and load children's videotapes and would cry and run from the sitting room in appropriate anticipation of frightening points in familiar recordings. John maintained a persistent interest in trains and he particularly liked to watch toy wheels turning using peripheral vision. The intensity of this activity was reflected in his father's comment that "he looks as though he's threading a needle".

John's persistent repetitive body movements prevented him from applying himself to many of the general intelligence tasks incorporated into the play-based assessment. His performance score on items from the Griffiths Scales of Mental Development (Griffiths, 1984) was just under three years (he was aged forty-eight months). His Performance Scale Developmental Quotient was therefore 70.8. Some of John's natural behaviour indicated the non-social aspects of his intelligence. For example, he would spontaneously touch taps before turning them on, apparently checking their temperature to guide him as to whether or not the water would be hot. His parents reported that "he never endangers himself". In the past they were astounded by his temporary ability to catch a ball.

Discussion

The case study shows how John's development from infancy was characterised by i) impaired social relationships with social deficits out of keeping with his intellectual level (including a lack of social empathy), ii) impaired verbal and nonverbal language development out of keeping with his intellectual level (including failures of social reciprocity and turn-taking), and iii) behavioural evidence of rigid thought processes (including stereotyped play patterns, resistance to change and lack of pretend play). The case therefore meets the diagnostic criteria of Newson (1977), Rutter (1978) and DSM-III-R (American Psychiatric Association, 1987) for autism. Formal testing indicated that John has additional moderate learning difficulties as is usually the case with autism. An independent clinician confirmed John's diagnosis using Schopler's "Childhood Autism Rating Scale" (CARS; Schopler, Reichler & Renner, 1986) on the basis of her observations of John at home and in the Child Development Centre. The Childhood Autism Rating Scale comprises broad questions encompassing a range of current behaviour applicable to observations of children with autism from birth to 16 years. It scores children on a 0-60 range and identifies those scoring 30 or over as having autism. John's pattern of behaviour scored 39.

Assessment of social engagement difficulties in autism

The case study demonstrates how the overwhelming familial and clinical experience of autism is affected by the pervasive nature of social engagement deficits. These deficits cannot be fully assessed by reliance on diagnostic criteria (as introduced earlier and presented in full in Appendix I) and the Childhood Autism Rating Scale scores alone. For the purposes of the thesis, these are complemented by instruments and procedures developed to assess the subtleties of social engagement in infancy and preschool childhood. These are the Detection of Autism by Infant Sociability Interview (DAISI) and the schedule for Coding of Active Sociability in Preschoolers with Autism (CASPA). Both were developed by the author and they are therefore influenced by her own observations of autism as reflected in the previous case study. Their development, as documented within the thesis, is informed by empirical evidence from preschoolers with and without autism. What does published empirical evidence reveal about the development of social engagement and related difficulties in autism?

Social Engagement in Autism and Normal Development

The approach of Developmental Psychopathology, considering normal and psychopathological development in relation to one another, is appropriate in reviewing empirical findings relevant to social engagement in autism. Evidence and theory from normal development are therefore presented initially and returned to throughout the subsequent descriptions of autism.

Empirical Findings re: Normal Development of Social Engagement

The following areas of normal development are most relevant to an understanding of autistic difficulties in social engagement: social orientation/interest, social/interpersonal timing, joint action formats, protosymbolic and symbolic functioning, and social empathy (including theory of mind). Empirical evidence from each of these is detailed below.

Social orientation/interest (including imitation) in normal infants. The social orientation and interest of normal infants is assumed by parents and has been demonstrated empirically. At birth, mothers attribute communicative intent to their infants' cries, hand movements, postures and vocalisations (Macfarlene, 1977). Neonates apparently prefer to track a face-like pattern rather than a scrambled face pattern of equal complexity (Goren, Sarty & Wu, 1975). When olfactory information is controlled for, they can also recognise their mother's face on the basis of visual clues alone (Bushnell, Sai & Mullin, 1989).

The social interest of normal infants is not passive. They have been reported to imitate tongue-poking at two days old (Meltzoff & Moore, 1977). By four weeks they react differently with people than with objects. The differences include their attentiveness, smiling, vocalising and motor behaviour (Brazleton, Koslowski & Main, 1974).

Social/interpersonal timing and reciprocity in normal infants. Early reciprocal infant/caregiver interactions are subject to mutual regulation (Cohn & Tronick, 1988). Murray and Trevarthen (1984) enabled mothers to interact with their two month olds through a live videolink. The timing of the feedback to the baby was then delayed. This resulted in dysynchronisation, the infants became distressed and turned away. This reaction was very different from their reaction to maternal passivity.

Parents are observed to interpret a wide range of body movements and variations in pitch as intentionally communicative before they have become so (Bruner, 1975; Lock, 1980). Caregivers become more discriminatory in their responsiveness when infants begin to show intentional actions on their environment (at approximately six months). Caregivers' attributions of communicative intent are then applied only to certain actions or vocalisations (Gibb Harding, 1983). The infant's transition to intentional communication is characterised by genuinely interactive turn-taking (Trevarthen, 1977; Trevarthen & Hubley, 1978).

Episodes of social engagement in normal infant-parent interaction. During the infant's first year, parent-infant interaction is increasingly characterised by joint action formats. These comprise turn-taking patterns of mutual imitation, exaggerated facial expressions, and repetitive runs of familiar behavioural patterns often leading to a predictable climax (Bruner, 1983; Newson, J., 1974; Ratner & Bruner, 1978, Stern, 1977). Parents' communication plays a 'scaffolding' role in enhancing the infant's own performance in communication and social cognition (Bakeman & Adamson, 1984; Bruner, 1975). The long-term positive effects of this on infant communicative development are clear (Schaffer, 1989). However, the long-term implications of participation in joint action formats for infant cognition have yet to be established (Schaffer, 1992). Joint action formats are often the context for the emergence of teasing by infants before the end of the first year (Reddy, 1991).

Normal development of protosymbolic and symbolic functioning. Through joint action formats, vocalisations and gestures become established as meaningful (Churcher & Scaife, 1982; Urwin, 1984). Early indications of communicative intent include infants around the end of the first year, looking to their mother's face when pointing, apparently to ensure that their message is being received (Bruner, 1975).

The onset of infant pointing has been observed to precede the comprehension of verbal labels by a few days (Harris, Barlow-Brown & Chasin, 1995). Early pointing involves two distinguishable functions: protoimperative and protodeclarative (Bates, Camaioni & Volterra, 1975). The former involves requests for another's assistance during attempted reaching towards objects whilst the latter involves drawing another's attention to an object for purposes of shared interest.

Vocalisations are soon used to complement protoimperative and protodeclarative pointing. Before the end of the first year these communicative functions further diversify and they begin to be communicated as words from around twelve to fifteen months (Goldbart, 1988). Eighteen month olds regularly make up, and consistently use, a word for items they cannot label (Ricks, 1979). They also engage in symbolic play with objects from about this age to two years, preceded by acts of purely interpersonal pretending in the first year (Reddy, 1991). The relationship between teasing and symbolic functioning is explored in the final chapter of the thesis.

Conclusion

Normal infants show competencies with respect to social engagement in each of the areas reviewed in this section. Their interrelationships in accounting for normal and autistic development will be considered later. These inform, and are informed by, observations from parallel areas of development in autism. The following literature review of autism focuses initially on nonverbal communication, including gaze behaviour, eye-contact and facial expression. It then covers imitation, social reciprocity, recognition of self and others, social empathy, symbolic play and spoken language.

Empirical findings relevant to Social Engagement in Autism

Nonverbal communication. In contrast to normal infants, infants with autism may fail to show an anticipatory posture or put up their arms to be picked up in the first year of life (Rutter, 1983). Communicative gestures such as waving "bye-bye" or pointing may subsequently fail to appear (Park, 1986). There is evidence which indicates that children with autism are unable to perceive and/or understand bodily expressions of emotion in the way that characterises normal infancy and childhood (Hobson, 1986, 1991a).

Whilst children with autism can employ gestural requests, they rarely engage in declarative gestural acts (Curcio, 1978; Wetherby & Prutting, 1984). At school-age they exhibit significantly less gestural "indicating" behaviour and respond less to adult indicating acts than normal or learning disabled control subjects (Landry & Loveland, 1989). Furthermore, deficits in non-verbal behaviour best discriminate autistic children from normal children and control subjects (Mundy, Sigman, Ungerer & Sherman, 1987).

Jordan (1993, pp. 233-4) reports that teaching sign language to children with autism is "far more problematic" than is the case for children with language disorder alone (Carr, 1982; Jordan, 1985; Wilbur, 1985). The pragmatic difficulties of children with autism in developing the spontaneous use of taught sign language reflect those in their development of spontaneous spoken language as described below (Jordan, 1993; Wetherby, 1986). Furthermore, children with autism have considerable difficulties with gestural expressions of social empathy (eg. sharing) relative to matched children with Down's Syndrome although their instrumental gestures (eg. request pointing) do not significantly differ (Attwood, Frith & Hermelin, 1988).

Gaze behaviour, eye-contact and facial expression. Research confirms the overwhelming clinical impression that children with autism show deviant patterns of eye-gaze (Mundy, Sigman, Ungerer & Sherman, 1986; Wing, 1976). Early quantitative studies gave contradictory findings. For example, Hutt and Ounstead (1966) reported more gaze aversion in response to human faces than control subjects whilst Hermelin and O'Connor (1970) found no difference from control subjects in visual preference for social stimuli. Subsequent studies have taken a qualitative focus in clarifying previously anomalous findings.

Churchill and Bryson (1972) found that autistic children were more likely to approach an attentive than an inattentive adult. Furthermore, they did not differ from normal control subjects in the frequency with which they looked at or approached unknown adults. In contrast, autistic patterns of gaze seem abnormal (Mirenda, Donnellan & Yoder, 1983). Fixation times to social stimuli are shorter than for normal or learning disabled control subjects (Hermelin & O'Connor, 1970). Older children with autism may stare fixedly and inappropriately at others (Wing, 1976).

The apparent insensitivity of children with autism towards faces (Hobson, Ouston & Lee, 1989; Jennings, 1973; Langdell, 1978; Weeks & Hobson, 1987) may account for their difficulties in recognising facial expressions (Hobson, 1983; 1986).

Imitation. Imitation skills in children with autism have consistently been found to show marked delays with respect to vocalisation and gesture. However, some imitation of body movements and actions with objects has been reported (Curcio, 1978; Dawson & Adams, 1984; DeMyer et al., 1972; Hammes & Landgell, 1981). Younger children with autism show lower levels of performance in vocal and gestural imitation than in object permanence skills (Dawson & Adams, 1984; Sigman & Ungerer, 1984b). A correlation has been found between the imitative ability of children with autism and other aspects of their social behaviour, including social responsiveness (Dawson & Adams, 1984; Wing & Gould, 1979).

Reciprocity and interpersonal timing. Newson's (1984; 1987) clinical observations of difficulties in "social timing" extend to every communicative mode (facial expression, body- and spoken language).

These observations have not yet become the focus of detailed investigation but corroborative evidence is available from independent empirical studies (Baltaxe & Simmons, 1985; Condon, 1974, 1979; Feldstein, Konstantareas, Oxman & Webster, 1982; Hermelin & O'Connor, 1970). Courchesne, Akshoomoff and Townsend (1990) report that in autistic patients, event-related potential (ERP) responses to attention-related functions are diminished or absent. They suggest that autistic children have significant dysfunction in the neural mechanisms that underlie the normal child's ability to capture, maintain and shift attention. This is compatible with Newson's (1984; 1987) clinical observations of difficulties in social timing. Research by Condon (1974, 1979) indicated that children with autism tend to respond to auditory stimuli with delayed and asynchronous movements. Condon has speculated that these children might be experiencing echoes of auditory stimuli for some seconds after the sounds actually cease. Condon's research awaits replication.

Consistent with reports of difficulties in early pre-symbolic patterns of relating (cf. Volkmar, 1987) there are a few studies examining reciprocal social interactions with children who have autism. The preverbal vocal signals of these children are idiosyncratic and only interpretable by very familiar others (Ricks, 1975). Turn-taking deficits are also found in the communication of children with autism (Mundy, Sigman, Ungerer & Sherman, 1986). Even where they have gained skills which are clearly adequate for verbal conversation, these children still demonstrate deficits in the responsive to-and-fro interchange (Bartak, Rutter & Cox, 1975; Cantwell, Baker & Rutter, 1978). This is reflected in Jordan's (1990) observation that they may even conduct 'conversations' without the presence of a conversational partner.

Feldstein et al. (1982) studied the conversational time patterns of verbal adolescents with autism. They examined the degree to which speakers with autism synchronised the time patterns of their speech with familiar and unfamiliar conversational partners. They found longer switching pauses and no evidence of temporal synchrony in the conversations of an autistic adolescent. This contrasted with the control conversations between the familiar and unfamiliar participating adults.

Recognition of self and others. Autistic children perform similarly to normal children in experiments designed to test for self-recognition using mirrors (Dawson & McKissick, 1984; Ferrari & Matthews, 1983; Neuman & Hill, 1978). However, Ungerer's review (1989) reports that they fail to show the "coy, silly or self-conscious behaviour that is sometimes observed in normal groups" (p. 84). This may be partly due to a lack of awareness of their own mental states as suggested by Baron-Cohen's (1989a) empirical findings.

Empirical evidence in this area reflects similarities with children without disabilities. It has been demonstrated that young children with autism understand others as permanent objects (Sigman & Mundy, 1987) and differentiate among faces of familiar others (Langdell, 1978). They also respond differentially to familiar caregivers and strangers following brief separations (Sigman & Ungerer, 1984a).

Social empathy (includes "theory of mind"). Baron-Cohen's (1985) empirical findings suggest that children with autism "fail to distinguish between mental and physical phenomena, and seem unaware of the mental function of the brain" (1989a, p. 596). Baron-Cohen (1989b) has identified a "theory of mind" deficit in autism. Frith, Morton and Leslie (1991) suggest that the failure to develop a normal "theory of mind" would make empathy almost impossible. Whilst difficulties in social empathy are universally accepted, empirical studies do not universally support the existence of a theory of mind-specific deficit (Klin, Volkmar & Sparrow, 1992).

Mundy, Sigman, Ungerer and Sherman (1986) reported deficits in children with autism in behaviour crucial for successful participation in social interaction. These included using eye-contact and pointing to request items out of reach, in contrast to more direct requesting behaviour. The pattern of abilities and disabilities observed was consistent with the impression that these children recognised adults as facilitators of interactions with their environment, but they had difficulty in understanding that adults can also share their focus of attention. The behavioural deficits observed by Mundy et al. (1986) would suggest that acts of teasing are also beyond the competence of children with autism in contrast to normal two-year-olds (Reddy, 1991). However, this awaits empirical confirmation.

Symbolic Play. There are clear differences between children with and without autism with respect to symbolic play (Riguet, Taylor, Benaroya & Klein, 1981; Wing, Gould, Yates & Brierly, 1977). The deficits in children with autism extend from free play to highly structured play interactions (Sigman & Ungerer, 1984b; Ungerer & Sigman, 1981). The symbolic play behaviour most clearly differentiating children with and without autism is the ability to use a doll as an independent agent of action (Mundy, Sigman, Ungerer & Sherman, 1987).

Verbal Language. Verbal language is given only limited attention here, as the subjects who took part in this research were almost entirely preverbal (none using signing). Where children with autism do develop spoken or signed language, their pattern of acquisition differs from children without autism, in that they show considerable asynchrony in their development of pragmatic functions (Jordan, 1993; Tager-Flusberg & Keenan, 1987; Wetherby, 1986). Wetherby identifies those functions which are much more readily acquired as 'nonsocial' whereas Tager-Flusberg (1988) identifies them as not requiring 'theory of mind'.

The speech of children with autism is characterised by echolalia, lack of spontaneous use for communication, abnormal tone or rhythm (DeMyer, Hingtgen & Jackson, 1981) and extreme delay in acquisition of appropriate speaker-addressee pronouns (Jordan, 1989). Deficits in prosody also persist over time (Baltaxe & Simmons; 1985; DeMyer, Barton, DeMyer, Norton, Allen & Steele, 1973; Rutter & Lockyer, 1967).

Baltaxe and Simmons' studies include durational aspects of speech production in autism which are included here for their potential relevance to Newson's (1987) proposed deficit in "social timing". Baltaxe and Simmons' evidence is that "these children often neglect to use the temporal cues in signalling grammatical information, in contradistinction to normal and aphasic subjects" (1985, p. 116). Difficulties that relate to the temporal processing of meaning-carrying elements (stressed elements) are also reported (Baltaxe & Simmons, 1981).

Tager-Flusberg (1989) identifies the key characteristics of language in autism as the asynchronies; i) between form and function (with syntactic and lexical aspects in advance of many aspects of pragmatic functioning) and ii) between more advanced productive abilities and comprehension (cf. Lord, 1985; Menyuk & Quill, 1985). However, she points out that the second asynchrony may be an artefact of assessment methods. Difficulties in comprehension include the literal interpretation of utterances (Jordan, 1993).

Jordan (1993) identifies a further asynchrony in autism, between elicited and spontaneous (signed or spoken) language. In this respect, children with autism differ from those with normal development; the latter's elicited language is only slightly in advance of their spontaneous language. Jordan therefore emphasises the need to differentiate the spontaneous communication of children with autism from echolalia or communication "that is cued as a 'set piece' of learned behaviour" (1993, p. 240). For example she cites children who greeted others in response to elicitation techniques whilst never doing so spontaneously.

Conclusion

The above observations and empirical evidence relevant to social engagement indicate that autism consistently involves impairments of non-verbal communication and social cognition. The developmental significance attributed to difficulties of social engagement are explored at the close of this review. First, however, it is important to examine what theoretical account has been given for these aspects of development in children without disabilities.

The development of Social Engagement in children without disabilities

Preverbal communication and the development of symbolic functioning and social empathy

Familiar play routines develop within mutually-regulated preverbal interactions which appear to enable the evolution of shared understandings between child and caregiver (Trevarthen & Logotheti, 1987). During such joint action formats, infants are given a position of social agency and influence long before their communication is intentional (Urwin, 1984). They thereby come to realise that their actions have meaning and will initiate standard games (Bruner & Sherwood, 1975). Non-verbal language is developed within this context (Lock, 1980).

Primary intersubjectivity is followed by secondary intersubjectivity when external objects are incorporated into joint action formats (Trevarthen & Hubley, 1978). Social referencing emerges from about seven months (Emde, Klingman, Reich & Wade, 1978; Klinert, Campos, Sorce, Emde & Svejda, 1983) followed before the end of the first year by pointing. These are examples of intentional preverbal communication in which infants may influence others. Referential pointing in preverbal infants has been suggested to be protosymbolic (Bates, Benigni, Bretherton, Camaioni & Volterra, 1979).

Urwin (1984) emphasises the role of social agency given to infants in preverbal communication. She gives a familiar example of infants using protodeclarative pointing without looking where they are pointing. The infant in this situation is "exploiting her power to direct" within a familiar joint action format. Urwin suggests that this "illusion of control" may be essential for language acquisition. She thereby emphasises the developmental value of the infant being able to convey and manipulate, as well as perceive, attitudes.

Hobson (1994b) attributes the development of symbolic functioning to the perception of bodily-expressed (and perceived) multiple attitudes towards an object. This is hypothesised as a precursor to the multiple levels of cognition required for symbolic representation. He argues that pretend play may thereby be facilitated through social interaction with objects.

Hobson's argument may be applied to mental 'objects' of joint attention. These are the content of familiar social routines where physical objects may not be present. Such routines are frequently the context of early teasing which involves the playful manipulation of others' mental attitudes. It is therefore an early example of active multi-attitudinal experience. Trevarthen and Logotheti (1987) have also identified teasing as protosymbolic.

The experience of joint action formats also enables the idea of a word as referring to become established in pre-speech exchanges ("eg. show me your nose", Nelson, 1973). Infants and young children without disabilities acquire verbal expression of various pragmatic functions on the basis of first developing the use of these preverbally (Bruner, 1975). The symbolic nature of early language acquisition, as opposed to learning by association, is demonstrated by the regularity with which eighteen-month-olds make up a word for items they cannot label (Ricks, 1979).

Normal development of social empathy (including "theory of mind")

Leslie (1987) recognises pretend play as an early manifestation of theory of mind and suggests that both are dependent on an innate "decoupling" cognitive mechanism. Leslie and Happé (1989) propose that this metarepresentational facility is triggered by the ostensive communication that occurs in social interaction. Perner (1991) argues that theory of mind arises from cognitive inference which may or may not be dependent on social precursors. He suggests that even if infants have a notion of attention or intention, it has yet to be established that they understand these states as specifically *mental*. For example, Perner's alternative explanation of infants pointing is that this may be "to check the effect of their pointing on their mother's eyes because they enjoy mastery over her eyes" (1991, p. 131).

In contrast, others suggest that knowledge of others' minds arises out of perceptual and/or affective experiences (Butterworth, 1991; Forrester, 1993; Hobson, 1991a; Reddy, 1991). Bretherton (1991) and

Hobson (1994a) interpret observations of infant communication (eg. early engagement in proto-conversations; Bates, Camaioni & Volterra, 1975; Bruner, 1975) as indicative that infants can interact with expressions of others' mental states, and the understanding of mind may be founded on this basis. Hobson (1994a) argues that normal children have an *experience* (not an inferred theory) of mind based on previous experience of others via directly perceived attitudes.

Reddy (1991) views playfulness as causal of developmental advances and identifies teasing as the central element in playing with people (Reddy, 1994). Following Stern (1985) she suggests that infants could not tease other people without the ability to guess what is 'in their minds' and make them suffer or laugh because of that knowledge. The development of acts of teasing (within the first year) before the infant appears to have awareness of his/her implicit theory of interfacible minds, is interpreted by Reddy (1989) as indicative of the presence of mental state knowledge. Potential interrelationships between social engagement, symbolic functioning and "theory of mind" are explored further in the thesis' final chapter.

How Primary are the Social Engagement Difficulties of Children with Autism?

Theoretical approaches to autism differ in the developmental significance they attribute to difficulties of social engagement. Some suggest that difficulties of social engagement are secondary to a core cognitive deficit. This thesis examines evidence for the contrasting theoretical position that difficulties related to social reciprocity are primary to the disorder and play a causal role in the manifestation of other deficits. The following review outlines the former perspective before detailing the theoretical basis of the thesis.

Theories based on a core cognitive deficit

Frith (1992) is among those who argue that all symptoms of autism arise from a single cognitive deficit that is involved in representing the mind itself ("theory of mind"). This is manifest as difficulty in understanding second-order mental representations, specifically beliefs and intentions. Social relations are therefore difficult and empathy almost impossible.

Leslie's (1988) metarepresentation theory of autism aims to account for theory of mind deficits. It assumes that a "decoupling mechanism" is necessary to understand second-order representations. It asserts that a faulty decoupling mechanism in autism explains both theory of mind and pretend play deficits. Leslie (1988) argues that earlier-appearing deficits (eg. in joint attention) are due to the same faulty decoupling mechanism. He does not acknowledge the presence of any emotional deficits.

Baron-Cohen (1989c) argues that earlier deficits (in pretending, pointing and showing) employ awareness of another person's perceptions. He hypothesises that they are therefore part of the theory of mind deficit. Following this, he suggests that the capacity for metarepresentation may be present from seven to nine months, and manifest in joint attention behaviour.

Baron-Cohen (1991b) has operationalised reciprocity in what he describes as a "crude" experimental task. Able older children with autism were asked to roll a ball to and fro with another person. On this empirical basis, Baron-Cohen concludes that subjects with autism are unimpaired in reciprocity where no mind-reading is involved.

Baron-Cohen suggests that "highly specific" theory of mind deficits may account for all other symptoms including reciprocity (1991b,

p. 301). He does not consider whether social reciprocity deficits per se may account for difficulties in social interaction on a more sophisticated level than ball-rolling.

Multiple Deficit Models

Mundy and Sigman (1989a) are among those who criticise Baron-Cohen (1989c) for failing to account for other deficits such as prosody found by Baltaxe and Simmons (1985). Mundy and Sigman (1989a, 1989c) do not ascribe to the primacy of either cognitive or social deficits. They point out that joint attention involves affect as well as the cognitive ability to perceive another's perspective. They therefore propose a model hypothesising both a deficit in affect expression and a representational deficit. These deficits are independent of each other but could combine to give autistic symptoms.

Mundy and Sigman's (1989a) proposed affective deficit incorporates Dawson and Lewy's (1989) work on affect expression and arousal. It assumes a failure to smile sufficiently on the part of the infant. A consequence of this would be a failure to evoke maternal smiles and subsequently a failure to discover the scheme "I smile-you smile" which Mundy and Sigman (1989a) identify as part of the phenomenon of joint attention.

Rutter (1983) emphasises the importance of social deficits *alongside* those in language, sequencing, abstraction, and coding skills as underlying the autistic syndrome. He proposes that the autistic child's social abnormalities and, in particular, deficits in reciprocal social interaction, derive from an impaired ability to process stimuli that carry emotional or social meaning, such as facial expressions and gestures expressing emotional states.

Jordan's (1993) review of the linguistic and communication difficulties of children with autism explores "the case for some 'social skills acquisition device', tuned in to detect social significance and benefit from the social 'affordances' of interaction as suggested by Forrester and Hobson" (Jordan, 1993 p. 248 citing Forrester 1993 and Hobson 1991a). Jordan considers that there are arguments for regarding the nature of this hypothesised device as both cognitive and social. Such arguments could be used to account for the phenomenon of those children with autism who appear socially motivated yet mistime and misinterpret interactions perhaps "because of a failure to recognise the social significance of key events in the interaction' (Jordan, 1993, p. 248). Alternatively it could be attributed to the social timing difficulties proposed by Newson (1977, 1987).

Arousal-based theory

Dawson and Lewy (1989) present the most recent arousal-based theory of social engagement difficulties in autism. They suggest that children with autism may share the difficulties of preterm infants who temporarily exhibit more negative affect during interactions and are less able to tolerate social interaction. They explain how the findings from biological studies of responsivity in autism are "consistent with an aversive response to novelty and reduced stimulus intake" (p. 55). Dawson and Lewy (1989) do not hypothesise a specifically *social* impairment in autism. Instead they argue that the complexity, novelty, and unpredictable nature of people means that they are overstimulating for children with autism. As a consequence of such overstimulation, these children may become inattentive and express negative affect. The proposed low aversion threshold may therefore "distort socioemotional development: in the early formation of attachments to people, in the expression of emotions, and in the interpersonal coordination of affective expression" (Dawson & Lewy, 1989, p. 57).

Mothers of preterm infants display less imitation of their babies' facial expressions (Malatesta, Grigoryev, Lamb, Albin & Culver, 1986). Dawson and Lewy (1989) propose that the pattern of maternal imitation of autistic infants is similarly disrupted but in a more extreme and persistent manner. They therefore argue that receptive deficits in autism may result in "the lack of socialisation of emotion in autism" rather than any primary expressive impairments (Dawson & Lewy, 1989, p. 61).

Dawson and Lewy's clinical observations are that children with autism are more responsive to "highly routine and ritualised forms of social stimulation" which may be "more optimally stimulating and thus more reinforcing" (1989, p. 58). This thesis will later consider whether a deficit in social reciprocity could account for the evidence Dawson (1991) takes as indicative of an arousal deficit.

Affect-based theories

As indicated earlier, autistic individuals have a disability in recognising bodily expressions of emotion (Hobson, 1986; Hobson, Ouston and Lee, 1988). Hobson proposes that their disability may include impairment in coordinating emotional facial expressions, gestures and vocalisations. He uses observations of normal development to argue that this disability may explain most but not all of the other impairments in autism (Hobson, 1994a). Hobson's empirical work and theoretical accounts do not extend to cover Newson's (1977) concept of "social timing".

Hobson specifically argues that a biologically-based capacity for a quality of 'personal relatedness' with others is essential for acquiring the concept of 'persons' (Hobson, 1994a). Individuals without this would fail to show the established differences in interacting with social as opposed to nonsocial stimuli (cf. Brazleton et al., 1974). Furthermore, they would fail to perceive others' attitudes to objects. Most significantly, they would fail to appreciate that they and others can adopt multiple attitudes to objects. Following Hobson's (1993) theory of normal development outlined earlier, this would preclude them from developing the normal kind of creative symbolic representation. Thus cognitive deficits may arise from affective impairments.

Evaluation

More empirical studies are required before definitive conclusions can be drawn about the theoretical attributions of primacy to the cognitive and/or affective deficits of autism (Jordan, 1993; Ungerer 1989; Waterhouse, Wing & Fein, 1989). Relevant preliminary data comes from the administration of social development items from the Vineland Adaptive Behaviour Scales to matched pairs of young autistic and non-autistic developmentally disabled children (Klin et al., 1992). These items were evaluated in relation to expected ages of acquisition based on the Vineland standardisation database. Results indicated that

> "social dysfunction in autism affects very basic and early emerging social behaviours which are typically present prior to the time at which even the earliest emerging social precursors of a theory of mind apparently emerge ... (These) results are consistent with Kanner's original emphasis on the primacy of social dysfunction in autism" (Klin et al., 1992, pp. 861, 871).

If Klin et al.'s interpretation of their results is correct, the question arises as to which aspect of social impairment is primary. Following Newson's (1978; 1984; 1987) clinical observations of autism, the hypotheses of this thesis are influenced by the suggestion that social reciprocity is critical in the mediation of social engagement. Social reciprocity deficit(s) may disrupt any adult attempts to establish preverbal interaction. Failure to experience preverbal interaction is anticipated to result in impaired understanding and practice of social agency, intentionality, nonverbal communication, social reference, teasing, empathy and imagination. The thesis recognises these symptoms of autism as interdependent.

The skills required for creative representation (imagination) may be distinguished from those required for logical representation (as in mathematics). Hobson (1993b) argues that the former arise and are practised in a communicative context. This may account for the impairment of imagination in autism. Social empathy may be more accurately construed as interpersonal imagination rather than 'mind-reading'. It is therefore predictable that empathy is always impaired in autism. In contrast, non-creative representational skills are often unimpaired in intellectually able people with autism. Following this theoretical perspective, the thesis includes evaluation of a clinical intervention which directly facilitates social engagement and indirectly appears to enable the development of imaginative play. A methodological outline for this and the thesis' other linked studies are presented in Chapter Two.

The thesis' main hypotheses all concern social engagement in autism. In summary, the hypotheses are that for children with autism: i) social engagement deficits are present from infancy, ii) simple social engagement in preschoolers is facilitated by child-focused adult turns during musical/motoric activities, and iii) skills related to social engagement may be developed over time through the therapeutic application of Musical Interaction Therapy (Christie & Wimpory, 1986; Wimpory, Chadwick & Nash, 1995).

Chapter Two

METHODOLOGICAL APPROACH

The thesis explores the nature of autistic social engagement deficits following the tradition of Lord's naturalistic approach (Lord, 1991). This chapter outlines a linked series of exploratory studies, and the issues they are designed to address. The cohort of preschool subjects with autism and/or developmental delays is initially introduced by descriptive statistics followed by detailed case studies. Chapters One and Two thereby establish a framework to which discussion returns throughout the thesis.

Design, methodologies and hypotheses

Through a series of linked studies the thesis explores the nature of social engagement deficits autism. It aims to answer the following questions: i) Are social deficits present in infants with autism?, ii) What strategies can facilitate social engagement in preschoolers with autism? and iii) What are the effects of musically enhancing these strategies? As indicated in Chapter One, studies addressing i), ii) and iii) are based on the use of i) the Detection of Autism by Infant Sociability Interview (DAISI), ii) the schedule for Coding of Active Sociability for Preschoolers with Autism (CASPA) and iii) Musical Interaction Therapy (Christie & Wimpory, 1986). DAISI and CASPA were developed in the course of this research. Social reciprocity is a primary focus of the exploration of social engagement in the studies described below. However, each of these studies also monitors the presence or absence of teasing by child subjects since teasing is later used to account theoretically for links between social reciprocity and symbolic functioning (in Chapter Nine).

i) <u>Are social deficits present in infants with autism</u>?

The first (DAISI-based) study employs a between-group design comparing the results of retrospective interviews of parents of children with autism, with interviews of parents with children with developmental delay. Between group differences were predicted a priori for the following aspects of the reports of infant social engagement (taken from the Detection of Autism by Infant Sociability Interview, developed for the purposes of the thesis):

1. Frequency and/or intensity of eye-contact.
2. Referential eye-contact.
3. Greeting others.
4. Soothability from crying by being lifted up.
5. Soothability from crying by non-physical social input.
6. Readiness to be entertained without the use of toys.
7. Enjoyment of lap games.
8. Activity in lap games (versus passive role).
9. Willingness to allow parents to join in play with toys.
10. Offering and giving objects.
11. Showing objects.
12. Use of pointing.
13. Comprehension of pointing.
14. Waving.
15. Raising arms to request being lifted up.
16. Teasing.
17. Preverbal turn-taking, for example through reciprocity in babbling.
18. Socially directing anger or distress (as if intentionally communicative).

19. Communicative use of preverbal noises.

20. Communicative use of words.

21. Acquisition and retention of early vocabulary.

22. Consistency in sociability towards main caregiver.

(NB Items 21-22 involve some recollections post- as well as pre-24 months; all remaining items pertain to pre-24 months only.)

ii) <u>What strategies can facilitate social engagement in preschoolers with autism</u>?

The second study comprises within-group comparisons of ten of the subjects with autism at preschool age, studied during one-to-one play-based assessment with clinicians (Newson & Newson, 1979). Videorecordings of such assessments were initially screened for episodes of social engagement in which a child looked towards an adult's face and simultaneously showed an additional form of communicative behaviour. Control periods, in which episodes of social engagement almost never occurred, were identified on the videotapes using time-sampling methodology. Clinician behaviour immediately preceding each Episode of Social Engagement and each Control Period was coded using an instrument designed for the purposes of this study (Coding for Active Sociability in Preschoolers with Autism).

Seventeen specific predictions were investigated. The first of these was that Episodes of Social Engagement would never feature teasing by the child. The remainder were that the occurrences of Episodes of Social Engagement would contrast with control periods, being:

1) positively related to adults' use of: "continuer" turns; extrinsic rewards; patterning (and its three individual components) and musical-motoric activities; and that they would be more likely to be associated with other Episodes of Social Engagement (hypotheses 1-8);

2) negatively related to adults' use of: "ignore" and "redirecter" turns, and with cognitive and free-play activities (hypotheses 9-12); and,

3) unrelated to adults' use of: "silent responsiveness", affective facial expressions and pretend play activities and unrelated to the caregiver's increasing familiarity through each session (hypotheses 13-16).

iii) What are the effects of musically enhancing the strategies identified in study ii?

The third group of studies employs single subject designs to evaluate the effects of Musical Interaction Therapy administered separately to two preschool girls with autism. Social and symbolic skills were videorecorded in semi-structured settings outside of therapy sessions. The designs of the single case studies were ABC and A, B, BC, CD, CE, (see below) rather than ABA. The original study (ABC) compared baseline measures with those taken during seven months of therapy and those taken at two years follow up. It was predicted that Musical Interaction Therapy would have a sustained positive influence on the following:

1. The time the child took to make a social acknowledgement;
2. The frequency of the child's eye-contact;
3. The frequency of child-initiated 'interactive involvement' (see Chapter Six);
4. The frequency of the child's spontaneous positive changes to interaction patterns;
5. The child's manifestation of spontaneous and symbolic play.

The second single-case study comprised a component analysis of Musical Interaction Therapy involving the staggered introduction of therapeutic components following baseline (A). These comprised exposure to audiocassette recordings of Musical Interaction Therapy (B);

Music Therapist Social Support (C); Musical Interaction Therapy Training (D) and full Musical Interaction Therapy (E). As indicated earlier, the design was A, B, BC, CD, CE, CA. It was hypothesised that significant social developments in the child would occur only during the phase of full Musical Interaction Therapy (CE). These social developments were predicted as positive changes in:

1. The frequency of Episodes of Social Engagement (ESEs);
2. The frequency of child vocalisations within each ESE;
3. The frequency of child smiling within each ESE.

Subjects

Appendix II contains a table of data on individual children, including expressive language level and birth order. Group details of subjects are summarised in Table 2.1 of this chapter whilst individual subject details are given in Appendix II. Up to ten of the eleven subjects with autism were selected on the basis of availability for participation in each of the studies which follow. Group details of subjects are briefly given at the start of each study together with statistical analysis of between group comparisons where appropriate. All subjects comprised the most recent referrals to a county Child Development Service, either to receive a diagnosis of autism (N=11); or, to be referred with queried Developmental Delay (N=10), and with age and nonverbal Developmental Quotients and (where possible) mean length of utterances matching those subjects with autism. Only one parent declined to participate in the study and so the next most appropriate developmentally delayed child was selected.

Performance Scores from the Griffiths Mental Development Scales (Griffiths, 1984) were used to give Developmental Quotients (DQs). The Griffiths Performance Scale can be completed by a trained clinician with children whose language comprehension is minimal. The DQ of one child from each group was over 100. The control group included two children whose only area of delay was in communication and two children who had Down's Syndrome. The aetiologies of the delays in the control group were otherwise unknown. Child Development Service clinicians confirmed that no subject had significant motor impairments that could affect gesturing.

All children in the autistic group met the DSM-III criteria of early onset, abnormal social relating, deviant speech and language skills, and unusual responses to the environment (American Psychiatric Association, 1987). Independent clinicians confirmed their diagnosis using the Childhood Autism Rating Scale (CARS; Schopler, Reichler & Renner, 1986). CARS scores can range from 15 to 60, with scores at or above 30 indicative of autism. The one child with autism who scored below 30 (i.e. 29) had been diagnosed by national specialist prior to moving to within the study's Child Development Service's catchment area. Here his diagnosis was confirmed clinically prior to his inclusion in the study.

As indicated in Table 2.1, CARS scores from the autistic group ranged from 28.5 to 57, with a mean of 43.5. The DQ mean was 78.8 (ranging from 23 to 117) for the subjects with autism, whose mean age was 42 months (ranging from 32 to 48 months). Most (N = 6) of the autistic group were preverbal whilst the remainder used one word utterances. Further details of autistic subjects' expressive language and comprehension are given in the case reports of this and the previous chapter. The average age for control subjects was 41.1 months (ranging from 30-48 months). Performance Scores from the Griffiths Mental Development Scales gave DQs for control subjects as 80.6 on average (ranging from 48 to 110). Most children in the control group used only one word utterances (N = 6), two used two word utterances, one used phrases and one was preverbal. No subject in the Developmentally Delayed group scored within the autistic range on CARS.

Table 2.1. Subject characteristics

	Children with Autism (N = 11)	Children with Developmental Delay (N = 10)
Age in months		
Mean	41.55	41.1
SD	5.05	5.84
Range	32-48	30-48
CARS score		
Mean	43.5	24.6
SD	8.5	2.64
Range	28.5-57	21-29
Performance DQ (Griffiths)		
Mean	78.82	80.6
SD	26.18	23.26
Range	23-117	48-110

Case studies detailing aspects of social engagement of subjects with autism

Individual subject details are given as single case studies for three of the nine children with autism, randomly selected from those who participated in more than one of the studies to be described. The first and most detailed of these was presented in Chapter One (John). Whilst John's case study serves as a general introduction to all aspects of preschool autism, the others are more specific to the focus of the thesis (re: social engagement). They record developments in social engagement throughout infancy until the time of participation in the studies. They thereby offer the reader some experience of the clinical phenomena underlying the data of the following chapters. All information presented is based on home observations and at least three hours of interview with both parents, including the Detection of Autism by Infant Sociability Interview (DAISI - introduced in Chapter Three). Videorecorded play-based assessment clinic observations (described in Chapter Five) are also a source for the information presented here. Quotation marks denote parental quotes throughout the case studies.

1. Bertie

Introduction

Bertie was the third child of three children who were otherwise without developmental difficulties. He was cared for at home jointly by both parents who had retired from manual work in the catering trade.

Infant Sociability

Bertie's parents contrasted him with his siblings in that he was an "easy" baby who "never cried much".... "Bertie didn't even cry if he was hungry" but took his feeds to time. They recalled that although he could amuse himself with toys, "he would never give a toy - he never has done". His mother reported that he would be happy to push a mobile toy back and forth with her but "he'd be more interested in playing with the toys than playing with you". To his parents, "Bertie never really seemed to be a baby" since he apparently had no interest in teasing and lap games and "was just disinterested if you tried them". For example, they reported that he would neither clap his hands nor would he hide himself during pee-po, although apparently he would watch his mother hide. His parents recalled how Bertie "never wanted to sit on anybody's lap" and he "never wanted any cuddling really" for his first two years, although later he would approach them for cuddling. They recalled that Bertie could be distracted and sometimes comforted when he was distressed as a toddler. However, he apparently cried so little that his parents found themselves wondering if Bertie could feel physical pain.

Infant Communicative Development

Bertie's mother described how "he didn't seem to have time to do the baby things like cooing, and the communicative things like giving and taking - it wasn't there, it never came"..."he didn't 'coo coo' back at you". In addition to the lack of baby vocalisations, Bertie did not appear to develop communicative gestures. For example, his parents reported that he neither shared nor offered his toys. Neither would Bertie point things out from his pram. Apparently he would extend his index finger at 18 months but he did not use this communicatively for pointing.

It was apparently impossible to direct Bertie's attention to interesting things by pointing to them. His parents report that instead he had to be taken physically to see them. Bertie apparently failed to either respond to his parents' greetings when they came to him after his sleep or to their offers (verbal and non-verbal) to pick him up.

Bertie's parents reported that he was still not making baby noises by 18 months but soon after this he began to say "(p)Ushchair". Apparently he did not use this or his other early words communicatively (eg. with eye-contact) and they often disappeared from his vocabulary. His parents reported that Bertie developed tantrums at two and a half to three years but he did not communicate his anger, instead he seemed "angry with the world but not at us".

Sociability at the time of participation in the studies (aged 41 months)

Apparently "Bertie would go with anyone" before his third birthday, however, he showed a clear preference for his parents' presence when in a strange place by the time of his play-based assessment. Another development at that time was for him to seek to be picked up (often because he wanted to be taken away from a situation). In contrast, his parents reported that at the time of his third birthday "you'd never have had him sit on your lap and let you cuddle him". At 41 months Bertie sometimes made eye-contact but there were other times when he would not do so (eg. when his parents were speaking to him). His parents described him as often "looking through you". Bertie apparently found it easier to play with children than with adults at this age. His parents reported that he would watch them and not protest when they took his toys. There was no turn-taking in his play .

At the time of the play-based assessment, Bertie's mother reported that he had begun to clap hands when she sang "Patacake" to him. Bertie was also apparently happy to come in to his parents' bed. However, he frequently failed to respond to his name being called, and his mother reported that there were still times when "he seems so distant - so distant from us". Bertie would give a broken toy to his parents for them to mend but he would not give them any other objects.

Although Bertie often expressed anger and distress, his mother reported "he's never cross <u>with</u> me". During the play-based assessment there were rare and fleeting episodes of apparent shared experience which were limited to brief eye-contact rather than reciprocal play. Bertie's expression and smile seemed to suggest some understanding of the adult's intention. He frequently demonstrated that he wanted to occupy himself alone by turning or walking away. He did not initiate physical contact for play purposes but did occasionally move closer to the adult's area of play. He also briefly engaged in parallel play (eg. at the table).

Communication at the time of participation in the studies (aged 41 months)

At 41 months, Bertie often relied on 'dragging' the hand of someone to what he wanted. Since his third birthday, Bertie had begun spontaneously to point to an object of interest and at the time of the study he would occasionally label something he appeared to want. He rarely looked towards people whilst pointing, he tended instead only to look towards the object he required. Bertie's mother reported that he did not point as a means of commenting on his environment. Pointing appeared mostly to be the means whereby Bertie marked observations for himself. When Bertie's pointing was apparently communicative it was to request something rather than to comment. His father reported that "if something's broken, Bertie'll point to it, go away for 5 minutes and come back looking as if "why haven't you mended it?" During a formal Griffiths Mental Development Scales (1984), but not the play-based, assessment, Bertie was observed once to point to an object and to look from it towards another person. Bertie did not use other non-verbal symbols as a means of communicating (eg. waving, miming etc.)

Bertie's mother reported that he would come to her if she called "drink" or "dinner" but not if she called his name. It seemed to her that he did not understand the significance of this. During the play-based assessment Bertie showed that he was able to respond to the verbalisations of another person, but his responses were unclear and inconsistent. He appeared to respond to the voice of a person, rather than the meaning of their words. For example, in response to his name being called, Bertie would turn towards the clinician briefly but then quickly turn away. He did not look at her during these occasions nor respond physically by moving closer. He did not wait to see what would follow his name being called.

At the time of the play-based assessment, Bertie had difficulty in grasping the specific meaning of seemingly simple questions, such as "Where's the cup?" However, he showed that he could sometimes follow the key-word in a sentence. He did not understand the appropriateness of different language and behaviour in different situations. For example in the playroom when he was asked if he wanted to "go bye byes" (i.e. if he was tired), Bertie responded by lying down on the table in preparation for sleep.

Bertie's mother described Bertie's speech development as "like a child of 18 months - he doesn't seem to have progressed". His father's impression was that "Bertie can't be bothered with all that baby talk". Bertie's noises were always uttered to himself rather than as a communication. He did not look at people when vocalising. If Bertie was hurt, eg. in the garden, he did not seek help but remained where he was and cried.

Bertie's vocabulary comprised a very limited number of utterances, such as "car", "chair" (= pushchair), "goka" (= broken). In the main, these utterances were used repetitively, though they were usually used in appropriate contexts. For example, he was observed to say "goka" whilst looking at torn pages in a book and also at a picture of a car with flat tyres. Bertie also echoed the speech of other people and tended to stop using (or lose) words from his own vocabulary. During the play-based assessment, Bertie was not observed to use verbal expression in order to initiate interaction, describe an object or event, express emotion or make requests. He made some random non-communicative verbalisations. When in distress, Bertie's self-expression was limited to crying accompanied by high pitched squealing. During play, Bertie used very little vocalisation, though some babble type noises were heard, together with the few utterances mentioned earlier.

At the time of the play-based assessment, Bertie's parents reported that he would sing a lot at home (more than he would talk) and it was their impression that he used recognisable tunes. Bertie's mother reported that she enjoyed singing with him and teaching him songs, "but he seems to forget them". Bertie would apparently sing back to his mother whilst in bed and this was where she felt closest to him. His parents generally described him as "quite happy in his own little world".

2. Charles

Introduction

Charles had a fever-induced convulsion at ten months. He was the first of two children who were otherwise without developmental difficulties. They were cared for by both parents. Their father was unemployed.

Early Social Development

Charles' father vividly recalled his son staring straight at him when they first met each other after the birth. He also recalled a nurse commenting that Charles spent a long time staring at the label on his cot. Charles is reported to have been a 'very good' baby from the start who cried only when he needed feeding. His mother remembered him regularly looking at her whilst feeding. At 9 weeks Charles appeared happy to be held by each adult at his christening and his parents recalled that from this time it was possible to make him smile. However, following the birth of their second child, Charles' parents realised that it had never been possible to have two-way (preverbal) conversations with Charles in the ways easily enjoyed by his sister at three months.

During his early months Charles apparently never objected to people picking him up. His parents recalled that, at four months, he liked "to stand up on a lap and be jiggled about". They also reported that it was possible to talk to him as he sat on a lap and he was very ready to laugh when people made faces. Their baby diary described him at four months as "a very happy baby who likes to be tickled". He apparently smiled each morning when his parents entered his room and they perceived him as a contented baby who loved attention. His parents were not sure that he would have demanded attention but, as an only child, there was no need for him to do this. Charles' parents reported that "he would follow you everywhere" when crawling at nine months. Retrospectively, it seemed that it was after his convulsion at ten months that his behaviour could be identified as increasingly different from that of other children. For example, apparently Charles began to tolerate cuddles only when he wanted them and even these were ended by him slipping away. By twelve months old he would not look at people who greeted him in the local shops. Charles' parents did not worry about their son's eye-contact during his infancy but they later realised that he did not used it with the frequency or sensitivity shown by most babies.

Early Communication

Charles' parents had a record of him at five months sniffing as if to make them laugh, 'talking' whilst feeding, and being upset when his food was finished or a toy was taken away. His mother's diary recorded Charles at seven months imitating his maternal grandmother's cough (to make people laugh). At nine months Charles "would wave good-bye to everyone". His parents also recalled that he would lift his arms and persistently cling to whoever went near his cot. This seems to have been a form of reaching rather than gesturing.

Charles passed his hearing test and Denver assessment at nine months. Apparently at this age he also began to grind his teeth for a brief period. His parents recalled that although Charles would play with a variety of his toys he never showed or offered toys to them. He did apparently enjoy lap games where his active participation was limited to clapping his hands in imitation. Although the diary written by Charles' mother had one or two mentions of pointing (i.e. extending his index finger), his parents could not recall him using this or other gestures to communicate or compensate for his lack of speech during infancy. Furthermore, they had no recall of successfully pointing out objects of interest to Charles when taking him out in his pushchair.

Charles apparently once said "Diddy" (= Daddy) along with a string of babbled sounds whilst rough-and-tumbling with his father at the age of twelve months. This was thought to be the only occasion when he joined "words" with babble. Charles' parents also recalled that he said the word "Mummy" and a few others (separately) during the 12-18 month period. It seemed to them that Charles sang in tune. His parents could remember him singing "Ba Ba Black Sheep" at fourteen months. Charles' parents report that his vocabulary and communicative skills have seemed to "come and go" since infancy. His mother's diary recorded that he would not co-operate with the Health Visitor for his nineteen month assessment. At this age it is recorded that he said "hello" and "good-bye" alone with the telephone (he had apparently babbled on the phone at twelve months).

At twenty months Charles would apparently "chat away to himself" but no one could understand him. Charles' parents recalled that they were unable to prompt Charles to use the (four) words he knew at two years and by the time he was two and a half years they were very worried about the fact that he was not speaking. They described Charles as having been mostly non-communicative at this time. Apparently he did not pass through the usual phase of temper-tantrums.

Social Development at the time of participation in the studies (aged 48 months)

After Charles' three year assessment his health visitor had advised Charles' parents to "try to get him to look at you". By the time of the play-based assessment, Charles often looked to people's eyes but he did not do this with the frequency or range of facial expressions typical of a child of his age. He often appeared "friendly" or at least interested in people. However, he seemed to find people confusing. He would often withdraw either physically (by moving or turning away) or mentally (he became "dreamy and seemed to switch off").

Charles' Child Development Service key worker had been visiting his family for four months before Charles approached her spontaneously. During his play-based assessment Charles faced away from this clinician when she greeted him and only made eye contact with her on four occasions during the two hours of one-to-one play which followed. On one occasion at home, Charles happily looked to her eyes for a few seconds and then tried to move her face about, seeming interested in the patterns her changing profile made against the window. This reminded his parents of another occasion when he had once tried to touch an unfamiliar child's face at the park.

If Charles was encouraged he could imitate (eg. animal noises, poking his tongue out, blinking and saying "abc") but these imitations tended to be repetitive (with an echolalic quality) rather than spontaneous and flexible. Charles could take turns if guided within a game with a familiar format. For example, he would apparently kick (but not throw) a ball with his parents, but he found this too difficult with his clinician during play-based assessment. When Charles wanted someone to move he would physically push them without making eye-contact. If the other person refrained from moving and asked what

Charles wanted, he would then communicate (for example, by making eye contact or saying "drink").

Prior to his fourth birthday, Charles became quite 'clingy'. He quietly and persistently followed his mother around (even to the toilet) and would sometimes pull her to where he was occupied. However, he did not mind her being away from him if he did not see her leave. During play-based assessment, Charles appeared to enjoy rough and tumble/lap games with his clinician although he did not make eye-contact. At the time of his fourth birthday, Charles began to climb on his (seated) parents' legs and appeared ready for physical action games. Apparently his face would become animated when he saw the four-year-old girl who lived across the road and he enjoyed spending time at her house. His parents reported that they felt closest to him when he cuddled in their bed. They also reporting feeling able to comfort him when he was upset although not in the ways which are usually possible with a small child. In the week before his fourth birthday, Charles had approached his mother apparently wanting her to play with his stickle bricks; this was the first time he had appeared to communicate in this way with any toy.

Communication at the time of participation in the studies (aged 48 months)

At the age of four Charles was taught to touch-point to pictures when he heard their corresponding animal noises on a audiotape. Charles' parents reported that he would sometimes point to something if they told him to do so and he would occasionally seem to follow their own use of distance-pointing. During play-based assessment, he was unable to make use of his clinician's pointing gesture when he was struggling to find the right hole in a posting-box toy.

Charles' use of language was usually without eye contact. When speaking (one-word utterances) he appeared to be simply saying the word he associated with an object rather than genuinely participating in a conversation. On other occasions Charles' utterances seemed inappropriate as if they comprised delayed echolalia. For example he said, "Naughty" when the clinician opened the Spot book (and asked "Who is?'). Charles also said "1, 2, 3" or "a, b, c" when he saw letters or numbers but he did not seem to link each specific word with each specific number or letter and he tended to be obsessional about this type of activity.

Charles' parents taught him to use a few social words. For example, he spontaneously said "hello" and "be-po" to an unfamiliar person working in the Child Development Centre. He would also say "bye-bye" (sometimes needing prompting). This would sometimes be accompanied with eye-to-eye contact and occasionally he would lean forward to be kissed or he would wave (in an immature way, opening and closing his fingers). Charles would often walk away more quickly than was socially appropriate after having said good-bye. He would sometimes say good-bye to his mother who interpreted this as him wanting her to go away. If he was hurt outside on a swing he would come and find his mother and say "that's better" to her but he could not help her guess what had happened (eg. by saying "swing").

Charles used idiosyncratic labels. For example, the brown coal bucket was referred to as "chocolate". He did not speak in a monotone, but his voice tones varied without relationship to the meaning of his speech. They were often imitations of the intonation of his parents' expressions.

The most reciprocal use of speech observed occurred at four years when Charles echoed the word "yellow" with poor articulation. He repeated this (four times) each time his play-based assessment clinician misheard and responded by asking "what?". Charles understanding of his parents' language was such that he would pick up the newspaper or open his curtains when asked to do so in context, but he would apparently only occasionally respond correctly if asked "Go and ask Daddy for a drink and take your cup".

During the play-based assessment Charles kissed a puppet after his clinician had twice asked him to do this. Charles tried to use the magnetic disc on the doodle board. When his key worker suggested "turn it round" he appeared to realise he had to do something with the disc but couldn't make use of her words to help him. When she asked him to identify the bird picture he echoed "bird" but touched another picture. Charles has never engaged in teasing.

Concluding Remarks

The case studies in this and the previous chapter show the variety of deficits in social engagement in autism. They show marked departures from normal development, especially with respect to social reciprocity, teasing and nonverbal communication. As qualitative reports, they remain relatively informal. The next chapter therefore documents an attempt to systematise these and related observations.

Chapter Three

PARENTAL REPORT OF SOCIAL ENGAGEMENT DEFICITS IN INFANCY

Introduction

This chapter aims to identify specific aspects of social engagement that differentiate the infancies of children diagnosed as autistic from those of other children at comparable developmental levels. The Detection of Autism by Infant Sociability Interview (DAISI) was designed and used retrospectively for this purpose. DAISI was developed by the author from Newson's (1990) guidelines on diagnostic interviewing and it appears in full in Appendix III. It covers 22 aspects of social engagement usually developed within the first 24 months of a normal child's life. It was predicted that results obtained from a sample of 10 parents of preschoolers with autism and 10 parents of preschoolers with developmental delay(s) would reveal group differences on all 22 items.

As indicated in Chapter One, specific impairments related to social engagement have been demonstrated in children with autism when compared with children without autism but with learning difficulties. These include: nonverbal communication including joint attention skills (Mundy et al., 1986; Sigman, Mundy, Sherman & Ungerer, 1986; Wetherby, Yonclas & Bryan, 1989); imitation (Sigman & Ungerer, 1984b; Stone, Lemanek, Fischel, Fernandez & Altemeier, 1990); and communicative use of language at a verbal and preverbal level including turn-taking (Feldstein et al., 1982; Newson, 1977, 1987; Ricks, 1975; Wetherby, 1986). Studies focusing on the early manifestation of the above social deficits may help to clarify their developmental role. Their presence in children with autism in infancy has been indicated by retrospective video and questionnaire studies.

Family videorecordings of infants later diagnosed with autism compared with those of normal infants show symptoms in the areas of social interaction, communication and emotional reactions (Adrien et al., 1991; Kubicek, 1980). Eriksson and de Chateau (1992) employed similar methodology to a single case study of autism. This revealed apparently normal development in the first year with subsequent deterioration including deviant preverbal vocalisation. The disadvantage of such studies is that they only enable observations recorded by empirically naive parents for very different purposes. Furthermore, difficulties may arise in the interpretation of such studies as apparent impairments may be associated with learning disabilities rather than autism per se. Parent report data pertaining to children with autism and control subjects with learning disability may therefore serve a complementary role.

Systematic parent report data is of unique value since it is based on continuous transactions with the child throughout infancy. Where parent report data is collected by a skilled clinician prior to diagnosis, this can reveal information unavailable on birthday videotapes. Pre-diagnostic data collection helps avoid the dangers of interviewer bias. A further potential pitfall is the possible bias of parental recall. However, Stone and Hogan (1993) found significant correlations between clinical observations of the behaviour of young children with autism and parental reports pre-diagnosis. This confirms the beneficial role of parental informants in the diagnostic process (Glascoe, MacLean & Stone, 1991). There are only three published parental report studies on autism covering infancy that include developmentally comparable control groups (Dahlgren & Gillberg, 1989; Ohta, Nagai, Hara & Sasaki, 1987; Stone & Lemanek, 1990). Other studies are also included below where they have particular relevance to this review.

Ohta et al. (1987) employed retrospective questionnaires with mothers of 141 children under 12 years (37 of whom were 2 to 3 years old). They found that 57% of parents first noticed abnormalities in their children with autism at 1.5 to 2.5 years old. Most early symptoms were social- and speech-related. Early social symptoms were found to discriminate between subjects with autism and mental retardation. Ohta et al.'s work is limited by reliance on global behavioural descriptions but nevertheless it offers direction to subsequent research.

Dahlgren and Gillberg (1989) also gave retrospective questionnaires to parents of 7 to 22 year olds with autism. Items that discriminated the infancies of children with autism from control groups both with and without mental retardation included, "Empty gaze" and "Did not try to attract adult's attention to own activity". Dahlgren and Gillberg acknowledge that post-diagnostic completion of the questionnaires "places the most severe restrictions on the study" (p. 171) and this problem also applies to Ohta et al.'s findings. However, they remain useful in directing subsequent research. For example, Dahlgren and Gillberg found no discriminating power for peculiarities of development of babbling, nor for pitch, tone or voice inflection in speech.

Unlike the above questionnaire studies which involved parental recall back to infancies of up to twenty years prior to the research, Stone and Lemanek (1990) used questionnaire methodology with parents of three- to six-year-olds with autism (N = 14, post-diagnosis) and with learning disability (N = 15). They requested Yes/No answers to questions pertaining to the children's first five years, rather than infancy per se. Six of the eight items revealing differences between the autistic and 'mentally retarded' groups involved aspects of social communication. However, these all involved activities with other children rather than adults and so they are likely to reflect differences post-, rather than during, infancy.

Gillberg et al. (1990) studied the responses of fourteen mothers of children with autism aged under three years old when given Dahlgren and Gillberg's (1989) 130 item questionnaire on general early symptoms. There were no matched control subjects. Gillberg et al. (1990) found that symptoms which affected ten or more of these children and had been previously found to discriminate retrospectively between autistic and 'mentally retarded' older children included: suspicion of deafness, "empty" gaze, does not try to attract adult's attention to own activity; and, does not smile when expected to. The following symptoms which affected 10 or more of these children and had <u>not</u> previously been found to discriminate retrospectively between autistic and 'mentally retarded' older children included: does not point to objects; something strange about his gaze; difficulties getting eye-contact; cannot indicate his wishes; and, does not listen when spoken to. All these findings can be summarised as including peculiarities of gaze and hearing together with abnormalities of play. It was not specified whether the questionnaires were completed by mothers pre- or post- diagnosis of their children.

In contrast to reports by previous authors (eg. Ricks, 1975), pathological patterns of babble, speech and language did not emerge as typical in Gillberg et al.'s (1990) young population. The authors acknowledge that "such abnormalities may well have been present, but at a level so sophisticated that they did not show up in our study." (Gillberg et al., 1990, p. 933). This highlights the need for interview methodology to identify difficulties at this level. Gillberg et al.'s (1990) mothers are reported also to have been given interviews by an experienced child psychiatrist which included focusing on early symptoms. However, this appears to have been for diagnostic rather than research purposes since results from it are not given within the paper. Relevant interview-based studies are presented below (Baron-Cohen, Allen & Gillberg, 1992; Charman, Swettenham, Baron-Cohen, Cox, Baird & Drew, unpublished; Hoshino et al., 1982; Lord et al., 1993; Schopler, Reichler & Renner, 1988; Stone, Hoffman, Lewis & Ousley, 1994; Stone & Hogan, 1993).

The Childhood Autism Rating Scale (CARS; Schopler, Reichler & Renner, 1986) comprises broad questions encompassing a range of current behaviour applicable to observations of children with autism from birth to 16 years. CARS has also been used in parent interviews although it was not designed for this. Baron-Cohen, Allen and Gillberg (1992) have recently developed an instrument, the Checklist for Autism in Toddlers (CHAT). This is designed to check for pretend play, joint attention behaviour "as well as unrelated developmental accomplishments" (Charman, Swettenham, Baron-Cohen, Cox, Baird & Drew, unpublished, p. 4). Published results from the application of this important new instrument have been limited by the difficulties of identifying subjects to whom it can be usefully applied. However, Chapter Nine outlines the findings of Charman et al.'s recent unpublished study which was made available at the close of the thesis.

Hoshino et al. (1982) employed post-diagnostic clinical interviews with parents retrospectively examining their children's infancies. Subjects were children with autism aged nearly seven on average compared with normal and 'mentally retarded' control subjects. Interviews by child psychiatrists found that autistic early symptomatology included disorders in personal relations and developmental regression. The former included not looking at others;

not imitating others; being indifferent to others; not reacting when called by name; not being bashful; fond of being alone; having an expressionless face; not following the mother; having no interest in playing peekaboo; not getting a habit of being held; behaving as if deaf; not smiling at mothers or others and not following the mother with the eyes.

Hoshino et al. (1982) found that early symptoms indicative of regression were: losing acquired words, losing the capacity to imitate; and, becoming incapable of pointing. The intellectual level of the 'mentally retarded' control subjects is not otherwise specified. Possible weaknesses in matching may explain why 78% of them failed to point at objects as opposed to 87% of infants with autism and 0% of normal control subjects.

Hoshino et al.'s (1982) generic look at autistic infant symptomatology probed recollections back over approximately five to seven years with a 59 item interview schedule. The Autism Diagnostic Interview (ADI, Lord et al. 1989) is probably the most comparable instrument to this Japanese schedule. A revised version of the ADI (ADI-R, Lord, Storoschuk, Rutter, & Pickles, 1993) is for generic diagnostic interviews with parents of children whose mental ages are 18 months or above. It is not intended for retrospective examination of autistic symptomatology in infancy.

In a study based on use of the ADI-R, with two- to five-year-olds with autism, some items were asked retrospectively ("defined as 'ever' occurring between 6-18 months chronological age", Lord et al., 1993, p. 93). However, retrospective results were apparently not always distinguished from data on current functioning. Overall results revealed diagnostic group differences on aspects of reciprocal social interaction. More significant to the purposes of the infancy study which follows, Lord et al. (1993) report that autistic children were described by their parents as "less likely to babble in a socially directed way as infants" (p.243) than the learning disabled or language impaired control subjects.

The Parent Interview for Autism (PIA) also has a generic focus. It is designed for diagnostic interviews of parents of subjects under six years old (Stone & Hogan, 1993). Six of the PIA's eleven dimensions contain elements which involve aspects of social reciprocity (eg. motor imitation).

In Stone and Hogan's (1993) study, "specially trained" undergraduate and postgraduate psychology students took 30-45 minutes to interview each participating parent using the 118 item PIA schedule prior to diagnosis. The (165) children under study were aged 40.7 months on average (ranging from 20-71 months). A sub-group of 58 children with autism were compared with a separate sub-group of 36 children with developmental delay using the PIA which focuses only on current behaviour. The strongest dimensions overall, in terms of discriminative ability and relationship to other measures of autism, were all found to involve aspects of social reciprocity (i.e. Social Relating, Motor Imitation, Peer Interactions and Nonverbal Communication).

Stone, Hoffman, Lewis and Ousley (1994) employed the PIA with parents of children with autism aged 24 to 44 months. They found that deficits in the areas of social interaction, imitation, play and nonverbal communication were more prominent than insistence on sameness and routines.

The Detection of Autism by Infant Sociability Interview (DAISI)

The semi-structured Detection of Autism by Infant Sociability Interview (DAISI) was developed by the author for the present study in order to focus on social engagement; it appears in full in Appendix III. DAISI was designed for use by experienced clinical psychologists for both research and clinical purposes as an essential component of the diagnostic process rather than the sole instrument employed. DAISI items cover aspects of social engagement as revealed by the literature. For example, they represent aspects of: nonverbal communication, early babbling and word use, social play with and without toys etc. DAISI checks for developmental regression with respect to social engagement as well as monitoring the presence of abilities and deficits.

DAISI comprises an intensive guided interview oriented around developmental progressions in the skills related to social engagement. The interview is designed to enable a relationship to develop between parent(s) and clinician which will encourage honest and accurate replies. It employs a conversational style without it being obvious to respondents when the interviewer is moving from one item to another. Questions are phrased to avoid response set bias and sensitive probing is employed, rather than reliance on Yes/No answers. For example, with respect to waving goodbye, clinicians using DAISI ask some, or all, of a series of questions focusing on waving: "Did X notice when people s/he knew well were leaving? What would s/he do? ... Would s/he wave if they (or you) waved? ... Would s/he need you to tell him/her to wave or to lift his/her hand for her? ... Would s/he wave spontaneously? ... How did s/he do it? (i.e. to distinguish from arm flapping) ... where would s/he be looking?" (Item 14, DAISI).

Progression to each question is dependent on replies to those preceding it. As in this example, questions are arranged to increase the likelihood of parents being able to give an initial positive response before having to give any negative responses with respect to further detailed questioning.

The study which follows uses the Detection of Autism by Infant Sociability Interview in seeking to identify aspects of social engagement which distinguish the infancies of children with autism from those with comparable developmental delays. The study is retrospective in the sense that parents are asked to recall aspects of child's behaviour that were part of their everyday lives from 6 to 24 months prior to the interview. Both parents and clinician recorded developmental histories of autism blind to subsequent diagnoses (later confirmed by specialist play-based assessment). Any DAISI-related abnormalities before the second birthday are registered as areas of difficulty since some of the reviewed literature indicates that apparently normal development may precede development of autistic symptoms in infancy.

Lord (1991) identifies a trade-off between accuracy of interpretation and the amount of information obtained in structured, as opposed to more open-ended, interviews; she thereby highlights the need for sensitive probing. In this respect, DAISI represents progression beyond the questionnaires, checklists and checklist-driven interviews of earlier studies (Dahlgren & Gillberg, 1989; Gillberg et al., 1990; Ohta et al., 1987; Stone & Hogan, 1993; Stone & Lemanek, 1990). For example, Stone and Hogan's (1993) research was limited to Yes and No type questions such as, "does X imitate simple gestures such as waving goodbye or clapping hands?". This contrasts with probes used within DAISI to derive a picture of the gestural development of waving, as detailed earlier. The administration of DAISI interviews by a clinician has obvious advantages over interviews by students as were employed by Stone and Hogan's (1993) study.

DAISI's focus on early social engagement contrasts with the general diagnostic focus of previous studies, the findings of which have informed its content. Examples include studies by Lord et al., (1993) and

Stone and Hogan (1993). The latter's findings emphasise the importance of early-identifiable deficits relating to social reciprocity in preschool children with autism. DAISI's orientation around developmental progressions in the skills related to social engagement contrasts with the deficit focus of early parent report instruments (eg. Rimland, 1971). In this respect DAISI follows the more recent tradition of the Preschool Social Behavior Checklist (PSBC, Stone & Lemanek, 1990).

The application of DAISI which follows is one of the few studies (for example, Stone & Hogan, 1993) carried out prior to diagnosis. It thereby contrasts with most of the studies reviewed earlier (for example, Dahlgren & Gillberg, 1989; Ohta et al, 1987). Furthermore, DAISI contrasts with published studies in focusing specifically on the first 24 months. Other studies which may retrospectively include the first twenty four months, include this within consideration of a longer period such as the preschool years (for example, Dahlgren & Gillberg, 1989; Stone, Hoffman, Lewis & Ousley, 1994; Stone & Hogan, 1993; Stone & Lemanek, 1990). Previous retrospective research has required parental recollections over up to twenty years (Hoshino et al., 1982; Ohta et al., 1987) rather than over six to twenty-four months as in the following application of DAISI. The study which follows also employs a well-matched group of control subjects in further contrast to a number of previous related studies (for example, Gillberg, et al, 1990; Hoshino et al., 1982).

Despite parental recall being over a relatively short period in the application of DAISI which follows, a potential pitfall remains the possible memory bias of participants. The clinical interview style aims to enhance the accuracy of recall by providing situational prompts (such as, "imagine he was on your knee in a doctor's waiting room where there were no toys available ..." etc.) which are unavailable in the checklists described earlier. Although concurrent parental interviews and observations of infants with autism remains the preferred option (as in Baron-Cohen et al.'s (1992) Checklist for Autism in Toddlers or CHAT), studies adopting this approach during infancy have yet to become published, as detailed earlier.

Design

As indicated earlier, between-group analysis was applied to the results of retrospective interviews with parents of preschoolers with autism and parents of preschoolers with developmental delay(s). It was predicted that the subjects with autism would differ from control subjects in that the former would show difficulties in each of the following areas prior to their second birthday:

1. Frequency and/or intensity of eye-contact
2. Referential eye-contact
3. Greeting others
4. Soothability from crying by being lifted up
5. Soothability from crying by non-physical social input
6. Readiness to be entertained without the use of toys
7. Enjoyment of lap games
8. Activity in lap games (versus passive role)
9. Willingness to allow parents to join in play with toys
10. Offering and giving objects
11. Showing objects
12. Use of pointing
13. Comprehension of pointing
14. Waving
15. Raising arms to request being lifted up
16. Teasing

17. Preverbal turn-taking eg. through babbling
18. Socially directing anger or distress (as if intentionally communicative)
19. Communicative use of preverbal noises
20. Communicative use of words
21. Acquisition and retention of early vocabulary
22. Consistency in sociability towards main caregiver

These items correspond with the items from the Detection of Autism by Infant Sociability Interview as given in table 3.2. The final three items may each involve some recollections post- as well as pre-24 months. Details of patterns of questioning are given in the copy of DAISI in Appendix III together with criteria for affirmative or negative responses.

Method

Subjects

Twenty parents of preschool children in two diagnostic groups were interviewed retrospectively using DAISI. Ten were parents of children with developmental delays but without autism, whilst ten were parents of children with autism. The DAISI was administered within the routine clinical assessment experience of all the children with autism and three of the control children. Ethical permission was sought to use their data for research and to collect complementary data from additional control subjects. Mothers were always present at interview. Six fathers from the autistic group and two from the developmentally delayed group were present. Parents rarely disagreed with each other but the views of the primary caregiver were recorded where this was the case.

The ten children with autism most recently diagnosed at the county's Child Development Centre were selected for the study. The parents of half of these children had no prior suspicion that this would subsequently be their child's diagnosis. All children in the autistic group met the DSM-III criteria of early onset, abnormal social relating, deviant speech and language skills, and unusual responses to the environment (American Psychiatric Association, 1987). Independent clinicians confirmed the presence of autism in these children using the Childhood Autism Rating Scale (CARS; Schopler et al., 1986). As indicated earlier, CARS scores can range from 15 to 60, with scores at or above 30 indicative of autism. Table 3.1 shows that CARS scores from the autistic group ranged from 35 to 57 (mean 45.1).

The Griffiths Performance Scale can be administered by a trained clinician to children with minimal language comprehension. Half of the autistic group were preverbal and half used one word utterances. Performance Scores from the Griffiths Mental Development Scales (Griffiths, 1984) were used to give Developmental Quotients (DQs): mean 79.2 (range 23 to 117) for the subjects with autism who were aged 40.9 months on average (range 32 to 48 months).

Control subjects were group-matched with those with autism. They were selected primarily on the basis of both Developmental Quotient and Chronological Age. Secondary selection criterion was expressive language level. The mean age for control subjects was 41.1 months (range 30-48 months). Control subjects comprised a random selection of children without autism who had been referred with possible developmental delay to the same Child Development Centre as the subjects with autism. Performance Scores from the Griffiths Mental Development Scales (Griffiths, 1984) gave DQs for control subjects as mean 80.6 (range 48 to 110). DQs of one child from each of the two groups were over 100. The developmentally delayed group included two children whose only area of significant delay was in communication.

Most children in the control group used only one word utterances (N=6), two used two word utterances, one used phrases and one was preverbal. The aetiologies of the delays in this group were unknown with the exception of two children who had Down's Syndrome. No subject had motor impairments that could affect gesturing. No subject in the developmentally delayed group scored within the autistic range on CARS.

The children with autism scored significantly higher on the Childhood Autism Rating Scale (CARS) than did the control subjects ($F (1,18) = 69.81$, $p = <.0001$). The two groups differed neither on chronological age (CA, $F(1,18) = .007$, $p = .93$) nor Developmental Quotient (DQ, $F (1,18) = .02$, $p = .89$) as recorded on the Griffiths Performance Scale. There were no differences in the proportion of males to females between the groups (χ^2, 2, N 20, 1.98, $p = .16$). Means, standard deviations and range for age, CARS scores and DQs for each group are given in Table 3.1. The groups did not differ in expressive language level (χ^2, 2, N 20 = 5.76, $p = .06$) nor in birth order (χ^2, 2, N 20, = 2.14; $p = .54$).

Within the autistic group, half the parents were aware of the probable diagnosis of their child, but this was not related to birth order (χ^2, 1, N 20, = 4.33; $p = .11$). Nor did the total DAISI scores of children with autism whose parents were aware of the probable diagnosis prior to interview differ from those of children with autism whose parents who were naive in this respect ($F(1,18) = .87$, $p = .38$).

Table 3.1. Subject Characteristics

	Autistic (N = 10)	Developmentally Delayed (N = 10)
Males	8	6
Females	2	4
Age (months)		
M	40.9	41.1
SD	4.82	5.84
Range	32-48	30-48
DQ score		
M	79.2	80.6
SD	27.56	23.26
Range	23-117	48-110
CARS score		
M	45.1	24.6
SD	7.3	2.64
Range	35-57	21-29

(Individual subject details are given in Appendix IV.)

Clinical Procedure:

Use of the Detection of Autism by Infant Sociability Interview (DAISI)

For this study DAISI was employed by the same Principal Clinical Psychologist in separate interviews with one or both parents of each subject. Two interviews from each group took place in a familiar Child Development Centre, the remainder were domicilary. The DAISI takes about an hour to administer to parents whose responses are recorded verbatim. Affirmative responses to each DAISI item receive one point, thus total scores from DAISI range from 0-22. Table 3.2 shows the DAISI items.

Table 3.2. Items from the Detection of Autism by Infant Sociability Interview retrospectively asked re: 0-24 months

1. No observed difficulties with frequency or intensity of eye-contact.
2. Appropriate use of referential eye-contact.
3. Greeted parents on reaching cot.
4. Could be soothed from crying by being picked up.
5. Could be soothed from crying by social input alone (non-physical, eg. talking).
6. Could be amused by parents when toys were unavailable.
7. Enjoyed lap games.
8. Took an active role in lap games (eg. clapping)
9. Allowed parents to join in play with toys.
10. Offered and gave objects to others.
11. Showed objects (eg. by lifting them up for others to see).
12. Pointed at objects.
13. Followed others pointing at objects.
14. Waved appropriately.
15. Raised arms to request being picked up.
16. Teased others.
17. Took turns, for example with preverbal babbling.
18. Socially directed anger or distress (as if intentionally communicative).
19. Used preverbal noises communicatively.
20. Words expressed as if with communicative intent.
21. Early vocabulary acquired and subsequently retained (not lost).
22. Sociability towards mother showed no dramatic change.

(NB Items 20-22 involve some recollections post-, as well as pre-24 months)

Results

The internal consistency of DAISI was determined using the Kuder-Richardson-20 statistic (for dichotomous data). This gave a standardised item alpha coefficient of 0.9. The autistic group's mean DAISI score was 3.7 (SD = 2.36, range = 0-7). The developmentally delayed group's mean DAISI score was 18.4 (SD = 2.72; range = 14-21). Significant group differences emerged from analysis of variance on DAISI total scores, $F(1,18) = 166.94$, $p < .0001$. Individual DAISI scores for each subject are given in Appendix V.

Numbers of children from each group passing each of the 22 DAISI items are shown in Table 3.3. Each item was subjected to Fisher (Fisher's Exact Test) analysis. This revealed significant group differences on 17 items. Most (N = 12) of these were significant at $p < .01$. The latter revealed autistic infant deficits in the following areas: frequency/intensity and referential use of eye-contact (1 and 2); showing, offering and giving objects (11 and 10 respectively); use of 'pick-up' gesture and pointing comprehension and use (15, 13 and 12 respectively); preverbal turn-taking and communicative use of preverbal noises (17 and 19); retention and communicative use of early words (21 and 20 respectively); and, unchanged levels of sociability towards mother (22). The remaining five group differences were significant at the $p<.05$ level only. These indicated infant deficits in the following areas: greeting others (3); sociability in play with and without toys (9 and 6 respectively); waving (14), and socially directed anger (18).

Table 3.3. Items indicating between-group differences

DAISI item	No. of children passing each item (max N = 10) Autistic	Developmental Delay
a) Significant at p<.01 (Fisher's Exact Test)		
1. No observed difficulties with frequency or intensity of eye-contact	0	10
2. Appropriate use of referential eye-contact	0	9
10. Offered and gave objects to others	0	8
11. Showed objects	0	6
12. Pointed at objects	0	10
13. Followed others pointing at objects	0	9
15. Raised arms to request being picked up	2	10
17. Preverbal turntaking	0	8
19. Used preverbal noises communicatively	0	9
20. Words expressed as if with communicative intent	0	10
21. Early vocabulary acquired and subsequently retained (not lost)	0	8
22. Sociability towards mother showed no dramatic change	1	9
b) Significant at p < .05 (Fisher's Exact Test)		
3. Greeted parents on reaching cot	4	10
6. Could be amused by parents when toys were unavailable	5	10
9. Allowed parents to join in his/her play with toys	4	10

Table 3.3 (continued)

DAISI item	No. of children passing each item (max N = 10) Autistic	Developmental Delay
b) Significant at p<.05 (Fisher's Exact Test)		
14. Waved appropriately	0	5
18. Socially directed anger or distress (as if intentionally communicative)	3	9
c) Not Significant		
4. Could be soothed from crying by being picked up.	6	9
5. Could be soothed from crying by social input alone (non-physical, eg. talking)	2	5
7. Enjoyed lap games	6	10
8. Took an active role in lap games	4	8
16. Teased others	0	2

(Individual results from DAISI are given in Appendix V.)

Where the two groups did not significantly differ it was sometimes the case that most of the developmentally delayed group scored positively on the item and so too did <u>some</u> of the children with autism. This was the case for needing to be picked up to calm from crying as well as enjoyment of and responsivity to lap games. Two items differed from this pattern. The developmentally delayed children often failed to stop crying in response to their parents talking to them and they generally failed to show acts of teasing. DAISI total scores correlated significantly with Childhood Autism Rating Scales scores for the entire group (-.891, p <.0001) and for the sub-group with developmental delay (-.882, p = .0002). The correlation between DAISI and CARS scores for the subgroup with autism was not significant (-.132, p = .73).

Discussion

This study of retrospective parental reports confirmed the presence of social engagement deficits in autistic infants comparable with those previously identified in older children with autism (Feldstein et al., 1982; Mundy et al., 1986; Newson, 1977, 1987; Sigman, Mundy, Sherman & Ungerer, 1986; Ricks, 1975; Wetherby, 1986; Wetherby, Yonclas & Bryan, 1989) including those at preschool age (Lord et al., 1993; Stone, Hoffman, Lewis & Ousley, 1994; Stone & Hogan, 1993) as detailed in the introduction to this chapter. Application of DAISI clearly revealed autistic infant deficits in aspects of: eye-contact; sociability; gestural body-language; interactive babbling and use of early words. The use of a control group with developmental delay(s) served to demonstrate that these deficits in the children with autism were attributable to their autism, rather than developmental delay per se. Furthermore, the study confirmed that guided clinical interviews on social engagement can enable parents of preschoolers with autism to describe their children's infancies with cross-subject and -study consistency.

The most significant findings (where $p < 0.01$) revealed autistic infant deficits in the areas of eye-contact, sociability, gestural body-language, babbling and use of early words. More global indications that these deficits were present during infancy were given in the parental report studies reviewed earlier (Dahlgren & Gillberg, 1989; Gillberg et al., 1990; Hoshino et al., 1982; Lord et al., 1993; Ohta et al., 1987). The following deficits in joint attention skills were identified on more specific terms through the application of DAISI: referential eye-contact, showing, offering and giving and instrumental use of gestures (re: arm-raising to request lifting and pointing together with comprehension of the latter).

A deficit in babbling with communicative intent (Lord et al., 1993) was confirmed using DAISI whereas the indication of a deficit in communicative turn-taking (usually through babbling) is an extension of previous findings. Furthermore, DAISI items concerning loss of early words and changed levels of sociability towards the main caregiver enabled new clarification on components of possible developmental regression in autism. This extends the findings of previous limited research in this area (Eriksson & de Chateau, 1992; Hoshino et al., 1982).

Other differences with lower levels of statistical significance ($p > .01$, $< .05$) identified by the study were behaviours relevant to meeting or leaving people (i.e. greeting and waving) and playing with others (with and without toys). Whilst the former constitute more specific deficits than previously identified, the latter confirm the findings of previous parental report studies (Dahlgren & Gillberg, 1989; Gillberg et al., 1990; Hoshino et al., 1982; Lord et al., 1993; Ohta et al., 1987). Application of DAISI also revealed that autistic infants were reported to be less likely to communicate their anger or distress to another person. This has not been considered by previous studies.

The DAISI study clarifies that some difficulties in infancy are not an inevitable consequence of autism since patterns of parental responses did not significantly differ between participating groups. For example, almost all the control children and most of those with autism were reported to need at least to be picked up in order to be calmed from crying. Few children could be soothed from crying by a parent's voice alone. The retrospective acknowledgement of both autistic and developmentally delayed infants' inability to be soothed by simply hearing their parent's voice indicated that parents were prepared to give 'negative' as well as positive answers, presumably in the interests of accuracy. In the absence of a normally developing control group, the common inter-group characteristics relevant to soothability cannot be defined as deficits.

Contrary to predictions, the autistic group did <u>not all</u> fail to respond appropriately in lap games. In this respect the study appears to confirm the PSBC checklist-based research of Stone and Lemanek (1990). This may indicate that lap-games provide structure for aspects of social reciprocity, and/or support for inter- and intra-personal timing, thereby enabling the participation of infants with autism. However the threshold for a positive response to this question within DAISI (and perhaps also the PSBC) may have been too low. For example, children with autism who could only clap hands during lap games scored positively on this item within DAISI. Control subjects may additionally have been able to initiate the lap games and use gestures specific to them, thereby contributing further to the familiar flow of interaction. However, within the current study they could score no higher than the threshold level.

The autistic group's deficit in infant teasing others was shared by most of the children with developmental delay in contrast to previously reported observations of normal infants who show acts of teasing before 24 months (Reddy, 1991). The current study therefore indicates that failure to tease in infancy cannot be attributed to autism alone. It may be that developing the ability to tease is delayed in most children with developmental delay but remains deficient in older children with autism.

The DAISI findings are congruent with other observations (eg. Lord et al., 1993; Ricks, 1975) in contradicting Dahlgren and Gillberg's (1989) and Gillberg et al.'s (1990) failure to identify pathological patterns of babble, speech and language as typical in preschool children with autism. As indicated earlier, the Gillberg studies involved the same 130 item questionnaire on general early symptoms and the authors themselves conclude that "such abnormalities may well have been present, but at a level so sophisticated that they did not show up in our study." (Gillberg et al., 1990, p. 933).

The overall pattern of DAISI-derived findings contrasts, in part, with the checklist study of Stone and Lemanek (1990). They found no deficits in the interactions of young autistic children with their parents with respect to the signs of social interest and responsiveness that are usually established by two years. They suggest that these findings may be due to the PSBC format being insensitive to *qualitative* differences in the aspects of social behaviour. It is possible that DAISI's pre-diagnostic clinical interview methodology enabled confirmation of social deficits in infancy (in the areas of eye-contact, sociability, gestural body-language, babbling, etc.) with greater specificity than previously possible through Yes/No responses to a questionnaire.

The DAISI-identified findings concerning pointing confirm previous related data other than those derived from Hoshino et al.'s (1982) post-diagnostic retrospective clinical interviews. The intellectual level of the 'mentally retarded' control subjects is not otherwise specified. Possible weaknesses in matching may explain why 78% of them failed to point at objects as opposed to 87% of infants with autism and 0% of normal control subjects.

The findings of the present study must be interpreted alongside its inherent limitations. For example, although DAISI includes items where imitation may be a sub-component (as in turn-taking vocalisations within item 17), it does not enable investigation of imitation per se as a potential early deficit. As indicated above, previous studies have identified this deficit in older preschoolers with autism (Stone, Hoffman, Lewis & Ousley, 1994; Stone & Hogan, 1993).

Unfortunately, data from DAISI does not distinguish a) the nature of early expressive pointing deficits or abilities (instrumental vs. expressive) or b) the precise age at which deficits or abilities became apparent to parents. Therefore the findings cannot clarify whether the autistic infant deficits appear before or after the postulated age of emergence of "theory of mind" (Baron-Cohen, 1991), for example, at eight to ten months when infants normally demonstrate joint visual attention (Scaife & Bruner, 1975). DAISI needs refining in this respect before it may be definitively used to address the accounts of early social developments in autism as proposed by the theory of mind hypothesis (cf. Klin, Volkmar & Sparrow, 1992).

As indicated earlier, DAISI total scores correlate overall with Childhood Autism Rating Scales scores. The lack of a significant correlation between DAISI total scores and Childhood Autism Rating Scales scores for the group with autism is puzzling. However, it may reflect the fact that the focus of the latter is on general aspects of autism in childhood rather than social engagement in the infancies of children with autism. It is possible that children who display more marked deficits in social engagement in infancy do not have greater severity of the general condition of autism in childhood. As indicated earlier, DAISI constitutes an important tool within the assessment process for autism rather than being a diagnostic instrument that stands alone.

Limitations in the present study's application of DAISI include the author's dual role as interviewer and researcher. However, parents and clinician were in most cases 'blind' because the autistic interviews took place before the diagnosis had been made. The lack of a normal control group prevents conclusions being drawn about possible social deficits attributable to developmental delay in the two clinical groups. In the light of the limitations identified here, findings from the present study must be considered preliminary.

In summary, the study indicates that infant deficits in the joint attention-related skills specified earlier are attributable to autism rather than any additional learning disability. Furthermore, they suggest that current research on visually-mediated joint attention skills (Baron-Cohen, 1991; Sigman, Mundy, Sherman & Ungerer, 1986) should be extended to include vocal/auditory skills.

Summary

On the basis of parental retrospective reports, the evidence presented here indicates that at least in the case of children with the profile of cognitive and language deficits that characterise the present sample, there are autism-specific deficits in aspects of social reciprocity before twenty four months. These include the communicative use of eye-contact, babbling and gestural body-language. The thesis now turns to consider how clinicians may facilitate the use of these skills by the same children with autism at preschool age.

Chapter Four

DEVELOPMENT OF CODING FOR ACTIVE SOCIABILITY IN PRESCHOOLERS WITH AUTISM (CASPA)

The previous chapter, based on retrospective parental reports, revealed deficits in the preverbal interaction skills of children with autism during infancy. The pattern of these deficits is consistent with those observed in preschoolers with autism. Reported observations, detailed in this and the following chapter, indicate that preschoolers with autism rarely participate in episodes of social engagement (Lewy & Dawson, 1992). The potentially therapeutic role of adults in facilitating such episodes has yet to be determined (see Chapter Five). The present chapter reviews previous attempts to record adult and child actions in this respect and presents the development of a coding schedule for this purpose. It initially considers the importance of social deficits in preschoolers with autism and reviews relevant assessment instruments and measures employed by previous studies.

The schedule for Coding Active Sociability in Preschoolers with Autism (CASPA) is introduced in the second half of this chapter. The process whereby CASPA evolved is described together with a rationale for each of its component parts. Advantages of CASPA over previous instruments are explained, followed by specific coding criteria for each CASPA item. The subsequent chapter applies CASPA to videorecordings of adults and preschoolers with autism.

Importance of Naturalistic Observation of Social Engagement in Autism

Interactive reciprocity is deficient in autism and social relatedness is therefore a primary focus of current research (Volkmar et al. 1993, Walters, Barrett & Feinstein 1990). However, there are relatively few descriptive studies of spontaneous social relatedness between autistic children and carers in natural, interactive settings (Dawson & Galpert, 1986; Stone & Caro-Martinez, 1990). Walters et al. (1990) have pointed out that there is "clearly a need for the development of a sensitive and reliable procedure for assessing behaviour based on the several significant and behaviourally measurable elements of social relatedness research to date has elucidated" (p. 321). Such procedures need systematically to capture social interaction rather than merely register isolated behaviour out of context (Lord, 1984, 1993). Studies of young autistic children's social relations with adults previously tended to focus predominantly on abnormalities (Howlin, 1986). However, research from the last decade has shifted to describing their communicative competencies as well (Wetherby, 1986). There follows a review of established instruments designed specifically to assess social engagement. Consideration is then given to measures employed in previous autism studies to assess both child and adult behaviour in relation to social engagement.

Observation instruments designed specifically to assess social engagement

There is a lack of information on the reliability of many instruments used to assess sociability in autism (Parks, 1983). Most autistic observation scales are for diagnostic purposes rather than for research into social engagement (Lord et al., 1989). Instruments specific to naturalistic observations of social engagement between adults and children with autism are rare (eg. Loveland, Landry, Hughes, Hall & McEvoy, 1988).

Loveland et al.'s (1988) pioneering observation schedule for their own research focused on the pragmatics of 1:1 interactive behaviour between adults and school children with autism (N = 12, plus control subjects). Individual turns were coded as responses or initiations and their pragmatic content was registered, including the presence of "turn-taking vocalisations". Single partners' behaviour was thereby coded for only vocal forms of turn-taking, excluding verbal or physical turn-taking. A possible weakness of the schedule is that children with autism may be most sensitive to nonsymbolic aspects of the adult's behaviour which are largely unrecorded. The schedule may therefore be limited in capturing the interactive flow of exchange between partners. The perspective of these children may also be missed where raters judge their behaviour as responses or initiations.

Other observation schedules are applied only to children and/or require structured rather than naturalistic observations (e.g. Buitelaar, van Engeland, de Kogel, de Vries & Hooff, 1991; Siebert & Hogan, 1982; Watson, Lord, Schaffer & Schopler, 1989). They therefore have limited potential for illuminating everyday facilitators of social engagement in autism.

Lord et al. (1989) established the Autism Diagnostic Observation Schedule (ADOS) for standardised research and clinical observations of communicative and social behaviour. Reciprocal play is scored within this schedule by "semistructured presses for interaction" (Lord et al., 1989, p. 185) whereby the examiner attempts to join in with the subject's play with miniatures. Turn-taking is then observed through a structured drawing game. General ratings are provided for four areas including reciprocal interaction and communication/language on the basis of the above observations (from 0 - within normal limits, to 2 - definite abnormality). These ratings reflect their diagnostic purpose rather than an advance in empirical measures of sociability in autism.

In summary, previous instruments designed to assess general social engagement in autism have the following weaknesses: a) limiting observations to adult-determined scenarios rather than naturally occurring episodes of engagement, b) failing to capture the interactive nature of communicative exchanges, and/or c) registering behaviour under pragmatic and other categories, derived from normal communication, which may not be appropriate for children with autism. Conventional purposes of communicative intent (such as attention-seeking) can be assumed, with relative confidence, to apply to most young children; however, they may not necessarily apply to children with autism.

Nevertheless there are specific aspects of the above instruments and other research-derived measures which warrant detailed consideration in assessing specific factors related to social engagement in autism. These are identified below followed by an introduction to the coding schedule (CASPA) developed specifically for the purposes of this study. The literature review follows the organisation employed within CASPA. It considers measures of child social engagement before turning to measures of adult contributions to that social engagement in terms of discourse role, content and activity of communicative turns.

Review of measures of social engagement employed in autism studies

a) Child Measures

Selection of episodes for analysis

Van Engeland, Bodnàr and Bolhuis (1985) reviewed event-sampling methodologies for children with autism. They recognised that the molecular approach to sampling behavioural events "ensures unequivocal concept definition and therefore a fair degree of interjudge reliability ... however ... many 'qualitative' aspects of the child's social behaviour cannot be studied" (p. 880). The alternative molar approach takes "units of behaviour that seem clinically significant and provide a somewhat better view on the qualitative aspects of behaviour" (p. 880). The risks of molar approaches are i) that intuitive-interpretative factors influence definitions of the units of analysis which temporal analysis may not support as coherent units of behaviour, and ii) existing temporal relations between units may be overlooked.

Stone and Caro-Martinez (1990) are among those to have established molecular units of behaviour indicating social engagement as reliably identifiable. Prior to this, Dawson and Adams (1984) had selected molecular units of behaviour as indicative of social responsiveness in this population (touching, gaze, vocalisation and gestures). Other comparable event-led studies have adopted a molar approach. For example, Koscielska and Nowak (1988) also selected the interactive episodes from observations of primary school-aged children with autism before examining the contexts in which they occurred. They used event-sampling and assumed interaction to occur when peers "begin to respond to their mutual presence" (p. 158).

Loveland et al.'s (1988) analysis cited earlier covered both the behaviour of primary school-aged children with autism and that of their adult partners. They began by selecting "only those behaviours that appeared to be part of a communicative interaction between adult and child" (p. 596). These comprised information-carrying verbal and gestural behaviours "as well as those that only contributed towards continuing an interaction" (p. 596).

Eye-to-face gaze as a component of social engagement

Analysis of communicative behaviour in autism is notoriously difficult. Autistic children's use of seemingly appropriate behaviour is not necessarily communicative. For example, Dawson, Hill, Spencer, Galpert and Watson (1990) found that the smiles of young children with autism were much less likely to be combined with use of eye-contact in contrast to the behaviour of normal control subjects. Neither McEvoy et al. (1988) nor Loveland et al. (1988) used eye-gaze as a component criterion for registering initiations or responses.

Further observations indicate that eye-contact deficiency in autism may be qualitative rather than quantitative (Mirenda, Donnellan & Yoder, 1983; Rutter, 1978). Howlin's (1986) review concludes that it is "probably misleading to try to assess eye-contact out of context" (p. 114) thereby necessitating assessments of other behaviour involved in social approach and interaction.

Coding Issues re: Eye-to-face gaze (EFG)

Mirenda, Donnellan and Yoder's (1983) review suggests the term eye-to-face gaze as the most appropriate description of what was previously referred to as eye-contact. They cite Argyle and Cook (1976) who note that "it is unusual to fixate the gaze on a small area (such as the eye) during an interaction" (p. 56). Instead most gazing is directed towards the partner's face. Sigman, Mundy, Sherman and Ungerer (1986) found it too difficult accurately to code the duration of looking towards another person. However, they found reasonable interrater reliability in coding the frequency with which a child with autism looked towards another's face (generalisabilty coefficient was 0.78).

Additional communicative behaviour indicative of social engagement

Stone and Caro-Martinez (1990) used the following categories to organise measures of young children with autism: motoric acts, gestures, vocalisations and speech. Dawson and Adams (1984) recorded "general social responsiveness" (as measured by touching, gaze, vocalisation and gestures). There follows a review of these and other relevant measures of communicative behaviour (other than eye-to-face gaze) which are indicative of social engagement.

i) Motoric acts

The anecdotal reports of children with autism avoiding physical contact with people are apparently overemphasised (Howlin, 1986). However, unlike the studies of smiling in autism, physical contact studies have given little attention to the communicative behaviour which accompanies the physical contact made or tolerated by these children. Its full communicative value therefore awaits clarification. Physical contact with objects has been previously recorded (eg. Stone & Caro-Martinez, 1990) although not in combination with (CASPA's) detailed additional coding of interactive behaviour.

ii) Body Language

Attention is initially given here to gestural body language, followed by facial expression. Protodeclarative pointing is often absent in children with autism (Baron-Cohen, 1989c; Curcio, 1978). Protoimperative pointing has been observed in some able preschoolers with autism (Baron-Cohen, 1989c) in contrast to control subjects with and without learning disabilities. Less able preschoolers with autism have been taught to use request pointing (Christie & Wimpory, 1986). Observations of gesture typically occur in structured rather than naturalistic settings (eg. Goodhart & Baron-Cohen, 1993).

Langdell (1981, cited by Kasari, Sigman, Yirmiya & Mundy, 1993b) reported that raters of pictures of autistic children's facial expressions often found them difficult to interpret. Langdell's findings are partly explained by other observational studies which revealed more mixed and flat facial expressions and less positive and more negative affect expressed socially in pre-school children with autism than in various control subjects (Snow, Hertzig & Shapiro, 1987a; Yirmiya, Kasari, Sigman & Mundy, 1989), and less positive affect occurring during sequences of joint attention (Dawson, Hill, Spencer, Galpert & Watson, 1990; Kasari, Sigman, Mundy & Yirmiya, 1990). These findings are discussed by Lord (1993). The presence of blended facial expressions in preschool children with autism compromises the coding of their facial expressions (Mundy & Sigman, 1989b).

Children with autism are less likely to use affect as a communicative signal than children without autism (Kasari, Sigman, Yirmiya, & Mundy, 1993b). Although as young children they are equally likely to exhibit smiles during play with their mothers, as indicated above, they are less likely to combine their smiles with eye-gaze towards their mothers (Dawson et al., 1990).

Further support for the necessity of combined measures of positive affect and eye-to-face gaze may be drawn from Snow, Hertzig and Shapiro's (1987a) finding that 2-5 year-old autistic children are just as likely to smile and/or laugh to themselves as to a nursery nurse and clinician in a 1:1 playroom situation. However, it is currently unclear whether this is attributable to a deficit of autism, as opposed to learning disability (since there were no normal control subjects).

iii) Vocal/verbalisations.

Preschoolers with autism are typically preverbal. Ricks (1979) found that unlike normal and "mentally handicapped" children, the preverbal vocalisations of children with autism were expressive but idiosyncratic in that they carried meaning for familiar others but not for strangers.

Review of measures of social engagement (continued): b) Adult measures

Coding adult turns prior to child acts of sociability

Simpson and Souris (1988) took a behavioural perspective in investigating reciprocity in teacher-autistic child interactions. They computed first-order conditional probabilities to this end. That is "the probability of a response occurring given the previous occurrence of a particular behavior. The formula for determining conditional probability was number times response divided by number times initiations" (p. 162). Most interactions involving the 3-5 year old autistic (or "autistic-like") children were found to be brief and characterised by an adult or child initiation and a single response from a child or adult.

Simpson and Souris argue that " ... investigating higher order probabilities is not required because the antecedent stimulus closest to the response exerts the greatest influence (Patterson, 1974, p. 162)". In addition to the sequential order of each analysed turn, Simpson and Souris noted the pragmatic role (eg. praise, threaten, refuse etc.) and mode of execution (i.e. motor and/or verbal) during 15-second partial-interval observations.

Buitelaar, van Engeland, de Kogel, de Vries and van Hooff (1991) also took temporal contingency to indicate functional relatedness in the experimenter-child interactions of school-aged children with autism and atypical pervasive developmental disorder. Buitelaar et al. stress that their focus of analysis was the structure of behaviour at group rather than individual subject level. They assessed temporal contingency by matrices of combination frequencies within 5-second time frames. Learning disabled control subjects were found to show strong temporal connections between their own and the experimenter's behaviour whilst subjects with autism lacked these temporal connections with the experimenter.

Loveland et al.'s (1988) attempt to analyse the reciprocity of 1:1 interactions between adults and verbal children with autism involved subjective decision-making as to the response or initiator status of each turn (as described earlier).

Coding discourse role of adult turns

Girolametto et al. (1988) made observations of adults relating to verbal and preverbal learning disabled non-autistic children. The discourse role of each adult turn was classified as continuing or redirecting the child's focus of interest, being silently responsive (= gazing) or ignoring the child.

Previous attempts to establish the effects of (re-)directing children with autism have taken a more global approach. Thus, for example, Volkmar (1987) reviews the varying effects of different levels of both structure and adult:child ratios on older children with autism in different educational settings. It seems probable that these factors would parallel levels of child (re-)direction by adults. However, clarity is needed on the precise nature of the adult directedness or responsivity that facilitates social engagement in this client group.

Content of adult turns (re: affect, use of rewards and patterning)

For the purposes of this thesis, patterning comprises an adult's use of social routines, imitation and self-repetition. Previously established measures to record and evaluate aspects of patterning, along with the use of extrinsic rewards and affect, are described below.

i) Adult affect

Previous research has employed drawn, photographic or videorecorded representations of facial expressions to investigate the responsivity of children with autism to affective facial expressions. Sigman, Kasari, Kwon and Yirmiya (1992) used live, albeit staged, situations to investigate the response of children with autism to various negative emotions in adults. In contrast to normal and learning disabled control subjects, many of the (preschool) autistic subjects appeared to ignore or not notice adults showing negative affect. It is not known whether they ignored the adults because of the negative emotions shown or for some other reason.

ii) Coding extrinsic reward

It is well established that the planned employment of rewards can be used to influence the behaviour of children with autism (eg. Lovaas, 1987), including their use of social or communication skills (Howlin, Rutter, Berger, Hersov & Yule, 1987). Behaviour modification is therefore recommended for everyday use with these children (eg. McEachin, Smith & Lovaas, 1993). However, few studies have investigated the effects of rewards offered spontaneously during naturalistic interactions as opposed to those predetermined by intervention programmes.

iii) Coding patterning in adult's turn

The concept of 'patterning' within the thesis is derived from consideration of potential aspects of "social timing" (Newson, 1977, 1987, or intra- and inter-personal timing) during interactions with children with autism. It comprises the employment of behavioural strategies which may employ familiar patterns of timing, as in a) social routines, b) imitation of the child's behaviour and c) immediate repetition of the adult's own behaviour. These familiar patterns may make interaction more predictable for children and might thereby facilitate Episodes of Social Engagement.

a) Use of Social Routines. Watson, Lord, Schaffer, and Schopler (1989) developed a broad definition of social routine which Stone and Caro-Martinez (1990) used for analysis of school activities for over two hours per child. They defined social routine as follows: child carries out simple routines or rituals of a social nature eg. "Hello!"; Thank you!"; child waves at teacher when she enters the room.

b) Use of Imitation. In Dawson and Adams' (1984) study an experimenter imitated autistic children's actions with toys and the effects of this on the children's eye-contact and social responsiveness were monitored. Referring to this study, Dawson and Lewy (1989, p. 63) comment that "Virtually every behaviour of each child" was imitated and so the resultant table-based interactions were made much more predictable. Dawson and Lewy acknowledge that "parental imitation is much less systematic" (p. 63).

Lewy and Dawson (1992) later coached and instructed mothers to employ intentionally imitative strategies with their 3-6 year old children with autism. They conducted daily 20-minute sessions over a two-week period using a predetermined set of (familiar and novel) toys. Mothers were instructed to imitate all actions with toys and told to "feel free" to imitate other aspects of child behaviour. However, monitoring of the effects of imitations of child actions with toys, as opposed to the effects of imitating other child behaviour, is not reported.

c) Use of Self Repetition. As indicated earlier, previous studies have focused on artificially high levels of adult imitation. The focus of interest and natural behaviour of children with autism is typically repetitive (DSM-IV-299.00, 1994). The behaviour of adults imitating such children may therefore be highly repetitive and so perhaps of particular interest to the child with autism. This may account for the increased tendency of (4-6 year old) children with autism to monitor visually an experimenter's actions when their own manipulations of toys were imitated (Tiegerman & Primavera, 1984).

Coding adult-child activity during Episodes of Social Engagement

Studies in this area typically adopt a top-down approach by predetermining activities under which to observe the interactions of adults and children with autism (eg. Buitelaar et al., 1991). Such activity categories appear to be determined from an intrapersonal perspective focusing on an individual's activity. For example, Buitelaar et al. (1991) used the following categories: manipulate, visual, locomotion, symbolic play, functional play, change toys, other.

i) Coding Issues re: Cognitive (vs. free play) activities

It was noted earlier how previous studies have tended to focus on structured activities with a cognitive focus in contrast to unstructured free play. For example, McHale, Simeonsson, Marcus and Olley (1980) found that the communicative behaviour of school aged children with autism was often influenced by the setting (i.e. presence/absence of teacher). Lord (1993) stresses the need to extend research beyond cognitive-type settings to study sociability and thereby avoid the danger of cognitive bias in accounts of autistic a/sociability. Cognitive-type settings contrast with naturally occurring situations which are affect-laden (Dunn, 1991).

ii) Coding Issues re: Pretend play activities

Pretend play is also usually assessed in autism by predetermined pretend play settings or activities (eg. Baron-Cohen, 1987). Although the lack of *shared* pretence is held to be particularly indicative of autism

(Leslie, 1987 & 1990), few studies extend beyond a cognitive analysis of pretend play to a social analysis of pretend play activities.

iii) Coding Issues re: Musical-motoric activities

There is evidence from studies of children with autism to support the interactive use of musical instruments (Heal & Wigram, 1993), rough and tumble play (where eye-contact difficulties appear to diminish, Mundy, Sigman, Ungerer & Sherman, 1986), games of physical contact and social routines (where social interaction impairments become less obvious than during other activities, Sigman, Mundy, Sherman & Ungerer, 1986) and action rhymes (Kasari et al. 1993a).

iv) Coding Issues re: Free play activities

Adult roles during the 'free play' activities of previous research range from adults' absence (McHale et al., 1980) to their active presence (Loveland et al., 1988), thereby indicating the need for clarity in future studies.

The following section introduces the Coding of Active Sociability in Preschoolers with Autism (CASPA). An account is given of its evolution for the purposes of this thesis, together with an outline of the rationale for each of its components (with reference to reviewed studies).

The Coding of Active Sociability in Preschoolers with Autism (CASPA)

Introduction

The schedule for Coding Active Sociability in Preschoolers with Autism (CASPA) is designed to identify naturally occurring social engagement in preschoolers with autism, and to clarify the nature of adult partners' immediately preceding behaviour. It is applied to videorecordings of naturalistic interactions to determine the context and social conditions that may facilitate instances of social engagement in autism. Original selection of CASPA components was influenced by the hypothesis that infant-level processes may be disordered in autism (Hobson, 1994a; Newson, 1984 & 1987). CASPA items are organised around combinations of aspects of child behaviour indicative of social engagement. Analysis covers concurrent activity, discourse role and content of adult turns immediately prior to each Episode of Social Engagement by a child.

<u>Evolution of CASPA</u>

(See Appendices VI and VII for Transcripts/Communication record sheets)

CASPA evolved from "blow by blow" accounts (as in Appendix VI) of the 1:1 interactive behaviour of adults and children with and without autism and/or learning disability and/or specific language disorders. The context from which these transcripts, and CASPA, were derived was that of play-based assessment (Newson & Newson, 1979). Here an experienced child-development clinician accompanies the child through child-led free play with a wide variety of pre-selected toys in a large playroom for one to two hours.

All Episodes of Social Engagement were identified from the videorecordings of such assessments in conjunction with the transcripts, by a graduate psychologist naive to the hypotheses of the study. Stone and Caro-Martinez's (1990) criteria were adopted to define and code instances of social engagement where they co-occurred with the children looking towards the adult's face (i.e. gaze plus physical contact and/or gesture and/or vocalisation and/or speech, see CASPA coding criteria given at the close of this chapter). These combined aspects of child behaviour were identified as Episodes of Social Engagement.

The rate of Episodes of Social Engagement from children not diagnosed as autistic were too frequent to justify microanalysis. For example, there were approximately thirty Episodes of Social Engagement in five minutes of interaction between a clinician and a child diagnosed with language disorder together with a moderate learning disability and "autistic tendencies". Recordings of children not diagnosed as autistic were laid aside at this point.

The remaining recordings were then examined by the author who is employed as the county's specialist psychologist for children with autism and related disorders. They were used to draw up categories of the adults' behaviour observed immediately preceding child Episodes of Social Engagement. These categories included the following: discourse role of turn (i.e. silent responsiveness, ignore, redirecter and continuer turns, derived from Girolametto, 1988); content of turn (re use of affect, extrinsic reward and/or "patterning" (i.e. social routines, Camaioni & Laicardi (1985) and repetition of self and other, including imitation as derived from Dawson & Adams, 1984); and, activity.

The activity of the adult and child's turns were initially both coded. For example, both were coded as engaged in cognitive activities if the adult attended to the child attempting a puzzle. Piloting on play-based assessment videorecordings revealed that children and adults would almost always be engaged with the same category of equipment during instances of Episodes of Social Engagement and they differed from one another in less than 5% of other observations. The activities of just the adult turns were therefore selected as components of the final version of CASPA since these offer greatest guidance to parents and professionals seeking to provide activities conducive to Episodes of Social Engagement.

The coding described here for Episodes of Social Engagement and for the discourse role, content and activity of adult turns was retained in the concise version of CASPA presented at the close of this chapter. Pragmatic function categories for adult and child turns (derived from Loveland et al., 1988, and Watson et al., 1989) were also included in the original analysis. However, interrater reliabilities proved difficult to achieve on these more subjective classifications. They were therefore withdrawn from CASPA. Pilot studies with CASPA also involved initial screening of Episodes of Social Engagement for joint attention but, consistent with previous research (Mundy et al., 1986), this did not prove fruitful.

An outline of CASPA follows, moving from general to specific components. Its underlying rationale is supported by reference to literature concerning relevant methodologies from the studies as reviewed earlier. The advantages of CASPA over previous instruments are outlined followed by details of the coding criteria employed.

Rationale for CASPA Components (with reference to reviewed studies)

Introduction

CASPA involves i) the selection of all Episodes of Social Engagement (ESEs) where the child with autism is actively involved and ii) the analysis of the adult's immediately preceding behaviour with respect to discourse role, content and activity. An outline of CASPA is given schematically in Figure 4.1 whilst specific coding criteria are given at the close of this chapter. CASPA's focus on 1:1 interactions is influenced by observations that primary school aged children with autism are more likely to participate in dyadic rather than triadic peer interaction (Koscielska & Nowak, 1988). The videorecorded settings to which CASPA is applied are natural attempts by experienced clinicians genuinely seeking to engage with children who were subsequently diagnosed with autism. This contrasts with other 'naturalistic' environments where investigators themselves interact with children in predetermined ways and are aware of the behaviour under examination (eg. Dawson & Adams, 1984).

Rationale for selection of episodes for analysis within CASPA

The selection of Episodes of Social Engagement (ESEs) within CASPA is influenced by Van Engeland, Bodnàr and Bolhuis' (1985) review of event-sampling methodologies for children with autism (detailed earlier). CASPA incorporates the objectivity of a molecular approach within a molar model designed to avoid the risks identified above. In defining Episodes of Social Engagement, CASPA combines molecular units of behaviour previously established as reliably identifiable (Stone & Caro-Martinez, 1990) into clinically meaningful molar units. These combinations overlap temporaneously or are simultaneous. The combination-derived molar approach of CASPA enables the achievement of less subjective coding than the molar approach of other comparable event-led studies (eg. Koscielska & Nowak, 1988). In further contrast to Koscielska and Nowak's approach, Episodes of Social Engagement do not include negative communicative behaviour.

The molecular units selected for combination to define Episodes of Social Engagement are detailed in the sections which follow. These molecular units are more specifically defined than those which Dawson and Adams (1984) selected as indicative of social responsiveness in this population (touching, gaze, vocalisation and gestures).

CASPA's Episodes of Social Engagement (ESEs) are comparable to the fourth and fifth of Lewy and Dawson's (1992) hierarchy of Engagement States (N=6), namely Person Engagement and Supported

CODING for ACTIVE SOCIABILITY in PRESCHOOLERS with AUTISM (CASPA)

Notes for Coders:	*Categories employed (mutually exclusive unless otherwise indicated):*
1) Screen all child behaviour for	**Episodes of Social Engagement (ESEs)**
These comprise Eye-to-Face gaze + 1 or more	**Forms of child communicative behaviour:**
	Motoric
	Body Language
	Vocal
	Verbal
2) Code all adult turns preceding Episodes of Social Engagement	
2a) Discourse role	**Type of adult turn:**
	Continuer
	Redirecter
	Silent Responsiveness
	Ignore
2b) Code content	**Content of turn:**
bi) Register facial expression i.e..	Positive Affect present/absent/uncodable
2bii) Register	Extrinsic Reward as present/absent
2biii) Specify use of any/all of these general patterning strategies as	Social Routine
	Imitation
	Self-Repetition
3) Register by equipment used:	**Adult Activity**
	Cognitive
	Pretend
	Musical/Motoric
	Free Play

(NB: Free Play = period of adult passivity)

Fig. 4.1 An outline for scoring observations according to CASPA

Joint Engagement, although ESEs involve more detailed coding. Episodes of Social Engagement (ESEs) are less sophisticated than episodes of joint attention. Mundy et al. (1986) found that the absence of joint attention differentiated 94% of children with autism from learning disabled and normal control subjects (aged 3- to 6-years).

Rationale for Eye-to-Face Gaze as an essential component of CASPA ESEs

The definition of Episodes of Social Engagement by combined, rather than single, molecular units helps to ensure that CASPA records genuine instances of positive social engagement. Following Sigman, Mundy, Sherman and Ungerer (1986), CASPA employs instances of looking towards another's face (Eye-to-face gaze - EFG) as an essential component of each Episode of Social Engagement. As detailed in the scoring criteria at the close of this chapter, each Episode of Social Engagement requires an additional simultaneous behaviour indicative of communication (excluding negative behaviour such pushing someone away). In this respect, the threshold for rating Episodes of Social Engagement is higher than for ratings of sociability/communication in previous related studies as described earlier (eg. McEvoy et. al., 1988; Loveland et al., 1988). Rejecting or anti-social child communicative behaviour was not included in Episode of Social Engagement criteria because the main purpose of CASPA was to enable identification of adult behaviour which may facilitate child sociability (see Chapter Five).

Rationale for ESE criteria of communicative behaviour additional to eye-to-face gaze

CASPA scoring criteria at the close of this chapter detail how Episodes of Social Engagement are recorded where at least one of the following aspects of communicative behaviour is combined with eye-to-face gaze: i) motoric behaviour related to the interaction; ii) body language and, iii) vocal/verbalisation (these categories are not mutually exclusive). These categories were derived from the measures developed by Stone and Caro-Martinez (1990) and Dawson and Adams (1984) for use with young children with autism as reviewed earlier.

CASPA Episodes of Social Engagement are unique in adopting eye-to-face gaze as an essential sub-component. This ensures that almost every recorded Episode of Social Engagement represents a socially significant event in adult-autistic child interaction. Episodes of Social Engagement represent instances where children with autism appear (albeit momentarily) to function beyond their usual impairments. As outlined earlier, Buitelaar, van Engeland, de Kogel, de Vries and van Hooff identify communicative deficits of autism as comprising "a) visual reciprocity behaviours; b) gestural "joint attention"; and c) functional coordination and integration of gaze and gestural mechanisms" (1991, p. 1007). CASPA criteria for Episodes of Social Engagement may be seen as corollaries of these.

<u>Rationale for CASPA criteria of ESEs' communicative behaviour additional to eye-to-face gaze</u>

i) <u>Motoric acts</u>. Although autistic child physical contact with objects has been previously recorded in a communicative context (eg. Stone & Caro-Martinez, 1990), it has not previously been registered in combination with the additional interactive behaviour recorded within CASPA.

ii) <u>Body language</u>. As detailed in the coding criteria at the close of this chapter, clearly positive affective facial expression on the part of the child (such as smiling) in combination with eye-to-face gaze constitutes an Episode of Social Engagement within CASPA. Langdell (1981, cited by Kasari et al., 1993b) reported that raters of pictures of autistic children's facial expressions often found them difficult to interpret. However, CASPA follows the practice of later research by using videorecorded material where supporting contextual information is available.

In seeking instances of genuine positive social engagement, CASPA criteria exclude any episodes containing facial expressions which are clearly negative. CASPA is designed to record only communicative manifestations of affect by registering children's smiles only where they are accompanied by Eye-to-Face Gaze. As indicated earlier, observations of gesture are typically made in structured settings, in contrast to the naturalistic setting employed for CASPA (eg. Goodhart & Baron-Cohen, 1993).

iii) Vocal/verbalisations. As the preschoolers with autism in this study are mostly preverbal, vocalisation (as well as verbalisation) is one of the forms of qualifying communicative behaviour for an Episode of Social Engagement. The use of the eye-to-face gaze criterion again helps to ensure that genuine Episodes of Social Engagement are being recorded. To the same end, instances of echolalia are excluded from Episode of Social Engagement status unless they occur together with an additional communicative behaviour and simultaneous eye-to-face gaze.

Rationale for CASPA Coding of Adult Contributions to ESEs (see Fig. 4.1)

Rationale for CASPA's focus on adult's turn preceding child's ESE

Although CASPA is not derived from a behavioural perspective, pilot work revealed that adequate interrater reliabilities on turn-boundaries could only be achieved by attending to the adult's turn which immediately preceded the child's Episode of Social Engagement. The theory underlying CASPA is that aspects of social reciprocity (for example, social timing) may play an essential role in facilitating Episodes of Social Engagement (Newson, 1977, 1987; Stern, 1977). This further justifies a micro-analytic focus on the adult's immediately preceding turn.

Rationale for CASPA coding of the discourse role of adult turns

CASPA codes each turn immediately preceding an Episode of Social Engagement as an adult continuing or redirecting the child's focus of interest, being silently responsive (/gazing) or ignoring the child. These categories are identical to those employed by Girolametto et al. (1988) as detailed earlier.

CASPA comprises micro-analysis of communicative turns rather than employing the more global approach of previous attempts to establish the effects of (re-)directing children with autism (cf. Volkmar, 1987). CASPA is thereby designed to determine the precise nature of the adult directedness or responsivity that facilitates social engagement in this client group. In this respect, CASPA's design is responsive to a need identified in the literature reviewed earlier. In further contrast to previous studies, which have evaluated the prescribed implementation of particular strategies, CASPA is designed to focus on their spontaneous occurrence in a natural setting.

Rationale for CASPA coding of content of adult's turn
(re: affect, use of rewards and patterning)

As detailed in the CASPA scoring criteria given at the close of this chapter, each adult's turn is coded for the presence/absence of:

i) positive affect,

ii) extrinsic reward, and

iii) use of patterning (i.e. use of social routines, imitation and self-repetition). The rationale for each of these is outlined below.

i) and ii) Rationale for CASPA coding of affect and extrinsic reward

As indicated earlier, previous studies have investigated child responsiveness to predetermined adult affective expressions or use of extrinsic rewards (eg. Sigman, Kasari, Kwon & Yirmiya, 1992; Howlin et al., 1987, respectively). In contrast, CASPA involves recording instances of naturally occurring manifestly positive adult affect or spontaneous use of extrinsic rewards. CASPA thereby facilitates correlations between this and the subsequent behaviour of children with autism.

iii) <u>Rationale for CASPA coding of patterning in adult's turn</u>

As indicated earlier, patterning comprises the employment of behavioural strategies which may employ familiar patterns of timing, as in a) social routines, b) imitation of the child's behaviour and c) immediate repetition of the adult's own behaviour.

a) Use of Social Routines. CASPA includes the adoption and extension of Stone and Caro-Martinez's (1990) use of Watson et al.'s (1989) definition of social routine to include conventional or spontaneously created action routines, rhymes and songs (eg. "The wheels on the bus", "Round and round the garden") which offer potential support to the "social timing" (Newson, 1977, 1987, or intra- and inter-personal timing) of interactions.

b) Use of Imitation. In contrast to previous studies, as reported earlier, CASPA is designed to record the effects of naturally occurring instances of imitation of all aspects of behaviour (eg. vocalisations), not just actions with toys.

c) Use of Self Repetition. CASPA contrasts with the coding schedules of previous comparable studies in enabling investigation of repetition within adults' behaviour. CASPA records all instances of self-repetition within adult turns which precede Episodes of Social Engagement. It thereby contrasts with otherwise similar studies where repetitions are explicitly excluded from coding analysis (eg. Buitelaar et. al., 1991).

Rationale for CASPA coding of activity during ESEs

In contrast to previous studies (as outlined earlier), CASPA's approach is child-led in that incidents for analysis are initially determined by the behaviour of the children, rather than by the strategies employed by their adult partners. In further contrast, CASPA's activity categories were derived post hoc following observations of the videorecordings rather than predetermined.

In addition to the conventional categories of cognitive (eg. puzzles) and pretend play, CASPA includes activity categories derived from an interpersonal perspective, namely "musical-motoric" and free play. These are based on anticipated differences between the interactive patterns associated with different activity categories. For example, musical-motoric activities involve objects and actions hypothesised to facilitate preverbal communication (using action songs and rough and tumble using body parts, musical toys etc.).

The musical-motoric activity category was originally derived from clinical observations. There are empirical data from studies with normal and learning disabled children as well as those with autism which are compatible with these observations (Heal & Wigram, 1993; Mundy, Sigman, Ungerer & Sherman, 1986). Musical-motoric activities are those which best lend themselves to adult "scaffolding" of interaction. They all involve potential support for the intra- and/or inter-personal timing of interactions, by making them simpler or playfully repetitive or by offering the framework of music and timing. They are therefore selected on the basis of potentially offering support to the social timing difficulties of autism as proposed by Newson (1977, 1987).

CASPA free play activities contrast with those of some other studies where adult roles range from being absent (McHale et al. 1980) to being actively present (Loveland et al., 1988). CASPA's definition of free play is for the adult to have temporarily withdrawn involvement from the child but still be present within the room.

Advantages of CASPA

As outlined above, the schedule for Coding Active Sociability in Preschoolers with Autism (CASPA) records instances of social engagement in preschoolers with autism, along with an evaluation of the immediately preceding conditions. It is designed to overcome the weaknesses of previous methodologies as summarised earlier. For example, CASPA is based on extended adult-child play under natural conditions and focuses on adult-child preverbal interactions rather than on child communication alone. The communicative perspective of children with autism may differ from that of children without autism. CASPA therefore includes items which may not appear immediately relevant to usual preschool communication (eg. an adult's repetition of her own motoric action).

CASPA videorecordings are subject to objective behavioural ratings rather than subjective clinical judgements. Empirical analysis is employed to determine any possible interrelationships between adult and child behaviour rather than raters' judgements determining initiator/response status during initial coding.

Scoring Criteria for CASPA

Introduction

As outlined in Figure 4.1, videorecordings subject to CASPA analysis are initially screened to identify all Episodes of Social Engagement. The nature of each Episode of Social Engagement is then registered in terms of the child's mode of communication. The activity, nature and content of the immediately preceding adult turn is then coded as detailed later in this section.

This introduction to scoring within CASPA opens with defining criteria for Episodes of Social Engagement and then criteria for the adult turns which precede them. It proceeds to give the criteria employed for further coding using sub-categories of child and then adult turns.

Defining Criteria for Episodes of Social Engagement (ESEs)

The criteria for Episodes of Social Engagement are that the child should look to the face of the adult and contiguously show at least one additional communicative behaviour. Scoring for the child therefore involves establishing and registering that a child is looking to the face of the adult (Eye-to-Face Gaze = EFG) and showing an additional communicative behaviour (motoric, body language, vocalisations, verbal). Any additional communicative behaviour scored within CASPA must be temporaneous with the child making Eye-to-Face gaze.

Chapter Five details interobserver reliability figures which incorporate agreement levels on what constitutes additional communicative behaviour in this context. Negative behaviour, for example, pushing the adult away from an activity, is not coded. The child's behaviour within an Episode of Social Engagement is not the focus of further coding.

Defining criteria for adult turns preceding ESEs

All of the adult's videorecorded behaviour can be divided up into contiguous turns using the criteria which follow. However, CASPA only requires identification and analysis of the adult turn immediately preceding an Episode of Social Engagement with which it may be contiguous. This follows Buitelaar et al's (1991) model, introduced earlier, which recognises temporal contingency as indicative of functional relatedness in interactions between adults and children who have autism.

Although each adult turn is not necessarily intended as communicative, it is always rated as serving a discourse role (eg. ignore, silent responsiveness etc., as detailed later). Following this model, turns can take place even though the child may be unresponsive. However, the child's behaviour may determine breaks between adult turns.

As in the example at the close of this section, the beginning of an adult's turn is determined by a distinct physical movement or vocal/verbalisation (see Reliability of CASPA in Chapter Five). Shorter rather than longer turns are identified for analysis by CASPA. For example, a phrase from a social routine would be taken for analysis, rather than the whole routine. In addition to conforming with Buitelaar et al.'s (1991) model, this decreases the potential margin of error in the coding of all components within each turn.

The following example is taken from videorecorded play with pretend play equipment during interaction between an adult and a child who has autism. It shows how an Episode of Social Engagement and its immediately preceding adult turn is embedded in a context which may assist in ascribing CASPA ratings to the adult's behaviour. The adult shakes a doll's dress in front of the child, possibly in an attempt to involve him in play. This is regarded as an adult turn although the child does not respond. In her subsequent turn, the adult appears to offer the dress to the child by leaving it in front of him. The adult then leans back on her chair looking towards the child, apparently awaiting a response from him. This "silent responsiveness" from the adult constitutes her third turn. The child then lifts the dress and passes it to the adult, looking towards her face as he does so. He is therefore accredited with an Episode of Social Engagement. The content of the adult's immediately preceding turn (i.e. the third turn in this example) is then coded according to CASPA.

Interobserver reliabilities incorporating agreements/disagreements as to the content of adult turns are given in Chapter Five. There follow detailed coding definitions of individual child-, and then adult-, items for turns identified within CASPA as described earlier.

Scoring criteria for the content of Episodes of Social Engagement

Eye-to-face gaze (EFG)

The orientation of the whole face of the child must be towards the whole face of the adult to meet criteria for eye-to-face coding. Facing the lower part of the face is not sufficient. It is assumed that the line of gaze is parallel with the orientation of the top of the head when coding eye-to-face gaze. Eye-to-face gaze includes orientation towards the other person, so this is not coded separately as body language (i.e. turning towards other) unless it is a body (torso) movement of 90 degrees or more. Turning the head alone is not sufficient. Silent looks, despite their intensity or duration cannot be counted unless accompanied by another communicative behaviour.

If the adult reports (as recorded on the videotape) that the child is looking towards her, eye-to-face gaze is coded. Otherwise it must be possible to see at least part of the profile of the participants to code eye-to-face gaze. If the child's face is oriented towards the adult's face but the child's eyes are closed, this cannot be counted as eye-to-face gaze.

Categories of additional communicative behaviour

Communicative use of one or more of the following combined with eye-to-face gaze is required to meet criteria for an Episode of Social Engagement:

Motoric may be person-to-person contact (eg. tickling) or object-person physical contact (eg. a hoop being handed to a child). Motoric object is counted only when the object is involved in the communication, for example, through giving or taking. Holding an object whilst looking towards an adult's face but not otherwise communicating would not count as an Episode of Social Engagement.

Body language does not involve touching, nor are objects involved. It has to comprise more than turning to give eye-to-face gaze. As indicated earlier, if there is movement of the torso of 90 degrees or more this may be counted as body language. Body language includes smiling, waving, lifting arms to request being picked up, pointing, clapping to praise, beckoning.

Vocalisation All vocalisations including those through a wind instrument (eg. a toy trumpet).

Verbal Any use of spoken language. (Child subjects almost never used this).

CASPA is subsequently used to examine adult behaviour immediately prior to each Episode of Social Engagement.

CASPA scoring criteria for adult turns

The content of the adult's turn is coded until the child's Episode of Social Engagement begins, according to discourse role, content and activity. These are each described in detail in this section, after being briefly introduced as follows:

Discourse role codes the turn as continuing, redirecting, ignoring or being silently responsive to the child's focus of interest;

Content codes the turn as characterised by manifest positive affect (or not); use of extrinsic reward (or not); and, patterning (or not). Patterning comprises use of social routines, imitation of self-repetition.

Activity codes the adult's involvement with cognitive tasks, pretend play or musical motoric activities, or her withdrawal from these thereby affording the child free play.

Discourse role - introduction.

Adult use of continuers, redirecters or silent responsiveness is considered communicative. Ignore is coded where there is apparently no attentiveness from the adult. Details of each of these four mutually exclusive categories follow:

Continuers comprise any verbal or physical behaviour which actively follows the child's lead or enables the child to continue with his/her focus of attention. A very positive smile would count as a continuer in the absence of any contra-indicator.

Redirecters comprise any verbal or physical behaviour which attempts or achieves a shift of focus on the part of the child eg. introducing a puzzle when child is involved in handling a toy.

Silent Responsiveness is coded when an adult is observing and/or waiting to respond to the child without displaying any other communicative behaviour. Where the adult is silent and off camera, it is assumed that she is silently responsive (given her clinical brief), unless the adult has left the room, in which case 'Ignore' is coded.

Ignore is coded when the adult is actively involved in a behaviour which does not involve the child eg. briefly speaking to another adult.

Content of Adult Turns - introduction

There are three sub-sections which always apply to coding the content of adult turns. These are affect, use of extrinsic reward and patterning (the latter comprises use of social routines, imitation and/or self-repetition).

Affect

The mutually exclusive categories for coding manifest positive affect are: present, absent and uncodable. Manifest positive affect must be both manifest and positive to be scored as present. Thus 'making a funny face' is not necessarily coded as manifest positive expression, because although manifest, there needs to be some sort of conventional positive expression (i.e. smiling) for it to be positive. If manifest positive affect is counted, this smiling must be communicative rather than a bemused expression (as in smiling to oneself).

At least one eye must be visible for coding manifest positive affect. Manifest positive affect may be coded when the adult's face is not visible, if the same facial expression occurs immediately pre- and post- the Episode of Social Engagement. If the coder is in doubt when coding a smiling facial expression, coding is determined by the adult's use of her eyes. (If the adult's eyes are shut, facial expression cannot be coded.)

Extrinsic reward

The degree to which adult interactive behaviour is intrinsically rewarding for the child cannot be coded. However, CASPA records instances where adults employ extrinsic rewards in attempting to enhance the likelihood of child responsivity. Each adult turn is coded as to whether adult use of extrinsic reward is present or absent within the turn. Examples of behaviour coded as involving extrinsic rewards include an adult either deliberately pausing in an activity or holding a desired item in front of her own face to prompt the child to look towards her before continuing or releasing the item. Hence her subsequent turn is used to help code this.

Patterning

As indicated earlier, this is coded as present if the adult uses social routines, imitation or repetition of herself within her turn. These items are then sub-coded separately although they are not necessarily mutually exclusive.

Social Routines

These include familiar games and songs and usually involve repetitive movement and sound. They may be conventional (for example, waving goodbye or playing peekaboo) or non conventional (for example, swinging the child round each time she/he comes off the slide). "Scripted" actions within a social routine are not additionally coded as body language. Routines based around 'testing' questions, for example, 'Where's your hair?', are not included because these require a specific answer.

Imitation

Imitation of any behaviour from the child's preceding turn in any modality is coded (eg. vocalisation, body movement etc.). This category does not include elaboration. Thus a repetition of 'Car' would be credited to the adult as imitation, but not if this were elaborated eg. 'Yes, it's a lovely red car'. Use of speech intonation apparently imitative of the child's speech does not count as imitation.

Self-Repetition

One or more repetitions of any of the adult's behaviour within her current turn or from her previous turn in any modality, is coded as a self-repetition. As turns are brief, it is anticipated that the child quickly re-experiences that behaviour which is coded as self-repetition (for example, vocalisation, forms of physical contact such as stroking, tapping or body mannerisms, actions with objects, etc.). Self-repetition is not counted if it is functional eg. laughing or coughing. Self-repetition is credited when the adult has composed a repetitive refrain, but not for conventional songs such as 'The wheels on the bus go round and round'. Repetition of a vocalisation is included but repeated use of similar intonation within speech is excluded.

Activity - introduction

In all except the category of child free play, activity is coded by the equipment with which the adult is employed, the details of this coding follow.

Cognitive tasks

These include: drawing activities (eg. magnetic drawing board, crayoning etc.); colour matching (eg. Galt wobble balls, Escor abacus, Galt pop-up men, Griffiths boxes; floor/table puzzles; inset boards including facial expression puzzles); fine motor tasks (eg. bead threading, barrels, blocks for tower building); reading books and selecting from a trolley of table-top toys.

Pretend play

This includes any use of the following: Wendy house toys (eg. Tiny Tears sized doll, telephone, scaled down ironing board, hoover, cutlery, crockery and plastic food etc.); 'shop' equipment; a wooden 'car' (steering wheel and gearstick); dressing up clothes and hand puppets.

Musical-motoric

This includes use of the following: audio/visual sensory stimuli/toys (eg. electrically-lit bubble tower; chirping bird; bubbles; beanpit; water and play); gross motor equipment (eg. slide, ball, seesaw, tunnel etc.); and, musical instruments or toys (eg. electric organ, saxophone, xylophone, tambourine and audiocassette player etc.). Musical-motoric activity also includes rough and tumble play at floor or chair level (eg. tickling, chasing etc.), together with singing, nursery rhymes and lap games.

Free play

This is coded where the adult has deliberately adopted a passive role or is actively engaged in an alternative activity (eg. tidying up) which does not involve the child. As a consequence the child typically explores the environment (eg. looking in cupboards, running around the playroom, self-stimulating, etc.).

Chapter Summary

This chapter has outlined the empirical background and rationale underlying the selection of individual components of CASPA. These components focus on clearly defined Episodes of Social Engagement and aspects of the immediately preceding behaviour of the accompanying adult in terms of her activity, discourse role and the content of her communicative turn.

The chapter has clarified CASPA's unique role in providing a detailed objective observation schedule for application to adult-autistic child dyads in naturalistic settings. The defining criteria for the CASPA schedule have also been presented here. The following chapter determines the potential role of adults in facilitating such episodes through reviewing previous studies and then applying CASPA to videorecordings of adult-child interaction for this purpose.

Chapter Five

DETERMINATION OF FACTORS FACILITATING EPISODES OF SOCIAL ENGAGEMENT USING CASPA (Coding for Active Sociability in Preschoolers with Autism)

Introduction

The literature and rationale underlying the development of CASPA presented in the previous chapter made reference to previous attempts to determine what may facilitate sociability in preschoolers with autism. This chapter systematically reviews previous relevant research in this area and identifies those areas in need of further investigation. These are then empirically addressed using CASPA. CASPA identifies Episodes of Social Engagement and records factors which may influence their incidence. These factors include different forms and functions in the communication of adult partners, the use of affect, rewards and effects of familiarity.

The study presented within this chapter is influenced by Hobson's (eg. 1994) argument that infant-level processes are disordered in autism. It therefore takes preverbal interactions/strategies as its focus. There is evidence from developmental psychology studies of normal infancy that parental contextual support may function as facilitative scaffolding for social communication (Bruner, 1982). Although it is known that caregivers are capable of facilitating sociability in some children with autism (Kasari et al., 1993a) there remain questions as to how they achieve this. The following application of CASPA aims to discover the characteristics of such scaffolding to facilitate sociability in autism. Facilitators of child sociability so far indicated by the literature on adult-child interaction are detailed in the sections that follow.

Previous research evaluating facilitators of social engagement in autism

Adult's style/discourse role adopted in interaction

Following the child's lead

Both Dawson and Galpert's (1986) and Christie et al.'s (1992) models for facilitating social behaviour in autism advocate responding to the child as though s/he is initiating. Dawson and Adams (1984) and Koegel, Dyer and Bell (1987) found that the quality and quantity of social responsiveness in children with autism improved considerably when strategies similar to following the child's lead were employed. Lewy and Dawson (1992) found that children with autism under six years spent more time socially engaged when adult play behaviour closely followed and was contingent on their own behaviour. However, this did not facilitate joint attention in these subjects.

Directing the child's attention

Studies on the effects of adults directing the attention of children with autism have been carried out on school-aged subjects. Landry and Loveland (1989) found that this strategy failed to facilitate attention-directing behaviour by primary school children with autism.

Structured vs. unstructured activities and adult passivity vs. involvement

The value of child free play in contrast to active adult involvement has been considered with respect to the facilitation of sociability in children with autism. Richer (1974) and Richer and Coss (1976) suggested that social demands should be kept to a minimum in order to avoid the risk of increasing negativistic and other autistic behaviour. However, subsequent research has shown that social intrusion increases child responsiveness in terms of task compliance (cf. Howlin 1986, p. 116). Bartak and Rutter (1973) found that the greater the educational structure imposed the greater the social responsiveness of school children with autism. Their study rated social skills on a checklist following interaction with a tester.

Children with autism are clearly responsive in situations where adults actively engage them in social interaction (Clark & Rutter, 1981). More structured settings, with higher adult:child ratios, are associated with more eye-contact in older children with autism (cf. Volkmar, 1987). Unfortunately, these studies are not sensitive enough to specify what the greater structure or active adult engagement means in terms of the adult's interactive behaviour. Clarity is needed on the precise nature of the forms of adult engagement that facilitate social responsiveness in this client group.

Kasari, Sigman and Yirmiya (1993a) found that children with autism were more sociable in situations where adults actively initiated rather than were just passively available. However, the former situations were interactive social activities (eg. action rhymes) as opposed to the more structured play with toys that characterised the situations where adults were passive. Social interaction impairments are less obvious during games of physical contact and social routines (Sigman et al., 1986). The latter (eg. lap games) have also been found to facilitate greater responsivity in normal infants and blind preschoolers with severe learning disabilities (Camaioni & Laicardi, 1985; Rogow, 1982, respectively). "Further studies are needed that investigate how others might best facilitate qualitative aspects of attention in social interactions (eg. joint attention interactions) that could serve as a basis for satisfying interactive exchanges" (Kasari et al., 1993a, p. 413).

Such studies would need to define the value of structured, as opposed to unstructured, interactions where adults may play equally active roles. In this respect, Walters et al.'s review of social engagement in children with autism concludes that it is unclear "whether avoidance is more or less likely in less structured settings" (1990, p. 306,). Dawson and Galpert (1986) have employed the findings of their previous research to develop a Developmental Model pertaining to social engagement in autism. This dictates that whilst structure to social interactions may be helpful, "the presence of distractions or "cognitive noise"" should be minimised (Dawson & Galpert, 1986, p.253.).

<u>Content of adult turns within interaction</u>

<u>Affective expression</u>

It is not yet known whether manifestly positive affective expression facilitates sociability in children with autism. In a study introduced in the previous chapter, Dawson et al. (1990) found that preschoolers with autism were much less likely to smile in response to mothers' smiles than were normal children.

<u>Naturalistic use of extrinsic rewards</u>

As indicated in the previous chapter, previous studies have typically evaluated the predetermined use of extrinsic rewards within intervention programmes rather than investigated the effects of rewards offered spontaneously during naturalistic interactions.

<u>Motherese</u>

Santarcangelo and Dyer (1988) found that use of motherese was related to responsiveness and eye gaze in autism. It has yet to be established what aspect of such behaviour is salient for children with autism (eg. pitch, predictable timing etc.).

<u>Predictability in adult turns during interaction</u>

Ferrara and Hill (1980) suggested that predictability may facilitate the behavioural competence of children with autism and this hypothesis has been more recently applied to the social behaviour of preschoolers with the disorder. Dawson and Lewy (1989) argue that the complex, novel, and unpredictable nature of people makes them overstimulating for children with autism. They suggest that the latter's low aversion thresholds may decrease their ability to process social information of this nature. "In our own clinical work, we find ourselves being readily shaped by the autistic child's responses ... to provide highly routine and ritualised forms of social stimulation. This shaping is likely to facilitate our forming positive relationships with autistic children, who may find this type of interaction more optimally stimulating and thus more reinforcing." (Dawson & Lewy, 1989, p. 58). Following this argument, Dawson and Lewy (1989, p. 63) "consider imitation to be only one example of many possible interactive strategies that may promote social responsiveness in autistic individuals."

Imitation

Both the models of Dawson and Galpert (1986) and Christie et al. (1992) acknowledge more than the predictability of imitation when advocating it as a facilitative strategy for sociability in preschoolers with autism. For example, imitation is seen as a developmentally appropriate form of communication (Dawson & Galpert, 1986). Furthermore, it gives opportunity for child empowerment and participation within turn-taking flows of interaction (Christie et al., 1992; Christie & Wimpory, 1986). Christie and colleagues' work is based on observations of the preverbal interactions of normal infants. For example, normal infants respond socially to imitation (Field et al., 1983).

Tiegerman and Primavera (1981) reported that nursery-school-aged children with autism increased their frequency and duration of object manipulation when their actions were imitated. They also found that four- to six-year-old children with autism increased their eye-contact and their tendency to visually monitor an experimenter's actions when their own manipulations of toys were imitated by the experimenter (Tiegerman & Primavera, 1984). Dawson and Adams (1984) found improvements in social behaviour (eg. eye contact, gesturing, touching, etc.) among the most socially aloof children with autism when adults "reliably imitated virtually every behaviour of each child" (Dawson & Lewy, 1989, p. 63).

The nature of effective imitative behaviour

The nature of imitative behaviour that facilitates sociability in this client group has yet to be established. Tiegerman and Primavera's work (1981; 1984) was limited to object play. In Dawson and Galpert's (1990) study mothers were told to focus on actions with objects although they were also free to imitate other behaviour.

Ricks (1979) found that three- to five-year-olds with autism (unlike normal and learning disabled control subjects) appeared to mimic their own vocalisation recorded on audiotape. However, subjects with autism did not respond to a normal child's imitations of the autistic child's own previous vocalisations. This raises the question of whether the autistic children in Dawson and Galpert's (1990) and Tiegerman and Primavera's (1981; 1984) studies were more attentive because they perceived themselves as imitated or whether they were attracted by another person's repetitive behaviour. It is well recognised that children with autism actively seek out and perform repetitive movements (DSM-IV-299.00, 1994).

Familiarity of caregiver

Kasari, Sigman & Yirmiya (1993a) found that children with autism are more sociable with familiar as opposed to unfamiliar caregivers (i.e.

"an experimenter"). Their study does not distinguish between those familiar with autism as opposed to those familiar with particular children. It is currently unknown whether experience with autism in general enables adults to facilitate sociability in children with autism with whom they are unfamiliar.

<u>Issues addressed by this chapter's application of CASPA</u>

As indicated earlier, some studies have evaluated the prescribed implementation of specific strategies. This is in contrast to CASPA which focuses on their spontaneous occurrence in a natural setting. The reviewed literature indicates that there are very few findings pertaining to the issues addressed by CASPA within this chapter. For example, it investigates the effect of increasing familiarity on children with autism by examining the frequency distribution of Episodes of Social Engagement over one-to-one play-based assessments, each lasting up to two hours.

Previous research reports that instances of spontaneous interaction in autism are typically short-lived (Lord & Magill, 1989) but the question of whether Episodes of Social Engagement cluster has not been previously addressed. As indicated in Chapter One, absence of teasing behaviour is implied by clinical accounts and formal observations of children with autism (eg. Newson 1984; Hobson, 1994a and Mundy et al., 1986, respectively) but this has not previously been the subject of systematic study. Chapter Three's DAISI-derived parental reports indicated an absence of teasing behaviour during infancy in all children later diagnosed with autism. CASPA-identified Episodes of Social Engagement are therefore exploited in the study which follows where the presence/absence of teasing by the child subjects is monitored in addition to CASPA analysis of preceding adult turns.

The literature reviewed earlier indicates that structured forms of adult attention increase child social responsiveness and compliance to tasks (Bartak & Rutter, 1973). However, research has so far failed to specify particular adult strategies and precise activities most conducive to Episodes of Social Engagement. CASPA is used within this chapter to investigate the relative value of particular forms of adult active involvement as opposed to passivity. The effects of four different types of adult turns are contrasted: redirecting the child's activity, following the child's activity, being silently responsive to the child, or ignoring the child. These categories were adapted from those originally employed by Girolametto (1988), as indicated in the previous chapter.

The content of the adult's turn is also assessed using CASPA in the following study with respect to use of positive affect, extrinsic rewards and social routines. The naturalistic use of these features of adult behaviour has not previously been analysed. Furthermore, CASPA enables the following study to extend beyond previous investigations of the facilitative effects of imitation by affording simultaneous consideration of the effects of playful repetition in the adults' behaviour.

Most of the questions asked by the present study's application of CASPA involve contrasting the content of time-sampled (control) periods with that of Episodes of Social Engagement. The former give an indication of the prevalence of particular aspects of adult behaviour which can then be contrasted with the extent to which these forms of behaviour immediately precede Episodes of Social Engagement. Research procedures in the methodology section detail how control periods are selected and their content then compared with that of Episodes of Social Engagement.

As summarised in Chapter Two, the study which follows investigated seventeen specific predictions. The first of these was that Episodes of Social Engagement would never feature teasing by the child. The remainder were that the occurrences of Episodes of Social Engagement would contrast with control periods in being:

1) more likely to be associated with other Episodes of Social Engagement and positively related to adults' use of: "continuer" turns; extrinsic rewards; musical-motoric activities; patterning (and its components, namely, social routines, imitation and self repetition) (hypotheses 2-9);

2) negatively related to cognitive activities and adults' use of: "ignore" and "redirecter" turns. (hypotheses 10-13); and,

3) unrelated to adults' use of: "silent responsiveness", affective facial expressions, free play and pretend play activities and unrelated to the caregiver's increasing familiarity through each session (hypotheses 14-17). This latter hypothesis reflects the anticipation that any potential increase in familiarity for each child, through a single play-based assessment, would be too slight and short term to facilitate measurable changes. It cannot be compared with the differential familiarity effects of caregivers versus experimenters reported earlier (Kasari et al., 1993a).

Methodology

Subjects

Child Subjects

Ten subjects were selected from the thesis' cohort of eleven preschoolers with autism, on the basis of availability. There were two girls and eight boys. They had a mean age of 41.5 months (range 32 to 48 months, SD = 5.32). All children met the DSM-III criteria of early onset, abnormal social relating, deviant speech and language skills, and unusual responses to the environment (American Psychiatric Association, 1987). Diagnoses were further verified by independent clinicians' ratings of children on the Childhood Autism Rating Scale (CARS; Schopler, Reichler & Renner, 1986). The range of possible CARS scores is from 15 to 60, with scores at or above 30 indicative of autism. In this study, mean CARS scores were 44.2 (range 28.5 to 57, SD = 8.68). (The only child scoring less than 30 had been diagnosed with autism by a national specialist prior to being CARS-rated and participating in the study. Diagnosis of all the remaining subjects occurred immediately following their participation in the study.) These scores place the sample in the lower to severe range of autism. Developmental Quotients (DQs) from the Performance scores from the Griffiths Mental Development Scales (Griffiths, 1984) gave a mean of 77.6 (range 23 to 117, SD = 27.26). Six of the subjects were preverbal whilst the remainder used one-word utterances; only two subjects were female. Forty percent of the children came from Welsh-speaking families.

There were no significant correlations between CARS and results from the Griffiths performance score ($r = -0.053$, $p = .89$), CARS and chronological age ($r = -0.365$, $p = .31$), nor Griffiths results and age ($r = 0.381$, $p = .2885$). Expressive language level and CARS scores showed no significant relationship ($F(1,8) = .036$, $p = .85$).

Adult subjects.

All adults participating in the project were professional clinicians employed within a county's Child Development Service. They comprised the author as Clinical Psychologist, two Speech and Language Therapists and a specialist Child Development Team Senior Nurse. All except one assessment were videorecorded prior to the child's diagnosis being confirmed. Staff were randomly allocated to work with individual children with the exception of the CDT Senior Nurse who was not Welsh-speaking. Two of the six children from English-only homes were randomly assigned to this Nurse. All clinicians had played with their allocated children prior to their play-based assessment (minimum previous contact was a four hour home visit in the week prior to the play-based assessment). All adults participating in the study reported in Chapter Five were trained and experienced in the use of behavioural techniques as well as the play procedures for facilitating exploration and communication which characterised the sessions. Any vidoeorecorded use of extrinsic rewards (registered on CASPA) was therefore likely to be intentional (eg. holding up a puzzle piece for release on achieving eye-contact).

Table 5.1. Grouped Subject Characteristics (N = 10)

Males:Females	
%	80%:20%
Age (months)	
M	41.5
SD	5.318
DQ score	
M	77.6
SD	27.26
CARS score	
M	44.2
SD	8.680

Design

Ten preschoolers with autism were each videorecorded during a clinician's attempted one-to-one interactions in a large playroom. The session lasted for approximately one hour and forty-five minutes. Control Periods were identified (using the videotimer) at 5-minute intervals throughout the videorecordings. The videorecordings were also screened for Episodes of Social Engagement which were registered each time a child looked towards an adult's face and showed at least one additional communicative behaviour, as detailed in the previous chapter's introduction to CASPA.

As outlined in the previous chapter, the adult turns immediately preceding each Episode of Social Engagement were then analysed in comparison with those from Control Periods in a between- and within-subjects design. Adult turns (typically a comment and/or an action) were brief. They immediately preceded or were contiguous with the child's Episode of Social Engagement or Control Period but began before them. Agreement on what constituted adult turns, Episodes of Social Engagement and Control Periods was derived through blind interobserver reliabilities reported later in this chapter.

It was hypothesised that the likelihood of Episodes of Social Engagement (as opposed to Control Periods) occurring would be influenced by the adult's activity and the nature and content of her communicative turn. As indicated in the previous chapter, the nature (or discourse role), of each adult turn was registered as ignoring or being silently responsive to the child or redirecting or continuing his/her focus of interest. The previous chapter also detailed how the content of each adult turn was registered in terms of affect, use of extrinsic reward and patterning (i.e. use of social routine, imitation and/or self-repetition).

As outlined in the introduction to this chapter, specific predictions on the nature of influence on the occurrence of Episodes of Social Engagement were determined by the literature reviewed previously in this chapter together with the author's clinical experience and understanding of autism as outlined in Chapter One.

Predicted positive influences on the likelihood of Episodes of Social Engagement (as opposed to Control Periods) occurring were: the use of turns continuing the child's focus (i.e. "continuers"); extrinsic reward, patterned turns (i.e. social routines, imitation and self-repetition) and musical-motoric activities.

Predicted negative influences on the likelihood of Episodes of Social Engagement (as opposed to Control Periods) occurring were: cognitive activities and adult turns which ignored the child or redirected his or her focus.

The remaining CASPA items were predicted to have no effect on the likelihood of Episodes of Social Engagement (as opposed to Control Periods) occurring. These items comprised silent responsiveness, affective facial expression, free play and pretend play activities.

In addition to the above, temporal analysis was predicted to reveal clustering of Episodes of Social Engagement. It was also predicted that no relationship would be revealed between the occurrence of Episodes of Social Engagement and a child's increasing familiarity with his/her caregiver and situation through the progression of each session. A final additional hypothesis was that Episodes of Social Engagement would never comprise teasing by the children.

Setting

Play-based assessments (described in "Clinical Procedure") were conducted at a county Child Development Centre in a spacious, light playroom. One corner of this room was set out as a toy kitchen with cupboards. Parents observed the proceedings by live video-relay in an adjoining room in the company of Child Development Team staff. The mean length of the videorecordings was 105.5 minutes (range 65-155 minutes)

Equipment

The playroom was well-equipped with apparatus for gross motor, fine motor, pretend play, musical and cognitive activities. Equipment included a shop with a till and toy money and goods, a Wendy house, a kitchen with a sink, cooker and table, together with toy cutlery, plates and food, a hoover and an iron and ironing board. There was a slide, a large foam roll, climbing apparatus, a tunnel, a large rubber ball, a child-sized bed, a light funnel, a chirping bird, bubbles, soft toys and floor mats, hand puppets and masks, a trolley containing puzzles and games for size-, shape-, colour-matching. Floor formboards were available. A xylophone, glockenspiel, tambourines, and toy trumpets were at hand, and also a tape recorder for musical cassettes. There was a magnetic and a chalk drawing board, an additional table, plenty of crayons and paper, scissors, toy telephones and a mirror.

Procedures

Clinical Procedure

In the play-based assessment (Newson & Newson, 1979) an experienced clinician played with the child in the above setting. The videorecorded session continued for up to two hours to enable the child to become familiar with both his/her surroundings and the clinician's company.

Generally, the child's lead was followed, with advantage taken of table activity to perform Griffiths Performance Scale assessments. Pretend play toys were deliberately offered to the child if s/he made no contact with them. Furthermore, surprising events were staged to provoke protodeclarative pointing. For example, an out-of-reach bubble tube and/or musical mobile were activated. More desirable toys and/or obsessional items were also positioned prominently out of reach to provoke instrumental pointing.

Research Procedure

The Coding of Active Sociability in Preschoolers with Autism, as introduced in Chapter Four, was applied to the play-based assessment videorecordings. CASPA's scoring sheet was slightly adapted for the purposes of this study, as presented in Appendix VII. Each videorecording was screened for instances of Episodes of Social Engagement (ESEs) whose nature and content were coded according to the categories detailed in the previous chapter. In addition to CASPA coding, each Episode of Social Engagement was monitored for the presence/absence of teasing by child subjects as indicated in the CASPA outline of scoring adapted for the needs of this chapter and presented in Figure 5.1.

Following Reddy (1991), teasing was defined as the playful violation by the child of manifestly shared expectations. Criteria comprised interobserver agreement i) that adult and child expectations of the child's behaviour were manifestly shared and ii) that the child was violating these expectations whilst simultaneously showing a manifestly positive facial expression apparently indicative of teasing. For example immediately and openly repeating a prohibited act whilst looking towards the adult's face and smiling. As indicated earlier, Episodes of Social Engagement always included Eye-to-Face gaze by the child.

As indicated in the scoring procedure outlined in Figure 5.1, Control Periods (CPs) were identified at five-minute intervals, from the start of each recording, using the videorecorder timer. The adult turns immediately preceding each Control Period were coded in the same way as those immediately preceding each Episode of Social Engagement for purposes of comparison.

Fig. 5.1. CASPA (incorporating teasing and Control Periods) as used in Chapter Five.

CODING for ACTIVE SOCIABILITY in PRESCHOOLERS with AUTISM (CASPA)

Notes for Coders:	*Categories employed (mutually exclusive unless otherwise indicated):*
1) Screen all child behaviour for	**Episodes of Social Engagement (ESEs)**
These comprise Eye-to-Face gaze + 1 or more	**Forms of child communicative behaviour:** Motoric Body Language Vocal/ Verbal
2) Identify whether	**Teasing** by child is present/absent
3) Identify time-sampled points at 5-min. intervals as **Control Periods**	
4) Code all adult turns preceding ESEs and Control Periods according to	
4a) Discourse role	**Type of adult turn:** Continuer Redirecter Silent Responsiveness Ignore
4b) Content	**Content of turn:**
4bi) Register facial expression i.e.	Positive Affect present/absent/uncodable
4bii) Register	Extrinsic Reward as present/absent
4biii) Specify use of any/all of these general patterning strategies as	Social Routine Imitation Self-Repetition
5) Register **Adult Activity** by equipment used	Cognitive Pretend Musical-motoric Free Play

(NB: Free Play = period of adult passivity)

A Control Period comprised whatever was happening in the videorecording when the timer indicated that each five-minute section had passed. For example, a control period might fall when a child began to lift his or her arm to operate a toy. As outlined in Figure 5.1, the adult turn immediately preceding each Control Period was coded for activity, nature and content (using categories identical to those employed for Episodes of Social Engagement). In the example given previously, this would be the adult's behaviour immediately prior to the child starting to raise his or her arm.

In summary, the activity, nature and content of the adult's turn immediately prior to each Episode of Social Engagement and each Control Period was coded according to:

<u>activity</u>: cognitive, pretend, musical-motoric or free play;

<u>discourse role</u>: use of continuers, redirecters, silent responsiveness or ignoring;

<u>content</u>: manifest positive affect, use of extrinsic reward, and patterning (social routines, imitation and/or self-repetition).

Full details of category definitions were given in the previous chapter which specifies that activity and discourse role alone comprised mutually exclusive categories.

Initial screening of videorecordings took a total of fifteen hours. Once the CASPA schedule was established, subsequent analysis took approximately 15 minutes per Episode of Social Engagement or Control Period (N = 350). As detailed in the results section, the percentages of both Episodes of Social Engagement and Control Periods associated with each CASPA category were separately assessed for each child. Differences between these percentages were analysed using the Wilcoxon signed rank test in one-tailed form where a direction of influence had been predicted and in two-tailed form for non-directive hypotheses. As detailed earlier, the latter formed the minority. They comprised silent responsiveness, affective facial expression, free play, pretend play activities and increasing familiarity through each session.

Results

Reliability of CASPA

The principal coder was a postgraduate research assistant to the project. Both intra-rater reliabilities and inter-rater reliabilities were calculated for the study. Both used agreements/disagreements for minute by minute sections.

20% of videorecordings (with each subject represented) were randomly selected for independent blind-rating. 15% of second coding was performed by trained psychology undergraduate who was blind to the hypotheses of the study; the remainder was performed by the author. Kappas for each category of inter-rater coding for Episodes of Social Engagement data ranged from .53 to 1 (mean = .77, excluding free play), as detailed in table 5.2. There was complete agreement that no teasing by children occurred.

Intra-rater reliabilities are also shown in Table 5.2. These were established by the main coder re-coding 12% of the data at least six months after they had been originally coded. They too confirmed the absence of teasing by children.

Table 5.2. Kappa reliabilities for Inter- and Intra-rater CASPA coding of Episodes of Social Engagement (ESEs)

Episodes of Social Engagement		Kappa Inter-rater (20% data)	Kappa Intra-rater (12% data)
Presence/Absence of Episodes of Social Engagement		.66	1
Adult Discourse Role	Continuer	.79	1
	Redirecter	.9	1
	Silent Responsiveness	1	1
Content of Adult Turns			
Manifest Positive Affect	Uncodable	.78	.88
	Present	.53	.5
	Absent	.6	.58
Presence/Absence of Extrinsic Reward		.8	.79
Presence/Absence of Patterning		.6	.92
	Social Routine	.89	1
	Imitation	.54	.66
	Self-Repetition	.73	.83
Activity	Cognitive	.69	1
	Pretend Play	1	1
	Musical/Motoric	.9	1

Comments on reliabilities for Episodes of Social Engagement.

There was only one (debatable) instance of Free Play in the inter-raters' reliability sample, which the second coder alone coded as such. Given the high reliability in coding this category in the Control Periods it was considered that this would not invalidate conclusions from the study. Both inter- and intra-reliability ratings agreed that there were no instances of adults ignoring children.

Control Periods

Inter-rater reliability kappas ranged from .3 (see note overleaf) to 1 (mean, excluding extrinsic reward = .74), as detailed in Table 5.3.

Table 5.3. Kappa reliabilities on 20% data for Inter- and Intra-rater CASPA coding - Control Periods (CPs)

		Kappa Inter-rater (20% data)	Intra-rater (20% data)
Discourse Role	Continuer	.66	1
	Redirecter	.3	1
	Silent Responsiveness	.91	1
	Ignore	.47	1
Content			
Manifest Positive	Uncodable	.69	.78
Affect *(affect coded on 16% data)*	Present	.47	.78
	Absent	.91	.91
Presence/Absence of Patterning		.71	1
	Social Routine	.91	1
	Imitation	1	1
	Self-Repetition	.71	.84
Activity	Cognitive	.87	.93
	Pretend Play	.83	.84
	Musical/Motoric	.85	.92
	Free Play	.78	.79

Comments on Control Period reliabilities

The low kappa (.3) for redirecters from the Control Period data was followed by further training of the second coder in the discourse role categories. This is reflected in the higher figure (0.9) for the ESE coding.

There was agreement that 29 of the 30 Control Periods checked for reliability did not contain extrinsic reward. One coder rated the remaining Control Period as containing extrinsic reward. Thus in calculating kappa, there was a marginal of 0. Given the high reliability of coding extrinsic reward in the Episodes of Social Engagement (.8), this did not warrant further examination.

Prevalence of Episodes of Social Engagement and Control Periods

200 Episodes of Social Engagement and 149 Control Periods were analysed. The former reflects the natural occurrence of Episodes of Social Engagement over the ten videorecordings whilst the latter were derived from observations made every five minutes throughout each videorecording. The number of Episodes of Social Engagement per child ranged from 8 to 47 (M = 20, SD = 14.36). The number of Control Periods per child ranged from 9 to 19 (M = 14.1, SD = 3.178). This corresponds to the length of their coded play-based assessment (minimum 65 minutes). Individual subject profiles of the frequencies of Episodes of Social Engagement, are presented with analysis in Table 5.4. As indicated earlier, no Episode Social Engagement nor Control Period involved teasing by a child.

Association of ESEs and Control Periods with individual CASPA items

The percentages of both Episodes of Social Engagement and Control Periods associated with each CASPA category were separately assessed for each child. Differences between these percentages were analysed using Wilcoxon signed rank tests, as detailed earlier. All results are one-tailed, unless otherwise indicated (*).

Discourse Role of Turn

As indicated in table 5.5, the likelihood of occurrence of ESEs the was positively related to adult's use of continuers and negatively related silent responsiveness by the adult. "Ignore" preceded 5% of Control Periods (N = 8) but never preceded any Episode of Social Engagement and so it was omitted from statistical analysis.

Table 5.5. Percentages of Episodes of Social Engagement and Control Periods preceded by each category of Discourse Role

	Episodes of Social Engagement		Control periods		Wilcoxon
Discourse Role	Mean %	n	Mean %	n	p-value
Continuers	82.64	165	55.56	83	.003
Redirecters	4.61	12	10.27	17	.13
Silent Response	12.75	23	38.91	41	.028*

*2-tailed Wilcoxon result; other results are one-tailed.

Table 5.4. Elements comprising adult turns prior to children's Episodes of Social Engagement

Name	Number of ESEs (none included teasing)	Activity (percentages of each category preceding ESEs)				Discourse Role (percentages of each category preceding ESEs)			Content (percentages of each category preceding ESEs)					Patterning types (percentages of each category preceding ESEs)		
		Cognitive	Pretend Play	Music/ Motoric	Free Play	Continuer	Re-directer	Silent Resp	Extrins Reward	Manifest Positive Affect Yes	No	Unclear	Patterning	Social Routine	Self Repet	Imitation
Bertie	8	0.00	12.50	87.50	0.00	75.00	0.00	25.00	0.00	37.5	62.50	0.00	50.00	0.00	50.00	0.00
Charles	11	9.09	0.00	81.82	9.09	90.91	0.00	9.09	0.00	63.64	9.09	27.27	72.73	72.73	54.54	0.00
David	43	6.98	0.00	90.70	0.00	90.70	4.65	4.65	41.86	23.27	16.28	60.47	76.74	67.44	51.16	23.26
Grant	8	37.50	12.50	37.50	12.50	87.50	0.00	12.50	0.00	25.00	0.00	75.00	50.00	12.50	50.00	0.00
Heather	14	14.29	57.14	28.57	0.00	92.86	0.00	7.14	0.00	42.86	35.71	21.43	50.00	14.29	21.43	21.43
Jack	9	22.22	0.00	77.78	0.00	77.78	0.00	22.22	0.00	0.00	44.44	55.56	55.56	11.11	33.33	44.44
Jake	26	34.62	46.15	11.54	7.69	80.77	11.54	7.69	15.39	11.54	57.69	30.77	30.77	19.23	15.39	7.69
John	47	14.89	8.51	76.60	0.00	74.47	8.51	17.02	31.92	19.15	55.32	25.53	48.94	10.64	36.17	12.77
Mark	14	64.29	0.00	42.86	0.00	71.43	21.43	7.14	0.00	35.71	42.86	21.43	71.43	14.29	57.14	21.43
Siân	20	0.00	30.00	70.00	0.00	85.00	0.00	15.00	20.00	5.00	60.00	35.00	70.00	30.00	60.00	25.00
Mean	20	20.39	16.68	60.49	2.93	82.64	4.61	12.74	10.92	26.37	38.39	35.25	57.62	25.22	42.92	15.60
SD	14.36	20.09	20.81	27.89	4.86	7.78	7.25	6.92	15.69	19.17	22.59	22.19	14.58	24.83	15.47	14.33
Range	8-47	0-64.29	0-57.14	11.54-90.7	0-12.5	71.43-92.86	0-21.43	4.65-25.00	0-41.86	0-63.64	0-62.5	0-75.00	30.77-76.74	0-72.73	15.39-60.00	0-44.44

Content of turn (Affect, extrinsic reward and patterning)

Affect Table 5.6 shows that adult affect did not influence the likelihood of occurrence of Episodes of Social Engagement.

Table 5.6. Percentages of Episodes of Social Engagement and Control Periods preceded by each affect category

	Episodes of Social Engagement		Control Periods		Wilcoxon
Affect	Mean %	n	Mean %	n	p-value
Positive	26.37	46	14.17	20	.139*
Not positive	38.39	81	47.06	72	.508*
Uncodable	35.25	73	38.77	57	.575*

*2-tailed Wilcoxon results

Extrinsic Reward and Patterning (Patterning comprises Social Routine, Imitation and/or Self-Repetition). As indicated in table 5.7, the adult's use of extrinsic reward and patterning positively influenced the likelihood of occurrence of ESEs.

Table 5.7. Percentages of Episodes of Social Engagement and Control Periods preceded by a) Extrinsic Reward b) Patterning

	Episodes of Social Engagement		Control Periods		Wilcoxon
	Mean %	n	Mean %	n	p-value
Extrinsic Reward	10.92	41	.59	1	.034
Patterning	57.62	116	22.53	35	.004

Patterning Components Table 5.8 shows that the adult's use of social routines, imitation and self-repetition positively influenced the likelihood of occurrence of Episodes of Social Engagement.

Table 5.8. Percentages of Episodes of Social Engagement and Control Periods preceded by components of patterning: a) Social Routines, b) Imitation c) Self-Repetition

	Episodes of Social Engagement		Control Periods		Wilcoxon
Patterning Component	Mean %	n	Mean %	n	p-value
Social Routine	25.22	59	3.78	6	.004
Imitation	15.6	33	3.8	6	.023
Self-repetition	42.92	83	18.56	28	.003

Inter-relationships between imitation and self-repetition

As indicated earlier, sub-components of patterning were not mutually exclusive. However, further analysis enabled presentation of mutually exclusive data for imitation alone and self-repetition alone, as separately presented in Table 5.9. The table also shows data for adult turns which were simultaneously imitative and self-repetitive (for example, where an adult imitated hand-flapping).

Predictions were consistent with those originally adopted for the study. Thus positive relationships between the separate or combined sub-components of patterning and the likelihood of occurrence of Episodes of Social Engagement were anticipated. As indicated in table 5.9, both self-repetition alone and turns which were simultaneously imitative and self-repetitive positively influenced the likelihood of occurrence of Episodes of Social Engagement.

Table 5.9. Periods preceded by each category of imitation and/or self-repetition

	Episodes of Social Engagement		Control periods		Wilcoxon
	Mean %	n	Mean %	n	p-value
Imitation alone	5.63	12	2.64	4	.18
Self-repetition alone	32.94	62	18.57	26	.02
Imitation and self-repetition	9.97	21	1.15	2	.02

Activity

As indicated in table 5.10, the adult's activity influenced the likelihood of Episodes of Social Engagement occurring. The direction of influence is positive for musical-motoric activities and negative for cognitive activities. As indicated earlier, pretend play materials were offered during each play-based assessment. Although not the subject of formal analysis, observations indicated that each child manipulated these but, in common with previous findings, failed to show genuine pretend play (eg. Baron-Cohen, 1987).

Table 5.10. Percentages of Episodes of Social Engagement and Control Periods preceded by each activity category

	Episodes of Social Engagement		Control Periods		Wilcoxon
Activity	Mean %	n	Mean %	n	p-value
Cognitive	20.39	36	40.43	59	.005
Pretend Play	16.68	32	11.73	18	.767*
Musical-motoric	60.49	128	36.98	58	.007
Free Play	2.93	4	10.86	14	.116*

*2-tailed Wilcoxon; other results are one-tailed

Familiarity with session/caregiver: Timestage Analysis of Episodes of Social Engagement and/or Control Periods

In order to test whether familiarisation with the caregiver situation affected the amount of social engagement, a 2-tailed Wilcoxon signed rank test was performed on the percentages of Episodes of Social Engagement falling in the first (N = 113) and second (N = 87) halves of the assessments for each child. The result was p = .919. There was no correlation between the length of play-based sessions and numbers of Episodes of Social Engagement (-.29, p = .43).

Clustering

The spread of Episodes of Social Engagement was examined. The mean percentage of Episodes of Social Engagement where another Episode of Social Engagement followed within one minute was 38.5 (N = 77). The mean percentage of Control Periods where an Episode of Social

Engagement followed within one minute was 13.42 ($N = 20$). For these results, $p = .004$.

Discussion

The study aimed to determine the relative efficacy of adult strategies and activities in facilitating social engagement during one-to-one naturalistic interaction with preschoolers who have autism. As indicated earlier, specific original hypotheses were that the likelihood of Episodes of Social Engagement occurring would be i) positively related to: "continuer" turns; extrinsic rewards, patterning (and its three individual components), musical-motoric activities and the presence of other Episodes of Social Engagement ($N = 9$); ii) negatively related to: "ignore" and "redirecter" turns and cognitive activities ($N = 3$); and, iii) unrelated to "silent responsiveness", affective facial expressions, pretend and free play activities and the caregiver's increasing familiarity through each session ($N = 5$).

For eleven of the twelve original hypotheses where an influence had been predicted, the direction of influence was confirmed at a statistically significant level. The factors significantly and positively related to ESE-occurrence were: "continuer" turns; musical-motoric activities; extrinsic rewards, the presence of other Episodes of Social Engagement; patterning and its individual components of social routines, imitation and self-repetition. More detailed consideration of the latter two was anticipated to show that imitation and self-repetition would be positively related to ESE-occurrence when they were analysed as mutually exclusive data. Turns which comprised self-repetitive imitation were also predicted to be positively related to ESE-occurrence. Analysis confirmed that self-repetition and self-repetitive imitation were positively related to the occurrence of ESEs, but imitation alone failed to reach significance.

Cognitive activities and silent responsiveness were the only CASPA components significantly negatively related to ESE-occurrence. The negative influence of adult redirecter turns failed to reach significance and there was insufficient data to evaluate the effects of adults ignoring child behaviour.

The predicted lack of influence of the remaining CASPA components on the likelihood of Episodes of Social Engagement occurring was confirmed for all except "silent responsiveness" which was found to significantly decrease the likelihood of such episodes occurring. As discussed earlier, these indicators must be considered in the context of the mostly child-led play activities from which they were derived. As predicted, the incidence of Episodes of Social Engagement in this study appeared unaffected by manifest positive affect, pretend- or free-play activities. An additional hypothesis, that Episodes of Social Engagement would not involve teasing by child subjects, was confirmed.

The finding that none of the Episodes of Social Engagement involved teasing by a child confirms clinical observations of autism (Christie et al. 1992) and extends the limited empirical work in this area. As indicated in Chapter One, children with autism have previously been reported as failing to show the "coy, silly or self-conscious behaviour that is sometimes observed in normal groups" (Ungerer 1989, p. 84). The theoretical implications of the CASPA-derived, and other, observations of the absence of teasing are explored in depth in the thesis' discussion (Chapter Nine).

The main body of results pertaining to facilitators of sociability in autism also confirm and extend previous findings. These include the observation that social responsiveness improves (in quality and quantity) when adults play an active rather than a passive role (Kasari et al., 1993a) and employ strategies similar to following a child's lead (Koegel, Dyer & Bell, 1987).

Data from the present study are also compatible with the suggestion from Howlin's review (1986) that free play (where the adult may or may not be responsive) is unlikely to facilitate Episodes of Social Engagement. In a related study, Landry and Loveland (1989) found that a high degree of directing behaviour by adults failed to facilitate more attention-directing behaviour from primary school children with autism. The CASPA-derived findings are also compatible with Dawson and Galpert's (1986) developmental model which acknowledges that structuring social interactions may be helpful, so long as distracting 'cognitive noise' is minimised.

A large proportion of adult affect was uncodable in the present study. However, visual examination of the data indicates that manifest positive affect was neither helpful nor unhelpful with respect to the likelihood of Episodes of Social Engagement occurring. These results are compatible with those of Dawson et al. (1990) who found preschoolers with autism much less socially responsive to maternal use of positively affective facial expressions than normal children.

The CASPA-derived data indicated the value of imitation (including self-repetitive forms) in facilitating Episodes of Social Engagement. This is compatible with other research by Dawson (Dawson & Adams, 1984; Lewy & Dawson, 1992). The CASPA study also confirms Sigman et al.'s (1986) finding that social interaction impairments are less obvious during games of physical contact and social routines. All the positive clinician behaviour identified through CASPA (that is, patterned turns following the child's lead during musical motoric activities) is also characteristic of parental behaviour facilitative of preverbal interaction with normal infants (as detailed in Chapter One).

The study confirmed previous findings of the effects of adult use of extrinsic rewards. Previous studies examined the artificial rather than naturalistic use of these. Another new area of study represented by the CASPA analysis in this chapter, sought to determine the effects of activities based around pretend play equipment. However, no direction of effect was discerned.

As indicated earlier, there was insufficient data to determine statistically the effects of ignoring children with autism on the likelihood of Episodes of Social Engagement occurring. Whilst "Ignore" never preceded any of the two hundred Episodes of Social Engagement, it characterised one in twenty of the Control Periods. Visual inspection of these data indicates that ignoring children is probably an unhelpful strategy in facilitating sociability. These limited data cannot lend support to the literature reviewed earlier suggesting that social demands by adults on children with autism should be kept to a minimum (Richer, 1974; Richer & Coss, 1976).

In an extension of previous research, the present study clarified that cognitive activities decrease the likelihood of Episodes of Social Engagement in a context where adult involvement is already high and other activities are available. The study also extends previous findings by indicating that actively involved adults may more effectively facilitate interaction through non-cognitive activities such as those classed as musical-motoric. This moves beyond the findings of previous studies which tend to compare structured educational adult involvement with adult passivity (as reviewed by Howlin, 1986).

The findings of the present study also extend previous research in highlighting the need to differentiate between adult imitation of a child (which may or may not be repetitive) and adult self-repetition (which may or may not be imitative) in influencing the likely occurrence of Episodes of Social Engagement. As indicated earlier, the behaviour of children with autism is particularly self-repetitive (DSM-IV, 299.00, 1994), and the present study shows that further research is needed to determine whether self-repetition may have influenced the outcome of previous research supposedly investigating the effects of imitation alone.

CASPA-analysed data indicate a stronger facilitative effect for self-repetition than for imitation. Where imitation and self-repetition are considered separately, an effect of self-repetition (in increasing the likelihood of ESEs-occurrence) is revealed independent of imitation. The effects of simultaneous imitation and self-repetition are comparable with those of the original category of general imitation (of both repetitive and non-repetitive aspects of child behaviour). These and other data indicate that the general imitation coded in response to the original hypothesis may have largely comprised imitation of children's self-repetitive behaviour. Further data are required to determine any independent trend indicating an effect for imitation without the sub-component of self-repetition.

These results may also be interpreted as compatible with aspects of Lewy and Dawson's model of joint attention deficits in autism involving "factors inherent to the disorder in transaction with social context" (1992, p. 555). Furthermore, they provide a more detailed picture as to how social engagement may be facilitated using strategies beyond the deliberate imitation of actions advocated by Lewy and Dawson (1992). Like the other CASPA-identified positive strategies, self-repetition is a characteristic of normal infant-parent joint action formats. The latter are particularly characterised by turn-taking patterns of mutual imitation and repetitive runs of familiar behavioural patterns (Bruner, 1983; Newson, 1974; Ratner & Bruner, 1978, Stern, 1977).

Further previously uninvestigated areas of findings from this study include the fact that although Episodes of Social Engagement showed clustered distribution, their frequency did not increase with increasing familiarity with the caregiver over the course of the 1-2 hour play-based assessment sessions The clustered distribution may indicate that the experience of social engagement is not aversive to the child with autism if s/he is genuinely and actively involved. The lack of influence of familiarity extends rather than contradicts previous findings of greater sociability with very familiar adults. This is because child-clinician relationships of the play-based assessments were not comparable with the parent-child relationships of previous research. In summary, the results of the play-based assessment study confirmed previous studies' findings with respect to the varied effects of adults being silently responsive, imitating, redirecting or following a child's lead and employing manifest positive affect, free play, musical-motoric activities and social routines.

Unfortunately, repeated observations of the same children are not available for further evaluation of reliability. The small subject pool and naturalistic observations of this study mean that there were few occurrences of some categories of behaviour. This may compromise the generalisability of the results involving imitation, redirecters and extrinsic rewards. There were fewer than fifty instances of each of these overall on which to analyse the original data, as indicated in the results tables given earlier. It should also be acknowledged that naturalistic use of the strategies observed does not necessarily reflect their efficacy when intentionally and elaborately employed. Caution must therefore be employed before generalising from the results.

Future research is particularly required to confirm the present study's tentative new findings pertaining to imitation (as opposed to self-repetition). The behavioural components of Episodes of Social Engagement and their facilitators (including adult and child use of gesture, vocalisation etc.) have been recorded but await analysis in a subsequent study. Future studies could also employ parents at home or in play-based assessment in an attempt to establish the generalisability of these findings which are currently restricted to interactions involving clinicians. It may also be useful to teach parents to employ these strategies and thereby assess their value as facilitative strategies for deliberate use by those living and with young children with autism.

Altogether these results suggest that Episodes of Social Engagement with preschool children with autism are most easily facilitated through activities comparable with those facilitative of preverbal interaction with normal infants. It maybe that they facilitate social engagement because they offer support for the inter- and intra-personal timing of interactions. The efficacy of each of these strategies would be predicted by Christie et al.'s (1992) model of intervention which is compatible with the social timing deficit proposed for autism by Newson (1977, 1987).

If it is the case that Episodes of Social Engagement are largely contingent upon or facilitated by activities which support social reciprocity and/or inter- and intra-personal timing, then strategies to formalise such support should be therapeutic. The use of music to provide such support is considered in the next chapter.

Chapter Six

THE USE OF MUSIC TO FACILITATE SOCIAL ENGAGEMENT IN YOUNG CHILDREN WITH AUTISM

Previous chapters have indicated that social reciprocity and/or the interpersonal timing underlying engagement may present particular difficulties to children with autism. Furthermore, Chapter Five showed that Episodes of Social Engagement were associated with (musical-motoric) activities that provided potential support to patterns of intra-personal timing and social reciprocity (through social-routines, movement, music, self-repetition, imitation, etc.). Music therapists offer potential support to the timing of interactions and so this chapter gives consideration to their therapeutic claims. It opens with a review of therapeutic applications of music for young children with autism. There follows an introduction to Musical Interaction Therapy which is subsequently evaluated using a single case study. The contribution of the separate or combined components of Musical Interaction Therapy are examined in a single case study in the next chapter.

It is a frequently reported clinical and empirical observation that children with autism appear to be particularly responsive both to music and to music therapy (eg. Alvin, 1978; Applebaum, Egel, Koegel & Imhoff, 1979; Benenzon, 1976; DeMyer, 1979; Sloboda, Hermelin, & O'Connor, 1985; Thaut, 1987, 1988). A recent survey of German child psychiatrists and paediatricians indicated that the therapeutic application of live music for autism is now widely accepted (Evers, 1992). Its use is advocated from a variety of theoretical perspectives with varying levels of evaluative support. This review considers the different types of music therapy in terms of how they address the disabilities of young children with autism. It subsequently advocates a developmental, research-based approach.

General Applications of Music Therapy for Children with Autism

Paul (1982) defines music therapy as a behavioural science and aesthetic experience which uses music as a tool to bring about positive changes in human behaviour. These changes may include educational as well as rehabilitative, social or emotional changes. The potential application of such a wide range of therapies emphasises the need for specific short- and long-term goals for any individual client.

Music therapies are mainly used clinically with children with autism to improve sociability. The use of music therapy may be considered to be particularly appropriate where verbal communication is impaired or impossible. It is suggested that music may afford opportunities for expressing and even mastering disturbing emotions and may open up channels of communication between therapist and client (Brown, 1994; Storr, 1993). More specifically, the use of music may be designed to address the social timing difficulties proposed in autism (Newson, 1977, 1978; see Musical Interaction Therapy below).

Although music has been found to be more successful in improving social behaviour than in improving task-oriented attention (Stevens & Clark, 1969), Rider and Eagle (1986) advocate and justify the use of music in learning. Their concepts of primary, secondary and tertiary entrainment are related to the Piagetian concepts of assimilation and accommodation in the learning process. Thaut (1984) reports earlier unpublished findings that adding rhythm or melody to verbal instruction aided comprehension (Thaut, 1980).

Non-directive and directive strategies

Music therapy for children with autism includes non-directive and directive strategies (Paul, 1982). Therapy may involve the child's active participation or s/he may be passive. Non-directive therapies are more widely reported than directive therapies and are influenced by the published experiences of therapists (eg. Alvin, 1978). Psychodynamic theories are frequently cited as the basis for non-directive music therapies (eg. Tustin, 1990). These therapies have not been evaluated formally (eg. Levinge, 1990; Nordoff & Robbins, 1971; Sydenstricker, 1991; Velleda, 1990). They typically employ improvisation and aim for the development of a one-to-one relationship between the music therapist and client (Nordoff & Robbins, 1971). Such an approach claims considerable success, but changes are not evaluated in terms of measured social behaviour nor are deficits measurably defined.

Non-directive applications of music therapy have been extended to encompass family therapy but such applications lack evaluation (eg. Decuir, 1991; Eiguer & Granjon, 1983). Unevaluated applications of music also include the Higashi school curriculum which mainly comprises highly structured art, music and movement lessons. Higashi instruction involves "a high degree of behavioural patterning and repetition, for example, ... imitating a drum beat, or imitating a set of motor exercises" (Quill, Gurry & Larkin, 1989, p. 627).

Directive therapies are informed by Social Learning theories of autism and emphasise the evaluation of findings (eg. Lovaas, 1977). They include the behavioural use of contingent reinforcement which has been used successfully with this client group in the context of music therapy (eg. Boyle, 1991 (cit. Toigo, 1992); Michel, 1976; Paul, 1982) A firm directive therapy involves specific, frequent and clearly defined expectations of the child and care is taken that the child is not permitted to escape planned activities (Oppenheim, 1974).

Vibroacoustic therapy

Vibroacoustic therapy involves "using the energy of musical sound waves applied directly to the body to produce relaxing physiological as well as psychological effects" (Skille, 1989). Benefits claimed for children with autism through Vibroacoustic therapy have included the following:

> "contact-defying children became so engaged by the effect of vibrations that they could permit the staff to give them more physical/skin stimulation than had been permitted in other situations. There is also some evidence that contact which occurred during VA may be transferred to situations where the music can gradually be withdrawn" (Skille, 1989, p. 66).

No specific measures were offered to support these claims. The use of this passive modality therapy with specific physiological effects (documented over ten years) may apparently benefit some children with autism (cf. Toigo, 1992). Nelson, Anderson and Gonzales (1984), citing Alvin (1978), suggest that children with autism can enjoy the sensory stimulus of sound vibrations, such as those from a radio they are holding.

Background music

Some studies have examined the effects of background music on the performance of children with autism. Skelly (1992) reported a significantly greater amount of symbolic play and positive affect in a music-present condition. A study by Burleson, Center and Reeves (1989) found that exposure to background music had a facilitative effect on colour-sorting. (This study used four children who were diagnosed as either autistic or schizophrenic. The two disorders were not examined separately.)

It is possible that background music has a calming effect on the children thereby enabling greater concentration rather than improvement in specifically impaired skills. Rider and Eagle (1986) suggest that the relationship between relaxation and learning "may be such that synchronised or regulated neurobehavioral rhythms yield optimal performance and learning potential" (p. 240).

<u>Autistic children's musical preferences</u>

Hypo- or hyper-responsivity to sound is claimed by some to be an inherent feature of children with autism (eg. Ornitz & Rivo, 1968, cit. Nelson et al. 1984). Overstimulation may have adverse effects eg. avoidance of contact, increasing tendencies to fixate and violent behaviour (Toigo, 1992). This emphasises the potential importance of sensitive matching of music to individual taste and state of arousal.

Studies searching for the preferences of children with autism for auditory as opposed to visual stimuli have produced conflicting findings (Hermelin & O'Connor, 1970; Kolko, Anderson & Campbell, 1980; Thaut, 1987). It is likely that the nature of the stimuli offered in each modality influences results. For example, most autistic children are more likely to respond to an auditory than to a visual stimulus when the auditory stimulus is musical (as opposed to a pure tone or white noise - Kolko et al., 1980).

Musical preferences depend on culture, personality, and current mood (Rider & Eagle, 1986). The musical preferences of children with autism appear to be congruent with autistic deficits. DeMyer (1979) reported that children with autism typically prefer only one or a few types of music. These tend to be simple and repetitive in nature. This is in keeping with Thaut's (1988) finding that in performance of improvised tone sequences, autistic children's tone sequences were rather short and repetitive. In contrast, normal children enjoy larger varieties of music. Nelson, Anderson and Gonzales' (1984) review of this field concludes that this clinical population may "prefer certain kinds of music stimuli to other kinds of stimuli because of the repetitiousness and concreteness of the stimuli." (pp. 107-8).

Objective evaluative studies

Whilst clinical reports of the effects of music therapy abound, there are few objective evaluative studies. For example, Hairston (1990) investigated the responses of two groups of school children with autism to combined art and music therapy. However, the study did not seek to evaluate the effects of art and music therapy separately. Recognition of the need for objectivity led to Müller and Warwick's recent evaluative research (1993). They used a traditional experimental design and systematic observations to look at a variety of hypotheses relating to changes in autistic children's communication and mother-child interaction through music therapy. Results showed an increase in turntaking, some increase in musical activity and a decrease in stereotypic behaviour during the sessions. Kostka (1993) also found the measured stereotypic behaviours (arm flapping, body swaying) of a nine-year-old boy to decrease in regular music classes. Müller and Warwick's work is unusual in that it is conducted and reported in a way that allows practitioners to select strategies and predict their effects on their clients. Furthermore, it supports mother-child interaction with live music rather than being limited to therapist-child interaction.

Nelson et al.'s (1984) review of music activities as therapy for children with autism and other pervasive developmental disorders, is based on an understanding of the interaction of the specific disabilities within autism. This significant paper gave suggestions for the musical application of such understanding a decade ago. It advocates the use of music therapy in response to the proposed temporal perception difficulties in autism (described below). Nelson et al. make several practical suggestions based on research findings, for tailoring musical input to the exact responses of individual children. For example, they suggest that stimuli of very short duration could be used so that stimuli do not become confused (cf. Condon 1975). Furthermore, they advocate that the therapist attempts to move and speak in synchrony with the child. They suggest that the timing of stimuli could be as important as the quality of the stimulus. The introduction to Musical Interaction Therapy, later in this review, incorporates and develops this. "Perhaps learning to control and therefore predict the timing of sounds will improve the child's ability to integrate sequences of sounds" (Nelson et al., 1984, p. 110).

Temporal perception

Nelson et al.'s conclusions are influenced by research suggesting that children with autism have specific problems in dealing with temporal perception (Condon, 1975; Evans, 1986; Hermelin & O'Connor, 1970). This issue was explored in detail, along with the 'social timing' difficulties proposed by Newson (1978, 1987), in Chapter One. Temporal perception is closely related to rhythmic movement (Nelson et al., 1984). Normal children have much better movement rhythm than do children with autism during music-prompted movement activities (DeMyer, 1979).

Rider and Eagle (1986) examined the role of rhythmic entrainment as a mechanism for learning in music therapy. They cite work by Nordoff and Robbins (1971, 1972) which indicated that stereotyped behaviour (repetitive and unchanging patterns) may be reduced through matching rhythm and loudness and/or vocalising precisely to the child's playing, Rider (1982) found that perception of tempo and duration were the musical attributes most closely related to cognitive developmental level. Rider and Eagle (1986) argue that musical activities which are age-appropriate may facilitate intellectual development.

Methodological issues in evaluative studies

In music therapy for autism, as indicated above, practitioners focus on differing aspects of the application of music. Some are interested in the processes occurring during therapy as examined through the development of the music, others are concerned with the therapeutic relationship and/or the outcome of particular interventions (Heal & Wigram, 1993). The latter approach is the one of greatest interest to practitioners who are looking for proven methods applicable to specific deficits, for therapeutic effects which extend beyond the sessions or therapists involved.

There is a dearth of evaluated studies to guide therapists as to what approaches are effective when addressing autism and its specific deficits. Radhakishnan (1991), reviewing Music Therapy in general, concluded that the literature on music therapy research showed consistent methodological weaknesses, principally the absence of a neutral control and the presence of observer bias. Generally any changes taking place were being recorded and interpreted by the music therapists themselves, without allowing for projected development with no therapy and without recognition of the uncertainties of generalisation.

The two latter points are particularly difficult in relation to children with autism. Therapies are often implemented over a long time span (typically one to four years). Although several studies claim generalisation of certain communicative skills (eg. Alvin, 1978; Benenzon, 1976; Saperston, 1973), such generalisation is mainly anecdotal and subjective without statistical support. Autistic children have particular difficulties in generalising learned behaviours across situations and persons (Howlin et al., 1987; Müller & Warwick, 1993). Nelson et al. argue that generalisation and transfer of learning must be programmed by the therapist, not simply assumed. "The unanswered question" remains "whether improvisation via musical instruments will transfer to improvisation in other aspects of life" (Nelson et al., 1984, p. 111).

An Introduction to Musical Interaction Therapy

Nelson et al. (1984, p. 101) state that "... therapists who use music stimuli must be able to make optimum therapeutic matches between specific activities and the developmental needs of their clients ... ". Traditional music therapy, as reviewed above, usually lacks the framework of a developmental perspective on autism. A series of papers, from Nottingham University's Child Development Research Unit, reports on an alternative application of music originally designed in response to the proposed intra-/inter-personal timing difficulties of this population (Christie, Newson, Newson & Prevezer, 1992; Christie & Wimpory, 1986; Newson, 1987; Wimpory, 1985). Prior to these reports on "Musical Interactions", there were no accounts of music therapy for autism based on a developmental perspective. The therapeutic use of music described here is based on observations of patterns of communicative development in children both with and without autism (eg. Newson, 1984; 1987). The approach is underpinned by the understanding that spoken communication stems from a preverbal framework of communication where interpersonal timing is crucial (Christie et al., 1992).

The clinical practice of Musical Interaction Therapy is described in the case study application which follows. It is based around activities and strategies which subsequent CASPA analysis (in the previous chapter) revealed as facilitative of social engagement. These are continuer turns, imitation, self-repetitive patterning, musical-motoric activities, and the presence of other Episodes of Social Engagement. Musical Interaction Therapy aims to prolong and enhance the active experience of preverbal dialogue for children with autism. A musician-facilitator offers live support to the interactions of a child with autism during free play with his or her familiar caregiver. The involvement of the caregiver and the use of the familiar home or school environment make for the greater probability of generalisation of behaviour changes (Howlin et al., 1987, 1989; Schreibman, 1988).

The musician's role is responsive to the specific social timing difficulties which are proposed to be a fundamental deficit in children with autism (Newson, 1978, 1987). The synchrony of live music to the interactions of an adult-child dyad is unique to Musical Interaction Therapy. For example, it enables the child to anticipate her caregiver's actions on the basis of music synchronised to those actions. Traditional music therapy instead emphasises the music therapist's relationship with the child, based on the child's 'inner mood music' (Nordoff, 1988).

The child's familiar adult play-partner in Musical Interaction Therapy relates directly to the child without the use of musical instruments (other than the musician-facilitator's live accompaniment). The play-partner's behaviour is based upon factors that facilitate normal preverbal interaction (Newson, J., 1974; Ratner & Bruner, 1978; Stern, 1977; Trevarthen & Logotheti, 1987; Urwin, 1984; Wimpory, 1986). It offers preverbal interaction as a means of fostering interpersonal contact, joint attention and understanding (Christie & Wimpory, 1986). Its strategies include imitation and extension of the child's behaviour; intonational commentary highlighting significant events; teasing play and action rhymes; and dramatic pauses leaving space for the child's contributions (Christie et al., 1992).

Musical Interaction Therapy is compatible with social-interactive developmental models for facilitating sociability in autism (Dawson & Galpert, 1986; Prizant & Wetherby, 1989). Social interaction impairments are less obvious during games of physical contact and social routines and so Musical Interaction Therapy is based around these (Sigman et al., 1986; Newson, E., 1987). Much of the child's behaviour is imitated. Imitation of child behaviours by adults increases the frequency of social behaviours in autism (Dawson & Adams, 1984).

Musical Interaction Therapy with Synchronised Music for Children with Autism: An evaluative case study

Introduction

This case study explores the effects of a therapeutic approach on the social and symbolic development of a young autistic child. Consistent with the thesis, it adopts a social-interactionist perspective in recognising that autistic children have a core difficulty in achieving shared understanding with others even at a preverbal level (Mundy & Sigman, 1989b; Newson, 1984; Hobson, 1994a). As indicated in Chapter One, it has been suggested that impairments in inter- and/or intra-personal timing may be responsible for this difficulty (Newson, E., 1977; 1987).

As indicated in the introductory chapter, observations of children with autism indicate that they fail to use the "very basic social and affective behaviours that are typically observed in normally developing 7- to 9-month-old infants" (Lord, 1984, p. 220). Their deficits include eye-contact and turn-taking (Sigman, Mundy, Sherman & Ungerer, 1986). Even when they initiate interaction this is typically brief (Lord & Magill, 1989). They also fail to show playful acts of teasing (Wimpory, 1994) and "coy, silly, or self-conscious behaviour" (cf. Ungerer, 1989, p. 84). In further contrast to normal young children, the early signed or spoken language of children with autism is not spontaneously used to acknowledge others socially (Jordan, 1993; Wetherby, 1986).

The case study that follows is consistent with arguments that such early difficulties in social interaction may contribute to the life-long problems with social cognition and symbolic play in autism (Fein, Pennington, Markowitz, Braverman & Waterhouse, 1986; Hobson, 1989a; Newson, E., 1984; Wimpory, 1990). It focuses on development prior to, during, and seven months after onset of Musical Interaction Therapy. Measures were selected on the basis of the literature reviewed earlier. They include measures of social creativity and spontaneity of interaction which previously established therapies have failed to facilitate (Fein et al., 1986). Two-year follow-up measures of this single case-study are presented in Chapter Eight.

Methodology

Subject

The subject (Heather) was 3 years 3 months when the study began. Her mother described her as "almost totally non-communicative". She met the DSM-III-R diagnostic criteria for autism (American Psychiatric Association, 1987) and manifested the clinical features of the sub-group identified by Wing and Gould (1979) as having a history of Kanner's early childhood autism (1943). An independent clinician scored her autism as severe (48) on The Childhood Autism Rating Scale (Schopler, Reichler & Renner, 1986).

The child functioned at a learning disabled level without verbal or gestural communication. Developmental Quotients on the Griffiths Mental Development Scales (Griffiths, 1984) prior to the study were: Locomotion = 75; Eye-Hand Coordination = 75; Performance (where she lacked cooperation with blocks and inset boards) = 42; Personal Social = 58; Hearing and Speech = 34. Her Speech Therapist confirmed that the latter reflected both receptive and expressive language abilities.

The child is the third of four children. Her siblings' development is normal. Their family has no history of autism or related disorders. Their father is a self-employed decorator. Their mother, a trained foundry-worker, gave up paid employment for child-care. She was disappointed in her attempts to breastfeed her daughter because, by three or four months, the child apparently could not tolerate physical and social closeness. This forced a switch to bottle-feeding whereupon she only stopped protesting when fed positioned on her mother's hip facing away from her. Behaviour modification was successfully employed for obsessional screaming and tantrums six months prior to the study.

Treatment

A teaching film was used to introduce Musical Interaction Therapy (Wimpory, 1985). Twice weekly twenty-minute Musical Interaction Therapy sessions were conducted at home throughout the intervention phase. Sessions involved repetitive yet varied runs of mother-child games of swinging, patting, tickling, blowing, stroking, vocalising, action-rhymes and singing. The child's lead was followed and she was treated as though she were intentionally communicative. She was frequently imitated, thereby exploiting opportunities for turn-taking. The musician and the child's mother used familiar lap games and spontaneously composed simple songs about her actions (e.g. "we're walking around the room", "arms up, arms down", "Peep bo" etc.). These predictable formats were intended to give a focus for joint attention and enable the child's active participation.

The musician's role was similar to that of a pianist accompanying silent films. The music reflected and highlighted the mood, timing and meaning of the dyad's activities. For example, if the child happened to jump, the mother also jumped and, together with the musician, sang "jump, jump, jump away" with timing appropriate to the actions. As soon as the child stopped jumping, the music and singing paused in anticipation of her next move. The (harp) music became quieter if the child avoided her mother and more exciting if she approached her - gradually reaching a crescendo with the climax of dramatic games (such as "tickly under there!").

Musical Interaction Therapy aims to facilitate, but not train, social participation. Increased use of eye-contact and other skills to initiate and maintain interactions were expected to follow the onset of the therapy. A more sophisticated positive indicator was for the child actively to influence interaction. Following arguments presented in Chapters One and Nine, acts of teasing and pretend play were hypothesised to be possible consequences of experiences of active sociability.

Design

Social and symbolic skills were videorecorded in semi-structured settings outside of Musical Interaction Therapy. Data were collected from home visits on six occasions over a four month baseline (A) and on seven occasions over seven months of Musical Interaction Therapy sessions (B). Clinic measures of symbolic play were also taken at the end of each phase. Since Musical Interaction Therapy aims to change dyadic patterns of communication, it is not possible to re-establish original contingencies post therapy. The design is therefore AB rather than ABA. Two year follow-up in Chapter Eight completes the design as ABC.

Measures

The child was familiar with being videorecorded at home, with her mother in both active and passive roles, prior to the study. Subsequent naturalistic home assessments comprised play with toys (where the mother was passive and then active) and play without toys (where the mother was active). The mother understood that each videorecording (up to ten minutes) was to assess the child's ability to share experiences. All measures were taken from the total of up to 30 minutes of recordings made on each occasion. Measure v (pretend play) produced insufficient data and so it was also applied to play-based assessments at the start of therapy (as described in Chapter Five). Here the same independent clinician supported the child for 60-90 minutes in the playroom of a local clinic. Following the underlying model of Musical Interaction Therapy and its effects, described above, the measures are presented in the order in which they are expected to record changes over time (measure i is hypothesised to record changes prior to measure ii etc.).

Details of Measures i to v

Measure i was the amount of time which elapsed from the start of filming before the child made a social acknowledgement. Such an acknowledgement was recorded when the child either a) looked towards her (passive) mother and made an accompanying vocalisation, facial or gestural movement or b) established physical contact.

Measure ii was the average number of times the dyad made eye-contact per minute (thereby controlling for any variation in the length of the sessions).

Measure iii was the frequency of child-initiated 'interactive involvement' (Burford, personal communication, 1989). This comprised two or more consecutive reciprocal exchanges between adult and child. A turn was defined as an appropriate communicative action or vocalisation. Non-communicative vocalisations or actions, such as stereotypies and giggling in response to being tickled did not constitute a turn. The frequency of mother-initiated interactive involvement was also monitored.

Measure iv was the frequency with which the child spontaneously made positive changes to the prevailing pattern of interaction. These did not include behaviour which she had been specifically taught (eg. hand-clapping). It was noted where behaviour comprised active teasing by the child, defined (as in the previous chapter) as the playful violation of shared expectations.

Measure v was the presence/absence of spontaneous and symbolic play defined according to Baron-Cohen's (1987) criteria.

Reliability

Interrater reliabilities were calculated using minute by minute section agreements. At least 20% (mean 32%) of each videorecorded condition was randomly selected for independent blind-rating. Kappas for each condition from this study combined with the follow-up study in the following chapter were at or above 0.92.

Results

Smoothed graphs are employed to avoid the bias that can be caused by outliers (although smoothed graphs may appear to scale down the size of recorded changes, Morley & Adams, 1991). Each point on Figures 6.1 and 6.2 therefore shows the medians of three occasions of testing (i.e. running medians) rather than the raw data that were used for statistical analysis.

Baseline raw data were used to predict developmental trend lines on the basis of Kazdin's (1982) split middle line method. The significance of raw data points from the intervention phase (B) falling above or below each projected line was determined using the binomial test. The use of this one-tailed test was influenced by directional hypotheses that the child would improve or remain stable with maturation. Baseline data were typically stable and began at or near zero.

It was assumed that if baseline levels were maintained during treatment then points would fall above and below the projected lines with a probability of 0.5. A stringent alpha level of 0.01 was employed in response to Crosbie's (1987) observation that any positive autocorrelations in the data for this test may inflate the probability of a Type 1 error.

Measure i: Time elapsed before social acknowledgement by child.

(See Figure 6.1)

Prior to therapy, a mean of six minutes elapsed without the child acknowledging her mother (through physical contact etc.) She sometimes failed to acknowledge her at all. Following onset of MIT, she always gave some form of acknowledgement. This typically occurred within two minutes during the intervention phase (B) (mean = 1.9) and most often within a minute. All data points post MIT-onset fell below the developmental trend line established from baseline. These positive changes are significant at the 0.01 alpha level (p = 0.008).

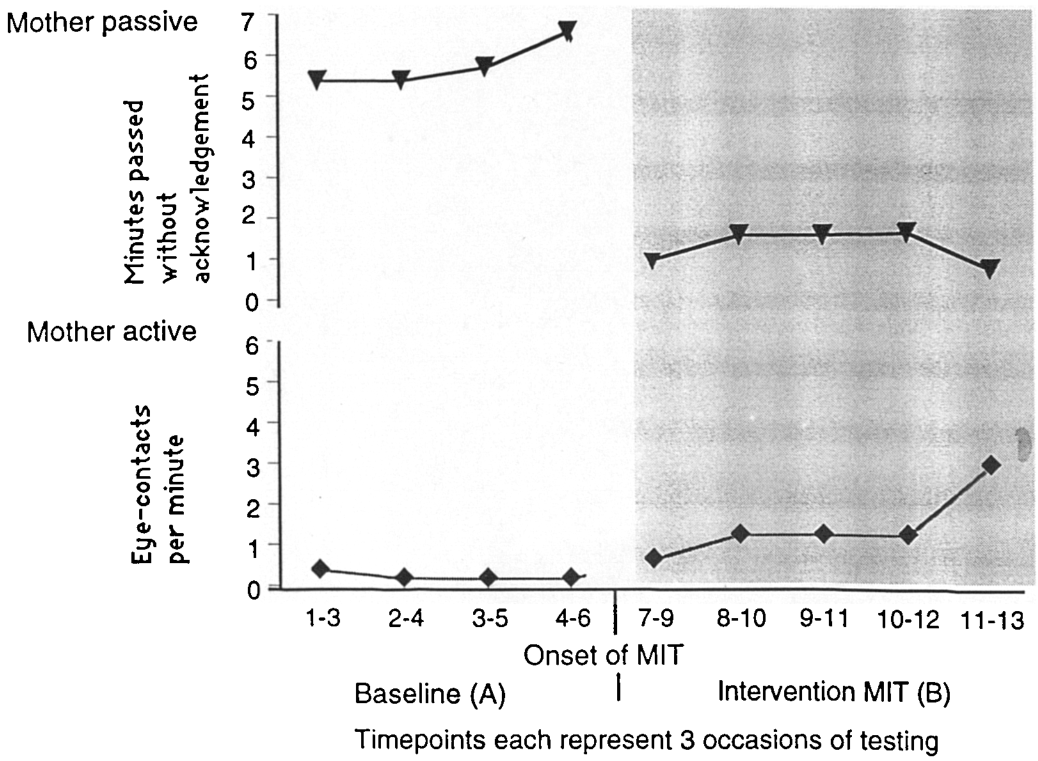


Fig. 6.1. Play with toys: Time passed without social acknowledgement and frequency of eye-contact

Measure ii: Mean number of eye-contacts per minute.

(See Figure 6.1)

As indicated in figure 6.1, baseline eye-contact was stable and low (mean = 0.3 per minute). Frequency of eye-contact during the intervention phase (B) averaged twice per minute (mean = 1.9) and increased steadily through that phase. One phase B data point fell on the developmental trend line established from baseline, all others fell above it. These positive changes are significant at the 0.01 alpha level ($p = 0.008$).

Measure iii: Frequency of child-initiated 'interactive involvement'.

(See Figure 6.2)

The child initiated 20% of interactive involvement during baseline (A) and 75% during the intervention phase (B). Raw data shows a ten-fold increase in her initiations from baseline to phase B (averaging from 0.2 to 2.3 per session). Two phase B data points fell on the developmental trend line established from baseline. The remaining five fell above it. These positive changes are significant at the 0.01 alpha level ($p = 0.008$). Maternal initiations were at a relatively stable rate of four pre- and five post-onset of therapy.

Measure iv: Frequency of child's spontaneous changes to the prevailing interaction pattern.

As indicated in figure 6.2, the child made no positive changes to the prevailing patterns of interaction during baseline and so developmental trend lines could not be projected for statistical analysis. However, she did so in most of the seven phase B assessments. Raw data first shows this in the third phase B assessment. On average, she changed the prevailing pattern of interaction once per session in phase B (mean = 1.3). This measure recorded teasing by the child once in phase B's final assessment and once at follow-up. For example, during a familiar hand-clapping song, she spontaneously lifted her jumper and clapped her stomach instead, smiling and making eye-contact as she did so.

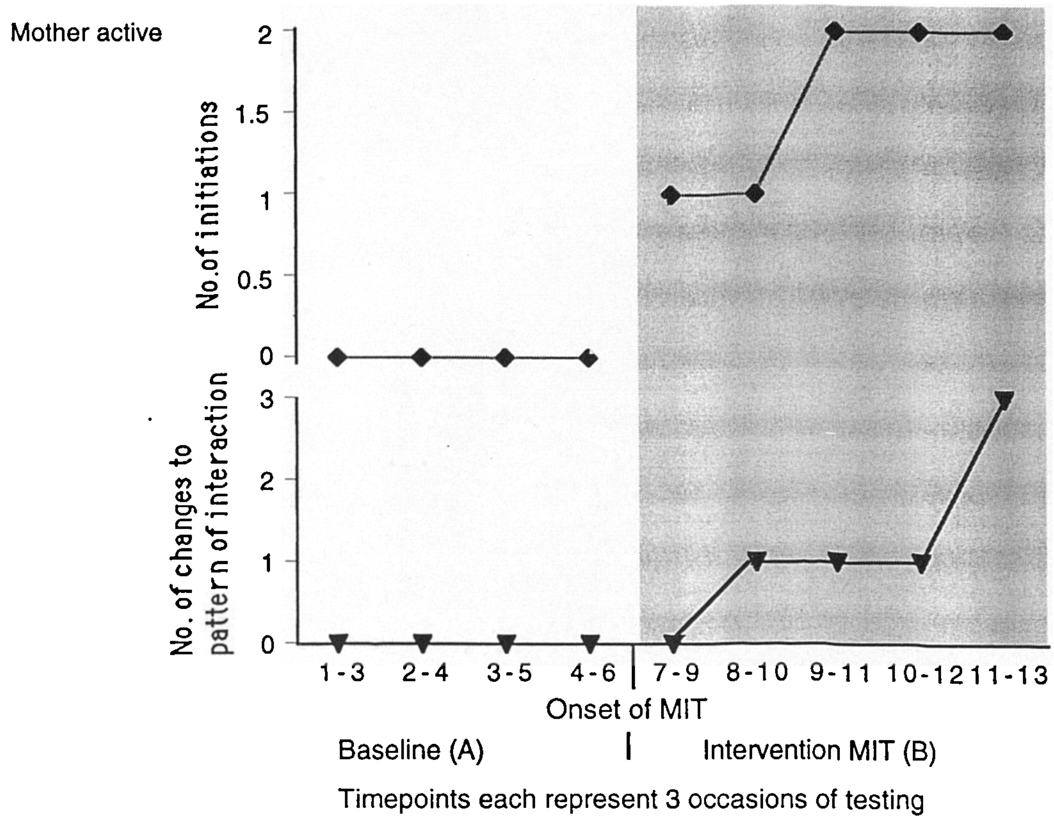


Fig. 6.2. Frequency of changes in initiations and pattern of interaction

Measure v: Presence/absence of spontaneous symbolic play by the child.

Developmental trend lines could not be projected for statistical analysis of pretend play since it appeared only in phase B's final home assessment. Here the child spontaneously 'fed' her toy fluffy penguin a biscuit three times, looking at the penguin and vocalising each time she did so.

Discussion

The overall pattern of recorded changes confirmed developmental hypotheses. Onset of Musical Interaction Therapy was followed by improvements in the child's use of social acknowledgement, eye-contact and initiations of interactive involvement (whereas the mother's initiations were fairly constant). Creative child-contributions to interaction (including acts of teasing) and symbolic play emerged later as hypothesised. Furthermore, the child no longer showed frequent social withdrawal. The observations have high inter-observer reliability ratings. They are consistent with clinical records and videorecordings of Musical Interaction Therapy effects elsewhere (Christie & Wimpory, 1986; Wimpory, 1985).

Single child case studies, without external controls or comparison groups, can only carry limited implications. It is impossible to be certain how much development was prompted by Musical Interaction Therapy. However, stable baselines followed by abrupt changes around the time of intervention suggest that Musical Interaction Therapy had a developmental effect. Comparable measures of preschool development in children with autism without intervention are unfortunately unavailable. However, Griffiths Scale personal-social scores of preschool children with autism in specialist educational provision show high stability over periods longer than the present study's phase A plus B (Snow, Hertzig & Shapiro, 1987b). Eight months prior to baseline the child in this study began attending a half-day pre-school assessment unit where staff were new to autism. Since baseline was stable it appears very unlikely that this attendance accounted for the observed changes.

Experimental, rather than naturalistic observations of apparent pretend play by the child would have added greater weight to the study. In the example given earlier, where the child appeared to "feed" a toy penguin, her mother confirmed that this was the child's own penguin, not shared with the other children, and that she had not previously seen this modelled by anyone else with the penguin. It is possible that the child may have seen others feeding soft toys and thereafter imitated this behaviour with her own toy. Other children with autism are equally likely to have observed such acts yet persistent autistic deficits with imitation and pretend play prevent them from spontaneously showing the behaviour recorded by this measure. The simultaneous and appropriately timed vocalisations and glances towards the toy penguin also indicate that the child was genuinely involved in her actions rather than carrying out meaningless imitation.

A further limitation of the single case study is that it is impossible to determine the influence of familiarisation to assessment situation on the child's recorded changes. The timing of the observed changes argues against this since they all occurred following the establishment of Musical Interaction Therapy rather than during the six baseline measures. Furthermore the child was familiar with visits from health service personnel who would routinely videorecord her in her mother's passive or playfully active presence prior to the study. She generally appeared oblivious to her mother's "passivity" during baseline measures. This contrasts with her readiness to acknowledge her mother in parallel situations subsequent to onset of therapy. There is no correlation between session lengths and recorded number of eye-contacts. This supports the assertion that the assessment conditions were naturalistic to the child since familiarisation within individual sessions did not influence her recorded behaviour. The difficulties raised here have prompted the multiple baseline case study which follows in Chapter Seven.

Musical Interaction Therapy may facilitate social games, playfulness and more sophisticated developments by supporting the timing that underlies interactive reciprocity (Newson, E., 1977, 1987; Wimpory, 1993). Timing of body-motion patterns differ in autism from those of normal children, whose responses show immediate synchrony to sound (Condon, 1979). Whilst this research awaits replication, clinical observations confirm that people with autism have persistent difficulties in timing facial expressions, gestures, body and spoken language appropriately (Feldstein, Konstantareas, Oxman & Webster, 1982; Howlin et al., 1987; Newson, E., 1984, 1987; Newson, Dawson & Everard, 1982). Motor coordination difficulties are a possible consequence of the neurocerebellar abnormality found in autistic subjects throughout the intelligence range (Courchesne, Yeung-Courchesne, Press, Hesseling & Jernigan, 1988). The child's mother and community nurse both spontaneously commented that her coordination improved following onset of therapy.

Although Musical Interaction Therapy was originally developed to address a hypothesised deficit in social timing (Christie & Wimpory, 1986; Newson, 1977, 1987), the above study can offer no confirmation of such a deficit in autism. Further research needs to determine possible social timing difficulties and the validity and efficacy of Musical Interaction Therapy in this respect. Preliminary evidence is that Musical Interaction Therapy facilitates playful joint action formats which generalise beyond therapy. The child under study departed from the usual autistic pattern by developing some social communication and symbolic play. The former included acts of teasing which the CASPA-based study had previously found to be absent in the episodes of social engagement of ten preschoolers with autism, including the child in this case study.

It is currently unclear which components or combinations of components of this multifactorial therapy are most efficacious. A replication case study follows in Chapter Seven using multiple baselines of varying periods and staggered cumulative introduction of Musical Interaction Therapy components. It investigates the independent effects of auditory exposure to prerecorded Musical Interaction Therapy sessions and Music Therapist social support.

Chapter Seven

COMPONENT ANALYSIS OF MUSICAL INTERACTION THERAPY (MIT), A SINGLE CASE STUDY

Introduction

This study examines the separate and combined effects of the components of Musical Interaction Therapy on the sociability of a three-year-old girl with severe autism (Siân). Although the previous case study indicated the apparent value of Musical Interaction Therapy, it remained unclear which component(s) facilitated these developments. Musical Interaction Therapy's efficacy may be due to factors including a) an autistic child's responsivity to the passive auditory experience of music or b) to a mother's responsivity to social support possibly engendered by the visits of an interested Music Therapist. It may be that the former could relax a child sufficiently for her to find socialising easier. Alternatively, potential social support from the Music Therapist to the mother may increase her feelings of well-being and thereby enable her to improve her own interactive abilities. Whilst these possibilities are not considered likely within the social interactionist account of autism presented in Chapter One, they represent potential challenges from a psychodynamic perspective on Musical Interaction Therapy.

In response to these considerations, the study which follows employed staggered cumulative introduction of passive exposure to audiocassette recordings of Musical Interaction Therapy sessions; music therapist social support; brief training sessions to introduce Musical Interaction Therapy and a month of full Musical Interaction Therapy. Evaluation used measures from the schedule for Coding Active Sociability for Preschoolers with Autism (CASPA, see Chapter 4) which was unavailable at the time of the original case study. Generic indicators from CASPA (Episodes of Social Engagement and their content) were more appropriate for evaluating the short term effects of a month of Musical Interaction Therapy. In contrast, evaluation of a year of such therapy in the previous study enabled the inclusion of measures of more sophisticated skills (for example, acts of teasing and pretend play).

Method

Subject

The subject (Siân) was 3 years 6 months when the study began. She met the DSM-III-R diagnostic criteria for autism (American Psychiatric Association, 1987) and manifested the clinical features of the sub-group with a history of Kanner's (1943) early childhood autism (Wing & Gould, 1979). An independent clinician scored her as severely autistic (46) on the Childhood Autism Rating Scale (Schopler, Reichler & Renner, 1986). The child functioned at a learning-disabled level without verbal or gestural communication. Her Developmental Quotient on the Griffiths Mental Development Performance Scale prior to intervention was 117. The child is the second of two otherwise normal children. Their family is from India and has no history of autism; they use English with their autistic child. The mother, a physics graduate, is primary carer. She uses a hearing aid following adult-onset hearing difficulties prior to the study; the children's father is a psychiatrist.

Musical Interaction Therapy

A teaching film was used to introduce Musical Interaction Therapy as described in the previous case study (Wimpory, 1985). In response to the mother's hearing difficulties and the family's recent move from India, a six week training period was employed to fully introduce the method of Musical Interaction Therapy to the child and her mother. This comprised brief (10 to 20 minute) sessions whereby the child's psychologist would model and prompt maternal behaviour whilst supported by the Music Therapist. These sessions would be concluded by a discussion of the strategies they had included. Full Musical Interaction Therapy sessions lasted up to an hour (minimum half an hour) and were independent of the psychologist. Their general therapeutic goal was to increase active social participation as indicated through Episodes of Social Engagement (ESEs - see measures).

Design

The mother-child dyad received staggered cumulative introduction of Musical Interaction Therapy components during twice weekly sessions following a three week baseline (A). These comprised passive exposure to audiorecorded MIT sessions (B); Music Therapist Social Support (C); Musical Interaction Therapy Training (D) and full Musical Interaction Therapy (E). All sessions (except the Musical Interaction Therapy training phase where sessions were only 10 to 20 minutes each) lasted between 30 to 60 minutes. An A, B, BC, CD, CE, A'C design was employed over a seven month period. Assessments occurred once or twice weekly. They comprised videorecordings of the child with her mother outside of therapeutic sessions during a) play with and b) play without toys. It was hypothesised that significant social developments in the child would occur only during the phase of full Musical Interaction Therapy (CE).

There was no phase of interaction therapy without music because the CASPA study (Chapter Five) had already shown the effectiveness of the non-musical components of Musical Interaction Therapy (following the child's lead, musical-motoric activities, etc.). Details of the multiple phases follow in Table 7.1. Each phase spanned a relatively short time period (3+ measures per phase) and so, in contrast to the previous case study (6+ measures per phase), graph-based developmental trend analysis was not employed. Instead the present study employed more frequent measures which facilitated statistical analysis. Factorial anovas and Fisher post hoc tests (Fisher's Protected Least Significant Difference) were used to compare the results from each of the six consecutive phases and thereby the phase or phases characterised by significant social developments.

Table 7.1. Assessment and therapeutic phases

Phase	Description	No. of assessment recordings	No. of weeks
A	Baseline	5	3
B	Pre-recorded Music Exposure	3	1.5
BC	Pre-recorded Music Exposure + Music Therapist Social Support	3	1.5
CD	Music Therapist Social Support + Musical Interaction Therapy training for child's mother with the child	7	6.5
CE	Music Therapist Social Support + Musical Interaction Therapy	5	4
A'C	Music Therapist Social Support (+ return to baseline)	5	5

Method and Measures

During each assessment the mother attempted to engage the child for up to ten minutes. The first ten minutes comprised play without toys followed by ten minutes of play with toys. A videorecording of each total twenty minute period of play was subject to each of the measures outlined below. Analysis was jointly conducted for play with and without toys, each of which were later considered separately.

Measure 1) Frequency of Episodes of Social Engagement

The main measure employed for subsequent video-analysis was the frequency with which the child showed an Episode of Social Engagement, as developed for the purposes of the group study in Chapter Five. The child was credited with an Episode of Social Engagement each time she faced towards her mother's face and simultaneously exhibited an additional positive communicative behaviour. Such behaviour included vocalising, smiling, physical contact, gesturing etc. (as outlined in the schedule for Coding Active Sociability in Preschoolers with Autism, Chapter Four). Measures 1 and sub-measures 1i, ii and iii (which follow) were not mutually exclusive.

Sub-measure 1i) Frequency of child vocalisations within each ESE.

The frequency of each Episode of Social Engagement including a vocalisation by the child was recorded.

Sub-measure 1ii) Frequency of child's smiles within each ESE.

The frequency of each Episode of Social Engagement including a smile by the child was recorded.

Sub-measure 1iii) Frequency of child imitation within each ESE.

The frequency of each Episode of Social Engagement including an imitative act by the child was recorded.

Results

Reliability

15% data were randomly chosen from play with and play without toys for analysis by an independent blind rater. Fifteen second intervals were coded for the presence/absence Episodes of Social Engagement, giving a kappa of .72. Within the agreed Episodes of Social Engagement, kappas were as follows: vocalisation .78. smiling .58 and imitation .46.

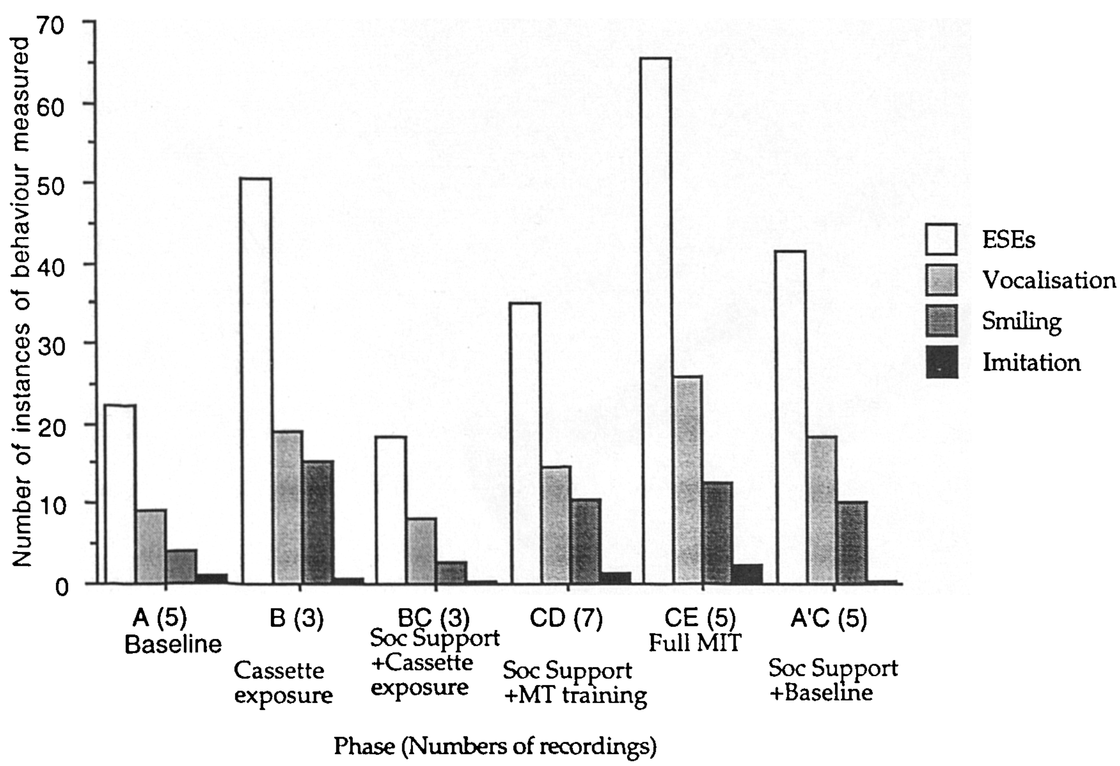


Fig. 7.1. Numbers of ESEs, vocalisations, smiles and imitation within those ESEs in combined measures of play with and play without toys Anova tables of results for each phase in each condition are given in Appendix VIII.

Results from Measure 1 from play with and without toys (See Figure 7.1)
Episodes of Social Engagement (ESEs).

There was a Main Effect of $p = 0.003$ ($F_{5,22} = 5.1$). Subsequent post hoc Fisher (PLSD) tests revealed that this was attributable to the following significant between phase differences: (A vs. B, A vs. CE, B vs. BC; BC vs. CE; CD vs. CE; CE vs. A'C). All but two of these represents an increase in the frequency of Episodes of Social Engagement as the study progressed. Exceptions to this trend are a brief regression before the onset of Musical Interaction Therapy Training (B vs. BC, $p = .024$) and again on return to baseline following full Musical Interaction Therapy (CE vs. A'C, $p = .028$).

The passive exposure to audiorecorded MIT sessions represented the first significant increase in the frequency of Episodes of Social Engagement following the initial baseline (A vs. B, $p = .027$). This trend was temporarily reversed when social support became additionally available (B vs. BC, $p = .024$). Full Musical Interaction Therapy was the next phase to differ (positively) from baseline (A vs. CE, $p = .0004$). It also differed (positively) from the phase of passive exposure to audiorecorded MIT sessions (BC vs. CE, $p = .001$) and from the training phase of Musical Interaction Therapy (CD vs. CE, $p = .004$).

As detailed earlier, full Musical Interaction Therapy (CE) was the only phase to figure in all between phase differences at a 0.01 level. It also had the highest mean frequency of Episodes of Social Engagement (65.4; the initial baseline mean was 22.2). Further Fisher analysis indicated that full Musical Interaction Therapy (CE) was also the only phase to differ significantly at .01 when the mean number of Episodes of Social Engagement from each phase was separately compared to baseline (A). When the mean of each phase was compared to the total of the other phases, full Musical Interaction Therapy (CE) was again the only phase to differ significantly at $p = .01$.

Sub-measures 1i, ii and iii (re vocalisations, smiling and imitation within ESEs)

1i) Vocalisations within Episodes of Social Engagement.

There was a Main Effect of $p = 0.007$ ($F_{5,22} = 4.31$) for vocalisations within ESEs. Subsequent post hoc Fisher (PLSD) tests revealed that this was attributable to the following significant between phase differences: (A vs. CE; A vs. A'C; BC vs. CE; BC vs. A'C; CD vs. CE). Each of these between phase differences represents an increase in the frequency of vocalisations used during Episodes of Social Engagement (ESEs) as the study progressed. As indicated, there was a positive significant difference between the initial baseline to both full Musical Interaction Therapy and to the final baseline phases (A vs. CE, $p = .0008$; A vs. A'C, $p = .04$).

There were significant progressions from the phase where social support was introduced both to the phase of full Musical Interaction Therapy (BC vs. CE, $p = .002$) and to the final return to baseline (BC vs. A'C, $p = .044$). Full Musical Interaction Therapy differed positively and significantly from the training phase of Musical Interaction Therapy (CD vs. CE, $p = .009$).

As detailed earlier, the full Musical Interaction Therapy phase was the only one involved in all between phase differences at the 0.01 level. As shown in Figure 7.1, the highest mean number of vocalisations (25.6) was recorded during the full Musical Interaction Therapy phase (CE) whilst the baseline (A) mean was 9.2.

1ii) Smiling within Episodes of Social Engagement.

There was a Main Effect for smiling within ESEs ($F_{5,22} = 3.41$, $p = .02$). Subsequent post hoc Fisher (PLSD) tests revealed that this was attributable to the following significant between phase differences: (A vs. B; A vs. CD; A vs. CE; B vs. BC; BC vs. CD; BC vs. CE). All but one of these between phase differences represents an increase in the frequency of vocalisations used during Episodes of Social Engagement (ESEs) as the study progressed.

The passive exposure to audiorecorded MIT sessions (B) represented the first significant increase in the frequency of smiling within ESEs following the initial baseline (A vs. B, $p = .006$). This trend was temporarily reversed when social support became additionally available (B vs. BC, $p = .006$) where a decrease in smiling within ESEs was observed. There were then significant progressions both from this phase (BC) and from the initial baseline (A) to both Musical Interaction Therapy training (BC vs. CD, $p = .037$; A vs. CD, $p =.04$, respectively) and to full Musical Interaction Therapy (BC vs. CE, $p = .015$; A vs. CE, $p = .015$, respectively).

The passive exposure to audiorecorded MIT sessions (B) was alone involved in the between phase differences which were significant at the 0.01 level (one positively and one negatively). The mean frequency of smiling within ESEs was highest during the passive exposure to audiorecorded MIT sessions (B = 15). It was 13 during the full Musical Interaction Therapy phase (CE) in contrast to 4 during the initial baseline (A).

1iii) <u>Imitation within Episodes of Social Engagement</u>.

There were no Main Effects for imitation within ESEs ($F_{5,22} = 1.35$, $p = .28$). As indicated in Figure 7.1, the highest frequency of imitation occurred during the phase of full Musical Interaction Therapy (mean = 2.4, SD =.9). This contrasted with the initial and final baselines (mean = 1, SD = 1.7 and mean = .4, SD = .6, respectively).

<u>Separate analyses of play with toys, and then play without toys applied to Measures 1, 1i, 1ii and 1iii</u>. (See Figure 7.1)

Separate examinations of Measure 1's data from combined sections of play with toys and play without toys (previously considered in combination) indicated weaker effects in the play with toys condition. Data from play without toys generally confirmed the overall pattern of results given earlier. Separate data from play with and then play without toys are given separately below.

Measure 1's Results: Episodes of Social Engagement during Play with Toys

Results for play with toys gave a Main Effect of 0.02 for Episodes of Social Engagement ($F_{5,22} = 3.39$). Subsequent post hoc Fisher (PLSD) tests revealed that this was attributable to the following significant between phase differences: (A vs. CE; B vs. CE; BC vs. CE; CD vs. CE; and, CE vs. A'C). Each of these both involves the full Musical Interaction Therapy phase (CE) and represents an increase in the frequency of Episodes of Social Engagement as the study progressed. Progress was sustained to include the final baseline phase (CE vs. A'C, $p = .002$).

The introduction of full Musical Interaction Therapy (CE) represented the first significant increase in the frequency of Episodes of Social Engagement in contrast with both the initial baseline (A vs. CE, $p = .003$) and the passive exposure to audiorecorded MIT sessions with and without social support (B vs. CE, $p = .009$ and BC vs. CE, $p = .025$, respectively). There was also a positive between-phase difference between the phases of Musical Interaction Therapy Training and full Musical Interaction Therapy (CD vs. CE, $p = .017$).

Results for Measures 1i, ii and iii
(i.e. Vocalisations, Smiling and Imitation) during Play with Toys

There were no Main Effects for vocalisations ($F_{5,22} = 1.56$, $p = .21$) nor for smiling ($F_{5,22} = 1.72$, $p = .17$) nor for imitation ($F_{5,22} = .531$, $p = .75$) within Episodes of Social Engagement during play without toys.

(Imitation occurred only during the phases of Full Musical Interaction Therapy and Musical Interaction Therapy training.)

Results for Measure 1: Episodes of Social Engagement during Play without Toys

Results for play without toys gave a Main Effect of 0.005 for Episodes of Social Engagement ($F_{5,22} = 4.71$). Subsequent post hoc Fisher (PLSD) tests revealed that this was attributable to the following significant between phase differences: (A vs. B; A vs. CE; B vs. BC; BC vs. CE; BC vs. A'C, and CD vs. CE).

All but one of these represents an increase in the frequency of Episodes of Social Engagement as the study progressed. The passive exposure to audiorecorded MIT sessions (B) was the first phase to show a significant increase in the frequency of Episodes of Social Engagement following the initial baseline (A vs. B, $p = .02$). This trend was temporarily reversed when social support became additionally available (B vs. BC, $p = .014$). Full Musical Interaction Therapy was the next phase to differ (positively) both from baseline (A vs. CE, $p = .001$) and from the phase of passive exposure to audiorecorded MIT sessions combined with social support (BC vs. CE, $p = .001$).

There was a positive difference between the phases of Musical Interaction Therapy Training and full Musical Interaction Therapy (CD vs. CE, $p = .008$).

Results for 1i, ii and iii (Vocalisations, Smiling and Imitation) during Play without Toys (see Figure 7.1)

1i) Vocalisations within Episodes of Social Engagement during Play without Toys.

There was a Main Effect of $p = 0.005$ ($F_{5,22} = 4.71$) for vocalisations within ESEs during play without toys. Subsequent post hoc Fisher (PLSD) tests revealed that this was attributable to the following significant between phase differences: (A vs. B; A vs. CE; A vs. A'C; B vs. BC; BC vs. CE; BC vs. A'C and CD vs. CE). All but one of these represents an increase in the frequency of Episodes of Social Engagement as the study progressed.

The passive exposure to audiorecorded MIT sessions represented the first significant increase in the frequency of Episodes of Social Engagement following the initial baseline (A vs. B, $p = .043$). This trend was temporarily reversed when social support became additionally available (B vs. BC, $p = .032$). Full Musical Interaction Therapy was the next phase to differ (positively) from baseline (A vs. CE, $p = .001$) and from the phase which combined social support and passive exposure to audiorecorded MIT sessions (BC vs. CE, $p = .001$).

There was a positive between-phase difference between the phases of Musical Interaction Therapy Training and full Musical Interaction Therapy (CD vs. CE, $p = .006$). Full Musical Interaction Therapy (CE) alone figured in all between-phase differences which were significant at a 0.01 level.

1ii) Smiling within Episodes of Social Engagement during Play without Toys.

There was a Main Effect of $p = 0.033$ for smiling within ESEs during play without toys ($F_{5,22} = 2.99$). Subsequent post hoc Fisher (PLSD) tests revealed that this was attributable to the following significant between phase differences: (A vs. B, $p = .008$; A vs. CD, $p = .044$; A vs. CE, $p = .044$; B vs. BC, p = .008; BC vs. CD, p = .039; BC vs. CE, p = .037). The pattern of these differences is identical to those given earlier for smiling within ESEs during combined play with and play without toys.

1iii) Imitation within ESEs during Play without Toys.

There were no Main Effects for imitation within ESEs during play without toys ($F_{5,22} = 1.77$, $p = .16$). The highest mean frequency of instances of imitation occurred during the phase of full Musical Interaction Therapy (mean = 2.2, SD = 1.1). This contrasted with equivalent figures for initial and final baselines (mean = 1, SD = 1.7 and mean = .4, SD =.6, respectively).

Discussion

Overall, these results support the hypothesis that full Musical Interaction Therapy (CE) is most strongly associated with positive developments in the child's sociability. This conclusion was determined by recorded frequencies of Episodes of Social Engagement (ESEs) together with vocalisations and, to a lesser extent, smiling within these ESEs. The likelihood that the month of Musical Interaction Therapy played a causative role in these improvements is reinforced by the fact that the trend of increasing frequency of Episodes of Social Engagement during combined play with and without toys was reversed following the planned withdrawal of musical input.

The overall pattern of progression with occasional brief regressions indicates that the general positive developments in sociability were particularly due to the experience of MIT music enhanced by the therapeutic format of full Musical Interaction Therapy. The possibility that coincidental maternal social support may be influencing the outcome of Musical Interaction Therapy is generally contraindicated by these data, as detailed later in this discussion.

It may be that low numbers of measures in some phases may have influenced the outcome of the study. The phases cumulatively introducing first passive exposure to audiorecorded MIT sessions and then social support are particularly vulnerable to this charge. For ethical reasons, they each comprised only three assessments over less than two weeks in contrast to other phases where six assessments over five weeks was the mean.

Passive auditory exposure to prerecorded MIT sessions was only sustained for only one additional phase following its introductory phase. Whilst the three measures of its brief introductory phase indicated a positive effect on some (but not all) measures, its subsequent brief combination with social support indicated a negative effect on those same measures. The paucity of data over these briefest phases make it particularly difficult to interpret the data from passive exposure to audiorecorded MIT sessions with confidence. However, they indicate the value of including this as a more substantial component of future studies.

In contrast to passive exposure to audiorecorded MIT sessions, social support was sustained throughout the study after being introduced in its third phase. It was the only factor common to phases where regressions were indicated. These were the phase where social support was introduced and the five-week return to baseline phase where it was the only remaining input. Despite the brevity of its introductory phase, these observations support the conclusion that social support is unlikely to account for the apparent success of full Musical Interaction Therapy in this or the previous study.

It seems logical that the effects of full Musical Interaction Therapy should generalise most readily to play without toys since this context most closely resembles that of the therapy where no toys are involved. The statistically significant positive changes observed in vocalisation and smiling, rather than imitation, within Episodes of Social Engagement are understandable since the latter is an area of particular difficulty for young children with autism (Sigman & Ungerer, 1984b). An encouraging observation, true for all conditions, is that imitation mean scores for each Musical Interaction Therapy (Training and Full) phase were always at least twice those of each of the other phases. In retrospect, it may have been over-ambitious to anticipate statistically detectable improvements in imitation in response to just one month of therapy.

The study generally indicates that the more dramatic developments of the previous case study may be attributable to the simultaneous combination of Musical Interaction Therapy's previously specified components (see Chapter Six), rather than due to the unprescribed possible social support resulting from a musical therapist's regular visits. It may be significant that social support is the only component of Musical Interaction Therapy without direct implications for aspects of timing within potentially interactive social routines. Further research is needed to clarify the possible role of passive auditory exposure to prerecordings of such sessions. However, the study overall has indicated the value of a multi-baseline approach and indicated the nature of appropriate phases for future similar case studies which could usefully be of longer duration.

The CASPA-derived evaluative ESE-based measures of the current case study represent progression from those of the previous one. For example, with respect to eye-to-face gaze, they register its communicative use, rather than being limited to the frequency of eye-contact which is not necessarily communicative (Mirenda et al., 1983). The multiple phase design enabled more rigorous statistical analysis, and in this respect the study constitutes progression from, as well as confirmation of, the previous case study.

Whichever components are responsible for these changes in the case studies of this and the previous chapter, an important question is whether such changes are sustainable or disappear following therapist withdrawal. In order to examine this, the thesis now returns to the latter in a consideration of the long term effects of a year's administration of Musical Interaction Therapy.

Chapter Eight

TWO YEAR FOLLOW-UP ON AN ADDITIONAL CASE STUDY (HEATHER) AFTER ONE YEAR OF MUSICAL INTERACTION THERAPY

Introduction to study

The follow up study which follows is a two year continuation of the single case study (Heather) introduced in the previous chapter (Seven). It was designed to determine whether or not changes observed following onset of Musical Interaction Therapy were sustained following the cessation of that therapy.

Design

Musical Interaction Therapy continued unmonitored for five months following the original case study (AB) introduced in Chapter Seven. Social and symbolic skills were videorecorded in semi-structured settings 20 months after the end of therapy (C), using home and clinic measures from the original study. As outlined in the previous chapter, Musical Interaction Therapy aims to change dyadic patterns of communication and so it was impossible to re-establish original contingencies post therapy. The design of the original study combined with the follow up which follows, is therefore ABC rather than ABA. It was hypothesised that the child would maintain the developments recorded in the original study despite twenty months without Musical Interaction Therapy.

Measures

As in the original study, naturalistic home assessment comprised play with toys (mother passive and then active) and play without toys (mother active). All measures were taken from this total of 30 minutes of recordings. Measure v (pretend play) was also applied to a play-based assessment supported by the same independent clinician as in the original study.

Details of Measures i to v

All measures were included from the original study where they are outlined in greater detail with overall reliability ratings. The measures are summarised as follows:

(i) Time passed without social acknowledgement.

(ii) Number of eye-contacts per minute.

(iii) Frequency of child-initiated 'interactive involvement'.

(iv) Frequency of child-initiated positive changes to interaction.

(v) Presence/absence of spontaneous symbolic play.

Results

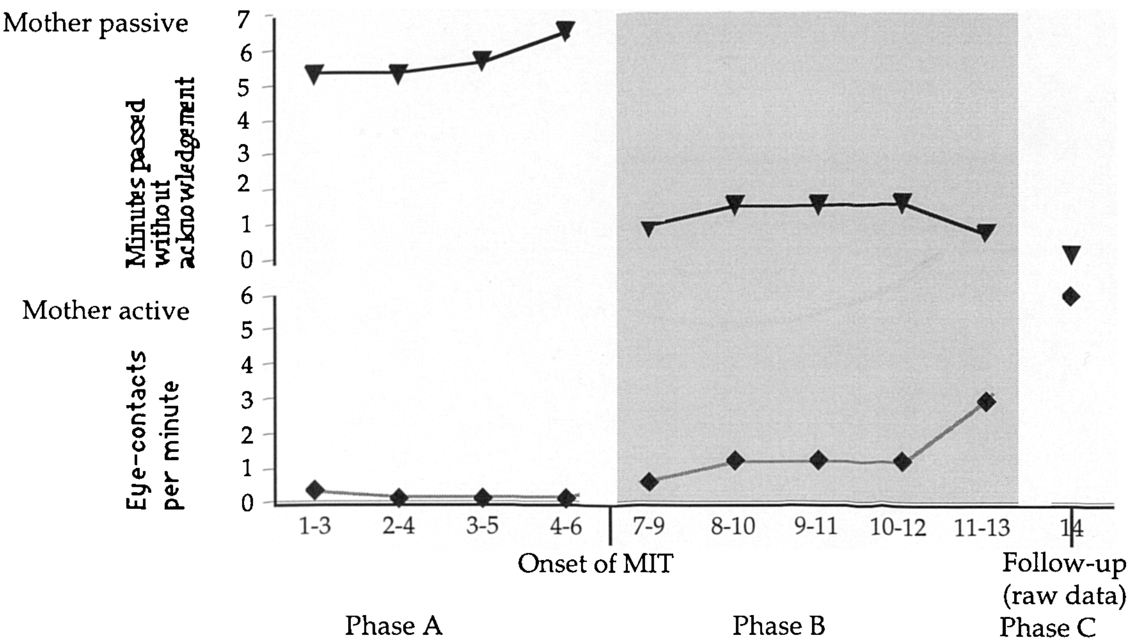
The single raw data points derived from the follow-up recordings are plotted (in Figures 8.1 and 8.2) as additions to the smoothed graphs originally presented in Chapter Six. Baseline raw data from the original study, were again used to predict developmental trend lines on the basis of Kazdin's (1982) split middle line method. The significance of each follow-up data point falling above or below each projected line was determined using the binomial test. Further details of this analysis are given in Chapter Six. The text which follows focuses on differences between measures taken over seven months of therapy (B) in the original study and at follow up (C) two years later.

Measure i: Time elapsed before social acknowledgement by child.

(See Figure 8.1)

Following onset of Musical Interaction Therapy (phase B of the original study), the child always gave a social acknowledgement. This typically occurred within two minutes in phase B (mean = 1.9 minutes), it took nine seconds at follow-up. The follow up data point, like those of phase B, fell below the developmental trend line established from baseline (where lower measures indicated progress). This was significant at the 0.01 alpha level (p = 0.008).

Points prior to follow up each represent three occasions of testing



Timepoints each represent 3 occasions of testing

Fig 8.1. Play with toys: Time passed without social acknowledgement and frequency of eye-contact

Measure ii: Mean number of eye-contacts per minute.

(See Figure 8.1)

Whilst frequency of eye-contacts during phase B of the original study averaged twice per minute (mean = 1.9), there were six per minute at follow-up. The latter data point fell above the developmental trend line (where higher measures indicated progress). This was significant at the 0.01 alpha level (p = 0.008).

Measure iii: Frequency of child-initiated 'interactive involvement'.
(See Figure 8.2)

At follow-up the child generally maintained her attentiveness over the 10 minutes of play without toys to which this measure applied. Interactive involvement was initiated by her mother at the start of recording (and once again after she withdrew to blow her nose). These positive changes rendered Measure iii no longer appropriate at follow-up (since it depended on any parent-child interaction comprising short bursts rather than being sustained).

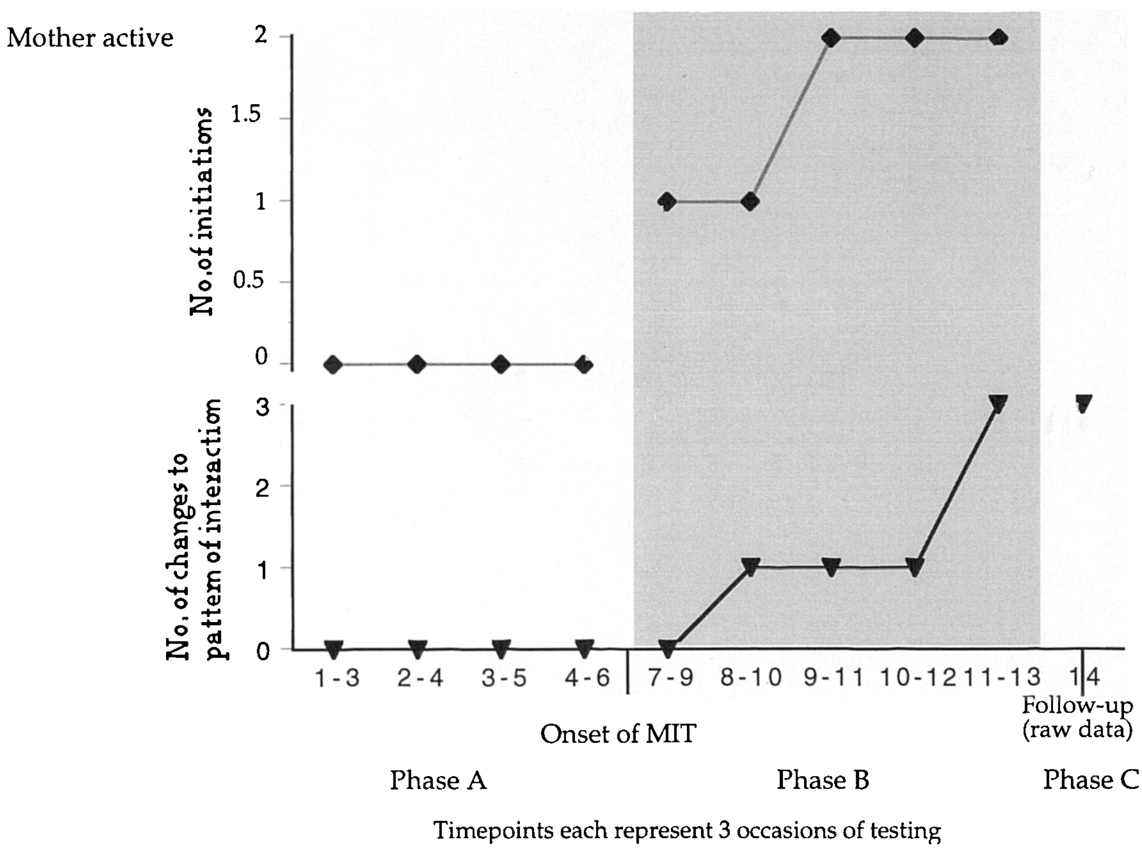


Fig. 8.2. Play without toys: frequencies of changes to patterns of interaction and initiations of interactive involvement

Measure iv: Frequency of child's spontaneous changes to the prevailing interaction pattern.

(See Figure 8.2)

As indicated in the previous chapter, the child made no positive changes to the prevailing patterns of interaction during baseline of the original study and so developmental trend lines could not be projected for statistical analysis. However, she did so once per session on average (mean = 1.3) in the original study's intervention phase assessments and she did so three times at follow-up. This measure recorded teasing by the child once in the original study's final assessment and once at follow-up. Here she chose to stand up on her mother's lap after having been told not to do so. This was registered as an act of teasing rather than simply failure to follow instruction, as the child was smiling and making eye-contact as she did so.

Measure v: Presence/absence of spontaneous symbolic play by the child.

Developmental trend lines could not be projected for statistical analysis of pretend play since it appeared only in the original study's final home assessment. The follow-up play-based assessment indicated that this ability had been maintained. Here the child spontaneously "washed" doll's clothes in a wendy house sink despite no water being present.

Discussion

The follow-up study confirms that gains made following the onset of Musical Interaction Therapy were sustained twenty months after it ceased. Specific gains were made in the child's use of social acknowledgement, eye-contact, symbolic play and creative contributions to interaction including acts of teasing. Furthermore, the child no longer showed frequent social withdrawal during interactions without toys.

Although the observations have high reliability ratings, implications from single child case studies, without external controls or comparison groups, are always limited. The two case studies in Chapters Six to Eight were designed to overcome some of these limitations. However, such studies will always be subject to external influences from the everyday lives of participants beyond the investigator's control, for example educational provision.

The child in this study was accompanied by her original unit teacher to afternoon sessions in a mainstream primary school between the final phase of the original study and follow-up. A separate study by the first author analysing regular videorecordings of this teacher in her class found that the focus was on desk-top tasks rather than sociability (Wimpory and Nash, in preparation). Raw data shows no effect of this approach during the original case study's baseline but it may have contributed to follow-up changes. Rutter and Bartak (1973) found that education may influence some social skills. However, their subjects were older children with autism who had received at least three years full time in partly residential specialist provision with high adult:child ratios. Adult:child ratios for the classroom of the child in this study averaged 1:15.

Another limitation of the single case study and discussed previously, is that it is impossible to determine the influence of familiarisation to assessment situation on the child's recorded changes. The positive observations of the "one-off" follow-up recordings argue against this having a major influence. Furthermore, the follow-up measures indicate that Musical Interaction Therapy may have facilitated fundamental and lasting changes in the child's developmental pattern.

Some of these changes may have been relevant for further, perhaps qualitatively different, developments such as acts of teasing and symbolic play. In this respect, Musical Interaction Therapy may approach Frith's recommendation that a successful remedy "would have to be applied at the beginning of the chain of causal events that leads to Autism" (1989, p. 184).

Rather than confirm Frith's purely cognitive account, the findings are more compatible with the interaction-based theoretical perspectives of Hobson (1994a, 1994b), Newson, (1984), Wimpory (1993) and Fein et al. (1986). The latter suggest that:

> "a minimum level of reciprocity may be necessary as a basis for a shared meaning and communicative intent, and social disinterest in autistic children may thus contribute to delays and failures in language and symbolic play" (Fein et al., 1986, p.208).

The study recorded qualitative as well as quantitative changes in the child's interactive skills post onset of Musical Interaction Therapy. For example, her mother initially commented that she used eye-contact "to look through people". She later combined eye-contact appropriately with other social skills to convey teasing. As indicated earlier, frequency of eye-contact is not particularly low in autism, it is the quality of eye-contact within social interactions that is the problem (eg. Dawson et al., 1990; Mirenda et al., 1983; Rutter, 1978). However, in the free play condition which most closely matched conditions in the follow-up study, Dawson found quantity of eye-contact to be a significant correlate of communicative level in young children with autism. This was not the case for normal controls.

Quality of eye-contact is extremely difficult to measure objectively but changes in frequency of eye-contact should be understood within the context of changes in the other qualitatively-rich measures of social communication. Appropriate use of eye-contact (in combination with other behaviour such as social acknowledgement, acts of teasing etc.) was a common component of the behaviour registered by the other measures of the study. The child's playful attitude at follow-up appeared to enable sustained interaction in contrast to previous short 'bursts' of interaction. Although statistically untestable, the clinical significance of such new skills (including pretend play) should not be overlooked. These skills are more sophisticated than those registered at baseline and they typically fail to develop in autism.

A separate study of the same child, between the original and follow-up studies, recorded the onset of protodeclarative and protoimperative pointing (Carlile, 1990). Teasing games and pointing gestures have been identified as 'protosymbolic' (Trevarthen & Logotheti, 1987; Bates et al., 1979, respectively). Models of a social origin of symbolic functioning could be applied to account for the child's progress in this respect (Newson & Newson, 1975; Hobson, 1994b). However, the case studies were not designed specifically to test these models. Similarly the studies cannot offer confirmation of the hypothesised deficit in social timing (Newson, 1977) which prompted the original development of Musical Interaction Therapy (Christie & Wimpory, 1986). Further research needs to determine possible social timing difficulties and the validity and efficacy of Musical Interaction Therapy in this respect.

Preliminary evidence from the studies presented in this and the preceding chapter is that Musical Interaction Therapy facilitates playful joint action formats which generalise beyond therapy. The child under study departed from the usual autistic pattern by sustained developments in social communication and symbolic play. An appropriate line of investigation for future research would be to evaluate maternal use of

Interaction Therapy strategies (without synchronised music support). This strategy could be usefully incorporated into a multiple baseline format with further case studies. Following the previous component analysis case study, CASPA measures of social engagement could be usefully employed in future case studies. In addition to this, refinement of the "social acknowledgement" measure could render it more sensitive and enable comparison with other observations of the early speech and sign use of children with autism (Jordan, 1993; Wetherby, 1986).

Chapter Nine

DISCUSSION

The thesis has explored the nature of the social engagement deficits in autism through a series of linked studies. The main questions it aimed to answer were as follows, i) Are the social deficits present in infancy?, ii) What strategies can facilitate social engagement in preschoolers? and iii) What are the effects of musically enhancing these strategies?

The findings discussed in this chapter are limited only to those with the highest level of statistical significance (i.e. at the 0.01 level) unless otherwise indicated. A summary of findings in response to the three main questions is given together with interwoven references to previous research which the thesis' findings dis/confirm and/or extend. This is followed by a theoretical framework intended to account for the empirical findings. Implications for alternative theories are then considered. Weaknesses within the thesis are acknowledged at the close of the chapter, together with suggestions for future studies.

Summary of the Thesis' Findings

The Detection of Autism by Infant Sociability Interview (DAISI) schedule was developed and retrospectively employed with parents in response to the question of whether the social deficits of autism are present in infancy. Social engagement deficits before 24 months were thereby revealed in the areas of eye-contact, gestural body-language and interactive babbling. The use of a control group ensured that none of these were attributable to learning disability. The DAISI-derived findings confirm and extend previous research. They are comparable with deficits identified in older children with autism as identified in Chapters One and Three. They also confirm the finding of previous retrospective interview research that infants with autism are less likely to babble in a socially directed way (Lord et al., 1993). This suggests that current research on visually-mediated joint attention skills (Baron-Cohen, 1991) may be usefully extended to consider vocal/auditory skills.

The DAISI-derived findings contradict those of Stone and Lemanek (1990) who found no deficits in the reported interactions of young autistic children with respect to signs of social interest and responsiveness that are usually established by two years. However, this post-diagnosis study required only Yes/No parental responses to a checklist pertaining to children's first five years, rather than infancy per se. In contrast, the study reported in Chapter Three confirms the value of DAISI's pre-diagnostic clinical interview methodology in indicating the presence of social deficits in infancy with greater specificity than in previous research.

The DAISI-based study raises questions for future research. The interview schedule could be usefully refined to determine a) the precise nature of early expressive pointing deficits and b) the age at which deficits or abilities became apparent to parents. This would clarify whether the autistic infant deficits appear before or after the age at which infants normally demonstrate the ability to conceive of other people's representations. In this refined form, DAISI could be used to address those accounts of early social developments in autism proposed by the theory of mind hypothesis (cf. Klin, Volkmar & Sparrow, 1992).

The findings of a study made available in written form after the completion of Chapter Three, is of interest here. Charman, Swettenham, Baron-Cohen, Cox, Baird and Drew (unpublished) exposed twenty month old infants to tests examining proposed precursors to theory of mind. Autism-specific deficits were found on measures of empathy, joint attention and structured pretend play but not attachment. Mixed results were found for imitation. Whilst imitation may be regarded as an aspect of social engagement, it should be noted that no social imitation tasks were employed in Charman et al.'s study.

All four of Charman et al.'s imitation tasks involved an experimenter modelling the operation of a wooden fitting toy, a hinge, a bleep-producing button and a touch-sensitive light illuminator. None employed imitative acts typical of normal infancy such as those involving facial expressions or hand-clapping. Following this consideration, together with the theoretical account of autism in this Chapter and in Chapter One, it may be that social engagement and/or reciprocity deficits account for the pattern of deficits observed by Charman et al.. The findings derived from DAISI in Chapter Three indicate the need to include a measure of social reciprocity or turn-taking in future replications.

Chapter Three identified deficits in acts of teasing during infancy in all children with autism and most of those with developmental delays. CASPA-based analysis in Chapter Four indicated the continued absence of acts of teasing in all children with autism at preschool age, even when they were socially engaged. This analysis confirmed hypotheses based on clinical observations (Newson, 1984; Hobson, 1994a) and, although the autism-specificity of such a deficit awaits clarification, it represents the first systematic consideration of teasing behaviour in autism.

The findings of Chapters Four and Five highlighted the clinical equivalents of the "scaffolding" role played by parents enhancing their normal infant's social and communicative performance (Bakeman & Adamson, 1984; Bruner, 1975). Videorecorded observations of clinicians and preschoolers with autism during one-to-one play-based assessments were analysed using a schedule developed for this study:- Coding for Active Sociability in Preschoolers with Autism (CASPA).

Use of CASPA revealed positive, negative and neutral relationships between adult strategies and children's active participation in episodes of social engagement (as opposed to time-sampled control periods). In confirmation of previous studies (detailed in Chapter Five), strategies which appeared facilitative of episodes of social engagement were found to include turns continuous with the child's focus, musical-motoric activities and use of social routines. Whilst play based on physical contact and social routines had previously been found to evoke sociability (Sigman et al., 1986) consideration of combinations of this with music and singing, as in musical-motoric activities, has not previously been considered.

The data from CASPA analysis extends earlier research in showing a facilitative effect of self-repetition. Whilst parent-normal infant studies have recognised the role of repetitive runs of familiar behavioural patterns in facilitating interaction (Stern, 1977) these have not previously been considered in autism research. Neither has the distribution of Episodes of Social Engagement over time been studied before. CASPA analysis confirmed that such episodes cluster rather than show an even dispersal throughout interaction.

CASPA further revealed that episodes of social engagement were negatively related to cognitive activities. Previous empirical work has failed to consider cognitive activities in isolation. Instead it has contrasted greater with lesser educational structure and higher with lower adult:child ratios (Bartak & Rutter, 1973 and cf. Volkmar, 1987).

Chapter Five's study therefore extended previous research by revealing that it is unlikely to be the cognitive focus of adult-intensive educational settings that facilitates social engagement in children with autism. As predicted on the basis of previous research documented in Chapter Four, episodes of social engagement were found to be unrelated to adult use of affective facial expression, pretend play activities and increased familiarity through the session.

Chapters Six, Seven and Eight evaluated clinical interventions based around the facilitators of social engagement identified by CASPA in the two previous paragraphs. Musical Interaction Therapy aims to increase the frequencies of Episodes of Social Engagement through musical-motoric activities and social routines where adult playful self-repetitive turns follow the child's focus of attention. Musical Interaction Therapy was originally conceived as an enhanced and prolonged experience of preverbal interaction patterns supported by live music, in response to autistic difficulties in social reciprocity. It was appropriate for evaluation within the thesis because its components are most compatible with CASPA-derived findings.

A short term preschool single case study in Chapter Seven evaluated further aspects of Musical Interaction Therapy (MIT) components. These included passive auditory exposure to prerecorded Musical Interaction Therapy sessions and Music Therapist's supportive visits to the mother. The effects of these components were compared with MIT training and full Musical Interaction Therapy through their staggered cumulative introduction. The full Musical Interaction Therapy phase uniquely differed from other phases in facilitating a generalised increase in Episodes of Social Engagement (i.e. it differed both from baseline and from passive auditory exposure to MIT combined with the Music Therapist's supportive visits). The objective measures and developmental perspective of the Musical Interaction Therapy studies extend beyond previous research (outlined in Chapter Six) in confirming the value of therapeutic applications of music.

A long term preschool single case study (Chapters Six and Eight) contrasted the generalised effects of ongoing full Musical Interaction Therapy with follow up twenty months after completion of therapy and with baseline data (Wimpory, Chadwick & Nash, 1995). The overall pattern of recorded changes confirmed developmental hypotheses. Onset of Musical Interaction Therapy was followed by improvements in the child's use of social acknowledgement, eye-contact and initiations of interactive involvement. Measures of acts of teasing and pretend play recorded zero throughout baseline and so developmental trend lines could therefore not be projected for statistical analysis. However, the generalised emergence of acts of teasing and pretend play during and following Musical Interaction Therapy extends beyond previous empirical findings from interventions. Given the deficits of autism, these findings are too significant to ignore.

The pattern of findings summarised here has implications for theories of autism. Following these results the theoretical perspectives (outlined in Chapter One) need to account for early deficits in social engagement and particularly social reciprocity. They also need to explain an absence of acts of teasing during Episodes of Social Engagement. Furthermore, they need to account for the observations that such episodes were facilitated by adults following the child's focus and using activities or strategies which generally simplify or support social reciprocity and intrapersonal timing. Finally, they need to explain how enhancement of these and related strategies with live music (Musical Interaction Therapy) produced fundamental and lasting changes which included acts of teasing and pretend play. The theoretical explanation of these findings follows. It adopts the social-interactionist perspective introduced in Chapter One. The implications of the findings for alternative theoretical accounts are then considered.

A Social Interactionist Account of the Thesis' Findings with Particular Reference to Social Reciprocity, Teasing and Symbolic Functioning.

In consideration of the development (or lack of) symbolic functioning in children with and without autism, Hobson (1993b; 1994b) gives compelling arguments for the origins of symbolic functioning in preverbal social interaction with objects. These arguments, and those of Newson and Newson (1975) and Newson (1978, 1984), serve as a springboard and framework for ideas pursued in this discussion.

Whilst both Hobson (1994a) and Newson (1984) mention or imply teasing in their accounts of normal and/or autistic general development, it is rare for considerations of development in autism to focus specifically on teasing (Wimpory, 1994). In the light of the thesis providing the first objective confirmation of the general absence of teasing by preschoolers with autism, this discussion seeks to consider its developmental role. There remains a need for wider empirical evidence to distinguish between the active experience of teasing, as opposed to the experience of being teased.

Observations from the thesis indicate that social interaction without toys and teasing others particularly, may play crucial roles in the development of symbolic functioning. The latter is given particular consideration since the thesis documents a very unusual development in its long term case study, that is the emergence of pretend play (following the onset of Musical Interaction Therapy in Chapters Six and Eight). Following the traditional approach of Developmental Psychopathology, the arguments presented here are based on patterns and theories of normal development before giving consideration to the implications for autism.

Hobson's (1994a) theory rests on evidence of a distinction between "I-Thou" and "I-It" patterns of infant relating. These differ in terms of infant attentiveness, smiling, vocalising and motor behaviours (Brazleton et al. 1974). Stern (1985) and Newson (1977, 1978) suggest that inter- and intra-personal timing are important factors in conveying attitudes between partners. The experience of social reciprocity may thereby be critical to the development of the "I-Thou"/"I-It" distinction.

As outlined in Chapter One, Hobson (1994b) attributes the development of symbolic functioning to the perception of bodily-expressed (and -perceived) multiple attitudes towards an object. The perception of duplicity of attitudes towards an object is hypothesised as a precursor to the multiple levels of cognition required for symbolic representation. Symbolic functioning can be seen as the perception and/or use of multiple attitudes towards objects. Thus Hobson (1994b) argues that pretend play may be facilitated through social interaction with objects. How can Hobson's account be used to explain the onset of pretend play in the thesis' long term single case study, where Musical Interaction Therapy involved no use of objects?

Hobson (1994b) suggests that the perception of the directedness of attitudes towards physical objects is essential in the development of symbolic functioning. Perhaps similar developmental significance could be attributed to the earlier phenomenon of infants apparently perceiving adults' attitudes towards joint action formats or the mental 'objects' of social interaction? That is, the content of familiar social routines where physical objects may not be present.

It may be easier for an infant to perceive an adult's attitudes towards something that s/he and the adult actually <u>do</u> together (as in familiar joint action formats) rather than to perceive an adult's attitudes towards an object external to the dyad. The implications of this for autism, and those of the arguments that follow, will be considered shortly. Since the thesis found a general absence of acts of teasing in autism, the importance of teasing in affording multi-attitudinal experience to normal infants is first considered here.

Lap games and social routines without physical objects are frequently the context and basis of early teasing (Reddy, 1991). Infants thereby experience duality (or disparate attitudes) in interpersonal engagement focused around a shared action format. For example, when a five-month-old apparently interprets an adult's comical imitation of his or her own actions as a joke, the referent of the playful attitude is not an external object but a shared internal expectation (i.e. the previously established action format). Teasing experiences are based on the playful violation of shared expectations and the interpersonal manipulation of mental attitudes. The 'contradictory' or disparate attitudes involved establish teasing as an early example of the active experience of multiple attitudes.

Early acts of teasing often comprise play around the established timing of an exchange. Some lap games may even be considered as inherently teasing experiences where a familiar pattern of activity is established and then sabotaged (for example by "tickly under there!" during "Round and round the garden"). Normal infants appear to comprehend such situations on a multi-attitudinal level when their facial expressions indicate conventional understanding of an established exchange and then humour on recognition that expectations are about to be, or have been, sabotaged.

The normal infant's "illusion of control" during communication may be essential for language acquisition (Urwin, 1984). Urwin cites the example of an infant teasing an adult by pointing and requesting a word label ("zat?", i.e. "what's that?") without looking to see where her own finger is pointing. This emphasises the developmental value of infants being able to convey and manipulate, as well as perceive, attitudes. What are the inter-relationships between teasing, pretence and social empathy?

In addition to providing a format for the communication of multiple attitudes, teasing itself often involves some degree of pretence or imagination by both or either partner(s). Trevarthen and Logotheti (1987) have previously identified teasing as protosymbolic whilst Reddy (1991) links it with developments in social empathy or theory of mind. Acts of teasing also often appear to involve some level of social empathy or 'mind-reading' (for example, as in "I'm going to eat you all up" where "not really" is taken as read). Discussions of empathy tend to imply that individuals are genuinely able to 'mind-read'. However, as indicated in Chapter One, empathy may be more accurately construed as the social application of imagination. To what extent can the arguments outlined so far account for autistic difficulties with acts of teasing, pretend play and social empathy?

The thesis provides empirical support to Newson's (1984) account of autism which implies an absence of acts of teasing. The social reciprocity deficits in infants with autism identified by the thesis would disrupt adults' attempts to establish preverbal interaction. A social interactionist account of normal development predicts that a lack of reciprocal preverbal interaction would result in impaired understanding and practice of social agency, intentionality, nonverbal communication, social reference, acts of teasing, spontaneous pretend play, empathy and imagination. These are the symptoms of autism.

The thesis has sought to explore social engagement and related developments in autism rather than to test the theoretical perspective presented here against opposing theories. Nevertheless, it has found support for the proposed early autistic deficit in social reciprocity along with other deficits in nonverbal communication which may be attributable to a social reciprocity deficit. Activities and strategies which in general support social reciprocity and/or follow the child's own focus (i.e. continuers) have been found to facilitate Episodes of Social Engagement in preschool children with autism.

Not one of the two hundred Episodes of Social Engagement in the play-based assessment research contained joint attention or acts of teasing. In further support of the theoretical perspective outlined earlier, the combined use of facilitators of social engagement, together with live music support of inter- and intra-personal timing, produced positive generalised sociability changes in two single case studies. This was not attributable to the passive auditory experience of music nor to any potential social support available from the Music Therapist. Observations of child teasing behaviour and pretend play were observed following six months receipt of this Musical Interaction Therapy which focused only on facilitating social engagement without the use of objects.

The thesis was not designed to test hypotheses of deficits in timing and/or attention shifting during social interaction (Newson, 1977, 1978; Courchesne et al., 1994). It focuses instead on the general issue of social engagement, and social reciprocity in particular. Nevertheless, the findings are compatible with accounts of autism proposed by Newson (1978, 1984) and Hobson (1993c, 1994a, 1994b) with the added considerations given earlier.

The pattern of findings also appears compatible with Courchesne et al.'s (1994) proposed consequences of neocerebellar maldevelopment (introduced in Chapter One) involving difficulties in shifting attention "in order to follow the rapidly changing events that compose reciprocal social interactions .... Much would be missed and the fragments caught would lack "... temporal continuity"", thereby derailing subsequent development (Courchesne et al., 1994, p. 102).

In contrast, "By precisely coordinating the direction and timing of attention, the [normal] baby is able to share with mother a learning experience about mother's interests in objects, his own affective reaction and interest in the same object, and his mother's reaction to his own affective and physical reactions." (Courchesne et al., 1994, p. 106). The implications of the thesis' findings for alternative theoretical accounts of autism remain to be considered.

This discussion relates closely to those by Dunn (1991) and Bruner and Feldman (1993). Dunn (1991) notes that emotional and interactional contexts (for example teasing and shared pretence) often reveal the earliest and more sophisticated manifestations of mind-reading/manipulating abilities. Bruner and Feldman (1993) identify participation in early interactive formats as precursory to the ability to understand, and to convey an understanding of, culturally canonical forms of social interaction through narrative encoding. Whilst these arguments do not specifically consider the role of social timing, they are compatible with the other social interactionist perspectives employed in the section to account for the thesis' findings.

Implications of the Findings for Alternative Theoretical Accounts of Autism

As outlined in Chapter One, theoretical approaches to autism differ in the developmental significance they attribute to difficulties of social engagement. In contrast to the social interactionist account employed earlier, some suggest that difficulties of social engagement are secondary to a core cognitive deficit.

Theories based on a core cognitive deficit.

Perner (1991) argues that "theory of mind" arises from cognitive inference which may or may not be dependent on social precursors. His account could therefore remain unaffected by the thesis' findings. Frith (1992) uses her argument that all symptoms of autism arise from a single cognitive deficit in "theory of mind" to account for difficulties in social relations and empathy. Following this argument, the "theory of mind" deficit would need to predate the evidence of infant social reciprocity and engagement difficulties uncovered in this thesis.

Leslie (1987) recognises pretend play as an early manifestation of "theory of mind" and suggests that both are dependent on an innate "decoupling" cognitive mechanism (Leslie, 1988). He argues that earlier-appearing deficits (eg. in joint attention) are due to this decoupling mechanism being faulty. It is unclear how this mechanism could account for apparently simpler social engagement/reciprocity skills whose emergence appears to occur earlier. An alternative account of these would render his theory unparsimonious.

As outlined in Chapter One, Baron-Cohen (1989c) argues that the earlier deficits of pretending, pointing and showing employ awareness of another person's perceptions. He hypothesises that they are therefore part of the theory of mind deficit. Following this, he suggests that the capacity for metarepresentation may be present from seven to nine months, and manifest in acts of joint attention.

Baron-Cohen (1991b) has previously concluded that subjects with autism are unimpaired in reciprocity where no mind-reading is involved. He found that able older children with autism could roll a ball to and fro with another person. The thesis' findings indicate that Baron-Cohen's definition of social reciprocity should be reconsidered to incorporate preverbal communicative turn-taking. This developmentally predates the joint attention skills of normal infancy. Baron-Cohen's account must either employ a "theory of mind" deficit to account for this early impairment in autism or acknowledge that social reciprocity may be instrumental in the development of some abilities currently attributed to the capacity for metarepresentation.

Multiple Deficit Models.

As outlined in Chapter One, Mundy and Sigman (1989a) are among those who criticise Baron-Cohen (1989c) for failing to account for other deficits such as prosody found by Baltaxe and Simmons (1985). Evidence from the thesis supports their criticism in this respect because deficits in social reciprocity or inter- or intra-personal timing may more readily account for prosody deficits than does a deficit in "theory of mind". Mundy and Sigman's own theory (1989a) does not ascribe to the primacy of either cognitive or social deficits. Their model instead hypothesises independent deficits in both affect expression and representation.

Mundy and Sigman's (1989a) proposed affective deficit assumes a failure to smile sufficiently on the part of the infant (following Dawson & Lewy, 1989). Dawson et al. (1990) have since found that young children with autism smile as often as controls although they are less likely to combine their smiles with eye-contact. Following the evidence from the thesis it would seem that difficulties in social reciprocity, or other aspects of social engagement which do not necessarily involve smiling, offer more plausible models for Mundy and Sigman's affective deficit. In contrast to Mundy and Sigman's model, Hobson's affective account of autism and the deliberations on it within this chapter, postulate no need for additional cognitive difficulties to account for the symptomatology of autism.

Rutter (1983) also emphasises the importance of social deficits *alongside* others in underlying the autistic syndrome. He considers that impaired abilities to process stimuli that carry emotional or social meaning may account for deficits in reciprocal social interaction rather than recognising social reciprocity itself as a core deficit in autism. Aside from emphasising the significance of social reciprocity difficulties in autism, the thesis' findings can neither confirm nor disconfirm Rutter's hypothesising on their origin.

As outlined earlier, Jordan has considered arguments for a 'social skills acquisition device' which may be "tuned in to detect social significance and benefit from the 'social affordances' of interaction" (1993, p. 248). This could account for a child with autism being "socially motivated to participate in social interaction, yet mistiming and misinterpreting that interaction" (Jordan, 1993, p. 248). Following evidence from the thesis and earlier theoretical discussion allied to a social-interactionist position, Newson's (1977, 1987) suggested 'social timing' deficit or at least a deficit in social-reciprocity, may play a crucial role within any such social skills acquisition device. Whilst Jordan suggests that both social and cognitive factors are influential, her discussion highlights the artificiality of dividing contributory factors in this way. The same criticism is applicable to the theoretical account of the thesis' findings presented earlier within this chapter.

Arousal-based theory.

Dawson and Lewy (1989) present the most recent arousal-based theory of social engagement difficulties in autism. They interpret the findings of biological studies of responsivity in autism as "consistent with an aversive response to novelty and reduced stimulus intake" (p. 55). Rather than hypothesise a specifically *social* impairment in autism, they argue that the complexity, novelty, and unpredictable nature of people means that they are overstimulating for these children. Furthermore, they propose that the pattern of maternal imitation of infants with autism may be disrupted in an "extreme and persistent manner" (Dawson & Lewy, 1989, p. 61) with subsequent distortion of socioemotional development in these children.

Whilst any test of Dawson and Lewy's theory would ideally involve infants with autism, the play-based assessment study gave findings which should be considered in terms of their model. Clinicians within the study were extremely responsive to the preschoolers with autism for most of each assessment. Their imitation patterns gave no indication of being disrupted. Although the children showed responsivity to being imitated, their responsivity did not amount to that shown when adults used self-repetition or followed the child's focus of interest.

These observations indicate that it may be too limited to suggest that the difficulties of autism are so crucially connected with the experience of being imitated as outlined earlier. Furthermore, they indicate that Dawson's work on the clinical effects of imitation may be masking the effects of intrinsic sub-components within that imitation, for example, "continuer turns", following the child's focus of interest and possibly self-repetition by the adult. The latter is likely to occur since the behaviour of children with autism (and therefore the adult's imitation) tends to be self-repetitive (DSM-IV, 299.00; 1994). Whilst the play-based assessment study confirms Dawson and Lewy's clinical observation that children with autism are more responsive to "highly routine and ritualised forms of social stimulation" it does not necessarily confirm their explanation of this.

Conclusions: Research and Clinical Implications of the Thesis

Overall the thesis' findings serve to strengthen the theoretical argument used to account for autism in terms of social reciprocity deficits. However, further evidence is required before it can be confirmed in full or rejected. One shortcoming of the thesis, and in particular the retrospective infancy study, is that it did not place greater focus on aspects of joint attention. In particular, future versions of the Detection of Autism by Infant Sociability Interview (DAISI) should distinguish between protodeclarative and protoimperative pointing used to show and request items respectively. Whilst no instances of joint attention arose in the play-based assessment study, a separate independent study of a long term single case recorded the child's use of protodeclarative pointing following Musical Interaction Therapy (Carlile, 1990). It is regrettable that this apparently spontaneous development was not studied within the thesis since it is compatible with the other developments recorded and would have strengthened the case for the adopted theoretical perspective.

A further weakness is that although the thesis lends support to live Musical Interaction Therapy as opposed to prerecorded audio tapes of the same, it does not conclusively demonstrate that music is an essential accompaniment to the strategies found to be effective through the play-based assessment study. Further study is needed to dis/confirm the impression that i) the positive strategies identified by CASPA evoke minimal acts of social engagement within the child's current competence whilst ii) the combination of these and related strategies with the live synchronised music of Musical Interaction Therapy directly and indirectly facilitate further developments in the child.

More research is also needed to confirm the autism-specificity of deficits in acts of teasing. Furthermore, empirical studies are required before definitive conclusions can be drawn about the theoretical attributions of primacy to the cognitive and/or affective social deficits of autism (cf. Jordan, 1993; Ungerer 1989; Waterhouse et al. 1989). However, the thesis' findings do indicate that issues relating to social reciprocity provide a realistic challenge to well-established theories. For example, they extend and confirm those of Klin, Volkmar and Sparrow (1992) whose data led them to conclude that

> "social dysfunction in autism affects very basic and early emerging social behaviours which are typically present prior to the time at which even the earliest emerging social precursors of a theory of mind apparently emerge ... (These) results are consistent with Kanner's original emphasis on the primacy of social dysfunction in autism" (Klin, Volkmar & Sparrow, 1992, pp. 861, 871).

Following Newson (1978; 1984; 1987) and Hobson's (1993c; 1994b; 1994c) clinical observations and theoretical considerations of autism, the thesis concludes that future research may usefully be guided by the hypothesis that social reciprocity deficit(s) may be the critical mediator of social engagement and may therefore disrupt adults' attempts to establish preverbal interaction. Failure to experience preverbal interaction could lead to the symptoms of autism: impaired understanding and practice of social agency, intentionality, nonverbal communication, social reference, teasing, empathy and imagination.

The thesis also provides research and clinical practitioners with potential tools for assessing current and retrospective aspects of social engagement. Following further validation and refinement, it is anticipated that the Detection of Autism by Infant Sociability Interview (DAISI) and the schedule for Coding Active Sociability in Preschoolers with Autism (CASPA) will meet a clinical-research need identified by the literature reviewed earlier in the thesis. Perhaps the thesis' most significant contribution is the objective verification of individual clinical strategies (continuer turns, social routines, musical motoric activities and adult self-repetition) and an intervention package (Musical Interaction Therapy) in facilitating social engagement in preschool children with autism.

On reflection, the validity of the teasing measure applied alongside CASPA in Chapter Five, should have been strengthened by additional application to a normally developing control group. Here positive observations may have been made to contrast with the recorded total lack of teasing by the autistic group. The validation of DAISI's measure of teasing could have been similarly enhanced by the inclusion of such a control group in Chapter Three. Here only two developmentally delayed, and no autistic, infants were reported as having engaged in teasing. Whilst the results indicate that the teasing measures of CASPA and DAISI are the most vulnerable to criticisms concerning validity, the validities of both assessment tools would be greatly enhanced by their subsequent application to normally developing control groups. Funding is now being sought to rectify this.

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Appendix I <u>DSM-III-R Criteria</u>

299.00 Autistic Disorder

The essential features constitute a severe form of Pervasive Developmental Disorder, with onset in infancy or childhood. The other features of the disorder are described above.

Diagnostic criteria for 299.00 Autistic Disorder

At least eight of the following sixteen items are present, these to include at least two items from A, one from B, and one from C.

Note: Consider a criterion to be met *only* if the behavior is abnormal for the person's developmental level.

A. Qualitative impairment in reciprocal social interaction as manifested by the following:

(The examples within parentheses are arranged so that those first mentioned are more likely to apply to younger or more handicapped, and the later ones, to older or less handicapped, persons with this disorder.)

(1) marked lack of awareness of the existence of feeling of others (e.g., treats a person as if he or she were a piece of furniture; does not notice another person's distress; apparently has no concept of the need of others for privacy)

(2) no normal or abnormal seeking of comfort at times of distress (e.g., does not come for comfort even when ill, hurt, or tired; seeks comfort in a stereotyped way, e.g., says "cheese, cheese, cheese" whenever hurt)
(3) no or impaired imitation (e.g., does not wave bye-bye; does not copy mother's domestic activities; mechanical imitation of others' actions out of context)
(4) no or abnormal play (e.g., does not actively participate in simple games; prefers solitary play activities; involves other children in play only as "mechanical aids")
(5) gross impairment in ability to make peer friendships (e.g., no interest in making peer friendships; despite interest in making friends, demonstrates lack of understanding of conventions of social interaction, for example, reads phone book to uninterested peer)

B. Qualitative impairment in verbal and nonverbal communication, and in imaginative activity, as manifested by the following:

(The numbered items are arranged so that those first listed are more likely to apply to younger or more handicapped, and the later ones, to older or less handicapped, persons with this disorder.)

(1) no mode of communication, such as communicative babbling, facial expression, gesture, mime or spoken language
(2) markedly abnormal nonverbal communication, as in the use of eye-to-eye gaze, facial expression, body posture, or gestures to initiate or modulate social interaction (e.g., does not anticipate being held, stiffens when held, does not look a the person or smile

when making a social approach, does not greet parents or visitors, has a fixed stare in social situations)

(3) absence of imaginative activity, such as playacting of adult roles, fantasy characters, or animals; lack of interest in stories about imaginary events

(4) marked abnormalities in the production of speech, including volume, pitch, stress, rate, rhythm, and intonation (e.g., monotonous tone, question-like melody, or high pitch)

(5) marked abnormalities in the form or content of speech, including stereotyped and repetitive use of speech (e.g., immediate echolalia or mechanical repetition of television commercial); use of "you" when "I" is meant (e.g., using "You want cookie?" to mean "I want a cookie)"; idiosyncratic use of words or phrases (e.g., Go on green riding" to mean "I want to go on the swing"); or frequent irrelevant remarks (e.g., starts talking about train schedules during a conversation about sports)

(6) marked impairment in the ability to initiate or sustain a conversation with others, despite adequate speech (e.g., indulging in lengthy monologues on one subject regardless of interjections from others)

C. Markedly restricted repertoire of activities and interests, as manifested by the following:

(1) stereotyped body movements, e.g., hand-flicking or -twisting, spinning, head-banging, complex whole-body movements

(2) persistent preoccupation with parts of objects (e.g., sniffing or smelling objects, repetitive feeling of texture of materials,

spinning wheels of toy cars) or attachment to unusual objects (e.g., insists on carrying around a piece of string)

(3) marked distress over changes in trivial aspects of environment, e.g., when a vase is moved from usual position

(4) unreasonable insistence on following routines in precise detail, e.g., insisting that exactly the same route always be followed when shopping

(5) markedly restricted range of interests and a preoccupation with one narrow interest, e.g., interested only in lining up objects, in amassing facts about meteorology, or in pretending to be a fantasy character.

D. Onset during infancy or childhood.

Specify if childhood onset (after 36 months of age)

Appendix II Individual Subject Characteristics

Subject characteristics and identification re: participation in i) retrospective, ii) play-based assessment and iii) intervention studies

"DAISI," "CASPA" and "MIT" within the table refer to studies which were based around; i) the Detection of Autism by Infant Sociability Interview (DAISI); ii) the Coding of Active Sociability in Preschoolers with Autism (CASPA); and, iii) Musical Interaction Therapy (MIT, Christie & Wimpory, 1986). DAISI and CASPA were developed for the purposes of the thesis.

Name (autistic)	CASPA/ DAISI/ MIT	Age in months	Expressive Language Level	CARS Score	Perf. DQ (Griffiths)	Birth Order
Bertie	CASPA/ DAISI	41	1 Word	53.5	88	3
Charles	CASPA/ DAISI	48	1 Word	47.5	81	1
David	CASPA/ DAISI	37	1 Word	40	92	3
Gary	DAISI	42	1 Word	37	91	1
Grant	CASPA/ DAISI	40	Preverbal	57	95	2
Heather	CASPA/ DAISI/ MIT	39	Preverbal	47.5	42	3
Jack	CASPA/ DAISI	32	Preverbal	49	23	1
Jake	CASPA	48	Preverbal	28.5	75	2

Name (autistic)	CASPA/ DAISI/ MIT	Age in months	Expressive Language Level	CARS Score	Perf. DQ (Griffiths)	Birth Order
John	CASPA/ DAISI	48	1 Word	38.5	71	2
Mark	CASPA/ DAISI	39	Preverbal	35	92	2
Siân	CASPA/ DAISI/ MIT	43	Preverbal	45.5	117	2
Mean		41.55		43.5	78.82	
SD		5.05		8.5	26.18	
Range		32-48		28.5-57	23-117	
Developmentally Delayed						
Alan	DAISI	34	1 word	25.5	75	1
Craig	DAISI	48	2 words +	22.5	96	1
David	DAISI	39	Preverbal	29	48	2
Elly	DAISI	30	1 word	22.5	110	2
Ieuan	DAISI	48	2 words +	24.5	75	3
Linda	DAISI	42	1 word	28.5	70	2
Ronnie	DAISI	43	1 word	23.5	96	3
Sonia	DAISI	42	1 word	26	100	4
Sandra	DAISI	39	1 word	22	77	3
Sharon	DAISI	46	2 words +	21	59	2
Mean		41.1		24.6	79.9	
SD		5.84		2.644	23.26	
Range		30-48		21-29	48-110	

Appendix III Detection of Autism by Infant Sociability Interview (DAISI) for retrospective use with parents of children who may have autism and/or related difficulties (design influenced by child clinical training at Nottingham University's Child Development Research Unit (1984-5) and Newson, 1990)

Introduction to the DAISI schedule

The following groups of questions each contain one or more key questions (underlined). The group of questions are designed to derive a comprehensive answer to this question. Key questions (also identified by item numbers) are those used to determine DAISI scores. They may be substituted by and/or preceded and/or followed by some or none of the associated questions. This arrangement is designed to enable parents both to gain confidence in answering the key questions and to clarify their answers to those questions. Italics denote examples and criteria for positive and/or negative replies. Only items 20 - 22 may involve some recollections post- as well as pre-24 months.

Key questions correspond with the DAISI items as given in table 3.3 of Chapter Three. Questions are ordered below in the order most compatible with the flow of a natural conversation (eg. greeting and reaching up to be lifted up from a cot are juxtaposed although these are later analysed separately as aspects of sociability and gestural communication).

Eye contact (item 1)

Did s/he look at you more or less readily as a baby (<2 yrs) than s/he does nowadays?

Did his/her readiness to give eye-contact change at any stage?

(Item 1) Did s/he have difficulties in the frequency and/or intensity of eye-contact? *(Negative replies include parents of preschoolers whose eye-contact is poor at the time of diagnosis but where parents report both that their child's readiness to give eye-contact has not changed since infancy, and that they do not see eye-contact as a problem for their child. This procedure also applies to item 2 below)*

Soothability from crying (items 4 and 5)

How would you stop him/her crying as a baby ?

(Item 4) Could you stop him/her crying by picking him/her up?

(Positive responses include those where this strategy worked for at least a few months of infancy)

(Item 5) Could you stop him/her crying by just talking to him/her?

(Positive replies include communicative use of "babytalk", i.e. employing singing, vocalisations and facial expressions) but no physical contact or movement. Negative responses include those for infants described as never interested in social interaction).

Greeting, Requesting to be picked up and Waving

(items 3, 15 and 14 respectively)

What would s/he do when you went to his/her cot after she'd woken (naturally) from a sleep?

Where would s/he be looking?

What would his/her face be like?

(Item 3) Would s/he greet you? *(Positive responses include manifest pleasure or excitement and/or appropriate facial expression whilst looking towards parents. Negative responses include a failure to look pleased on most occasions where there was potential for greeting)*

What would s/he do if s/he wanted to come out of the cot or be lifted from the floor?

Would s/he touch you or the cot whilst reaching up as if to climb up/out physically

(Item 15) Would s/he spontaneously lift her arms to be picked up?

(Positive responses comprise spontaneous non-tactile gesturing including the support of vocalisation, eye-contact etc.)

Did you need to offer your own arms for him/her to lift his/hers?

Would s/he appear to notice someone s/he knew well was leaving?

What would s/he do?

Would s/he wave if they (or you) waved?

Would s/he need you to tell him/her to wave or to lift his/her hand for her?

Would s/he wave spontaneously?

How did s/he do it? (i.e. to distinguish from arm flapping)

Where would she be looking?

(Item 14) Would s/he spontaneously and appropriately wave goodbye?

(Positive responses comprise spontaneous waving with apparently appropriate communicative intent, as indicated by context, looking towards other's face, etc. Negative responses include only brief apparent acquisition of waving and/or waving an arm for social or motoric stimulation without apparent understanding of its gestural significance)

Lap Games (items 7 and 8)

(Item 7) Did s/he enjoy lap games? eg. 'Round and round the garden', 'Peep-bo' *(Negative responses included a lack of interest in lap games)*

How did s/he show it (his/her enjoyment)?

What did s/he tend to do during lap games?

Would s/he watch you doing the actions?

Would s/he try to join in?

(Item 8) Did s/he actively participate?) *(Positive replies require use of body actions, for example, imitative clapping,)*

Social engagement during play with and without toys, including sociability with main caregiver over time (items 9 , 6 and 22 respectively)

Would he be happy for you to play with him/her?

How would she react if s/he was already occupied with toys?

(Item 9) Would s/he be happy for you to join in his/her play with toys or would s/he regard that as an intrusion and prefer to play alone? *(Positive responses included those covering infants apparently happy for parents to play alongside them without parents feeling excluded)*

Would you need toys in order to play with her?

(Item 6) Could you amuse him/her without toys (if say, you were together on a bus or in a doctor's waiting room where no toys were available)? *(Positive replies may include chatting and/or singing, play with body parts) etc.*

Did s/he show any dramatic changes in his/her sociability towards you over time?

Was there a time when s/he was much less or much more sociable than now?

When was that?

Describe what happened/ how s/he changed?

(Item 22) Did s/he show consistency in sociability towards his/her main caregiver?*(Positive responses included changes typical of normal developmental patterns, for example, due to onset of stranger anxiety or acquisition of increasingly sophisticated expressions of sociability).*

Showing, Offering, Giving and Pointing (items 11, 10, 12, 2 and 13 respectively)

Did s/he sometimes want to draw your attention to her toys? (Or did s/he seem too interested in them to share them with anyone else?)

(Depending on responses to previous questions...) What would s/he do if she wanted you to share her experience of a toy?

Would s/he hold it up for you to see?

Where would s/he be looking?

<u>(Item 11) Would she show you things?</u> *(Positive replies include either holding an object up to another's field of view or pointing to it and simultaneously looking at the other person. Referential eye-contact scores positively on item 2. Communicative pointing also scores positively on item 12 below)*

Would s/he give a toy (or other item) to you?

Was this in response to a request it or would it be spontaneous?

Have you known babies who like to give something (eg a biscuit) to other people...babies who give it very carefully, often breathing heavily as they do so, and then they want it back as soon as they've given it? *(All respondents replied positively to this question associated with item 10)*....Did s/he like to play giving and taking games like that or did s/he tend to "post" or place objects on you instead?

Where would s/he be looking before and during the act of giving?

<u>(Item 10) Would s/he offer and give objects?</u> *(Positive replies include pausing and looking to the recipient's face before giving)*

What would she do if s/he wanted something (eg a biscuit) out of reach?

(If reaching) How would she position her fingers?

Where would s/he be looking?

What would s/he do if she saw something of interest like a plane or an animal across the street?

(If reaching) How would she position her fingers?

Where would s/he be looking?

(Item 12) Would s/he use pointing communicatively? *(Positive replies include eye- or finger-pointing (without touching) to request and show items of interest accompanied by eye-contact. Negative responses include extension of index finger with no apparent communicative intent).*

(Item 2) Would s/he look both to where s/he was pointing and to you? (Referential eye-contact)

Did she take notice if you pointed at something or did s/he tend to be preoccupied with her own interests?

What would s/he do if you pointed (at near and far objects, eg an animal across the street, the correct hole for a puzzle piece etc.)?

Where would s/he look... towards your finger or to where you were pointing?

(Item 13) Could she follow your pointing gestures?

Expressing Anger and Distress and Teasing (items 18 and 16 respectively)

Did s/he have tantrums?

Where would s/he be looking during these?

What would s/he do if s/he was hurt?

Where would s/he be looking ?

(Item 18) Would s/he appear to direct anger and/or distress with apparent communicative intent? *(Negative responses include toddlers who would avoid looking towards other faces during expressions of anger and/or distress. Positive responses include toddlers who directed anger towards parents when after feeling physical pain unrelated to parental behaviour)*

Did s/he understand "No" even if s/he chose to ignore it? *(All respondents in Chapter Three's study answered positively, as was necessary before proceeding to subsequent questions. Some continued spontaneously to describe how their child would tease them in such situations, others were asked some or all of the following questions)*
Have you noticed some toddlers will still do what they've been told not to do (eg. touch an electric switch) and will be smiling and looking to their parents at the same time as if they are doing it again *because* they've been told not to do it?
Was s/he a toddler who was interested in doing that?
Can you give examples?
Where would s/he be looking?
What would his/her face be like as s/he did it?
(Item 16) Would s/he tease you? *(Negative responses include enjoyment of playful reprimands, such as being chased, rather than manifesting playful provocation/teasing per se)*
Can you think of other ways in which she'd tease you?

Preverbal Turn-Taking and Use of Vocalisations and Early Words (items 17, 19 and 20 respectively)

Did s/he make baby noises? *(All except one participant answered positively, thereby enabling progression to the following questions. The remaining participant, from the control group, described a period of infant mutism and therefore scored negatively on item 19 below)*
Did s/he make these just for him/herself or did s/he seem to be making them for you to listen to him/her?
How did s/he show that they were for you?
Where would s/he be looking?

(Item 19) Were his/her baby noises communicative? *(Negative responses included an absence of babbling or parental inability to recall communicative use of babbling despite parental expectation that this occurred)*

Have you noticed how some babies like you to join in with their babbled noises, so that there's a turn-taking pattern between you and them- as if the two of you are speaking another language? *(All participants in Chapter Three's study answered positively as was required before proceeding to the following question)*

Was s/he the kind of baby who did that?

Were you able to have babbling conversations with him ?

(Item 17) Did s/he take turns before s/he could talk, eg with babbled noises? *(Positive responses included turn-taking flows established by i) infants repeating a babbled noise as if with communicative intent apparently in response to an adults' imitations of those noises, and ii) active silent participation in a flow of interaction using appropriate facial expressions and communicative body actions during a period of mutism)*

Did s/he use his/her early words for him/herself or for giving messages to you?

Where would s/he be looking when using them?

What would s/he do if s/he was hurt?

Would s/he let you know how s/he was hurt?

(Item 20) Did s/he make communicative use of early words? *(Negative responses included the failure to acquire any spoken words or failure to use (albeit meaningful) spoken words with apparent communicative intent. Positive responses comprised simultaneous looking towards another's face and/or other indications of communicative intent whilst speaking early words)*

Where would s/he be looking when saying them?

Did s/he lose or forget words after using them for a time?

<u>(Item 21) Did s/he acquire and retain early vocabulary?</u> *(Negative responses included failure to acquire any speech)*

Appendix IV Individual Subject Characteristics for DAISI Study

Subjects with Autism

Name	Age in months	Language Level	CARS Score	DQ (Griffiths)	Birth Order	Total DAISI score/22
Bertie	41	1 Word	53.5	88	3	0
Charles	48	1 Word	47.5	81	1	7
David	37	1 Word	40	92	3	4
Gary	42	1 Word	37	91	1	4
Grant	40	Preverbal	57	95	2	4
Heather	39	Preverbal	47.5	42	3	4
Jack	32	Preverbal	49	23	1	6
John	48	1 Word	38.5	71	2	1
Mark	39	Preverbal	35	92	2	6
Siân	43	Preverbal	45.5	117	2	1
Mean	40.9		45.1	79.2		3.7
SD	4.8		7.3	27.5		2.36
Range	32-48		35-57	23-117		0-7

Control Subjects with Developmental Delay(s)

Name	Age in months	Language Level	CARS Score	Perf. DQ (Griffiths)	Birth Order	Total DAISI score/22
Alan	34	1 word	25.5	75	1	18
Craig	48	2 words +	22.5	96	1	21
David	39	Preverbal	29	48	2	15
Elly	30	1 word	22.5	110	2	21
Ieuan	48	2 words +	24.5	75	3	20
Linda	42	1 word	28.5	70	2	14
Ronnie	43	1 word	23.5	96	3	20
Sandra	39	1 word	22	77	3	20
Sharon	46	2 words +	21	59	2	20
Sonia	42	1 word	26	100	4	15
Mean	41.1		24.6	79.9		18.4
SD	5.84		2.644	23.26		2.72
Range	30-48		21-29	48-110		14-21

Appendix V - Individual Results from the Detection of Autism by Infant Sociability Interview Study

	Children with Autism										Children with Developmental Delay									
	Bertie	Charles	David	Grant	Gary	Heather	Jack	John	Mark	Siân	Alan	Craig	David	Elly	Ieuan	Linda	Ronnie	Sandra	Sharon	Sonia
1 *No observed difficulties with frequency or intensity of* eye-contact.	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
2 Appropriate use of referential eye-contact.	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1
3 Greeted *parents on reaching cot.*	0	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1
4 Could be soothed from crying by being picked up.	0	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0
5 Could be soothed from crying by social input alone (non-physical, eg. talking)	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0	1	1	1	1	0
6 Could be amused *by parents* when toys were unavailable.	0	1	1	1	0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1
7 Enjoyed *lap games.*	0	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1
8 Took an active role in lap games (eg clapping)	0	1	1	1	0	1	0	0	0	0	0	1	1	1	1	0	1	1	1	1
9 Allowed *parents to join* in play with toys.	0	1	0	0	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1
10 Offered and gave objects to others.	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	1	1	1
11 Showed *objects* (eg. by lifting them up for others to see).	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	1	0
12 Pointed at *objects.*	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
13 Followed others pointing at objects.	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	1	1	1
14 Waved appropriately.	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	1	0	0
15 Raised arms to request *being picked up.*	0	0	0	0	0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1
16 Teased others.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
17 Took turns, *for example* with preverbal babbling.	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	1	1	1
18 Socially *directed* anger or distress (as if intentionally communicative).	0	1	0	0	1	0	0	0	1	0	1	1	1	1	0	1	1	1	1	1
19 Used preverbal noises communicatively.	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
20 Words expressed as *if* with communicative intent.	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
21 Early vocabulary acquired and subsequently retained (not lost).	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	1	1
22 Sociability towards mother showed no dramatic change.	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0

(NB Items 20-22 involve some recollections post,- as well as pre-24 months)

0 = Child did not demonstrate relevant item   1 = Child demonstrated relevant item

Appendix VI Transcript of interaction used to develop CASPA, from videorecording in play-based assessment

David's Play-based Assessment

	With Dawn at table. Threading beads.
0.01.57	Looks towards Dawn with comment. Eye Contact.
2.38	Looks towards Dawn with comment. Eye Contact.
3.00	Looks towards Dawn with comment. Eye Contact.
8.44	Box of stacking rectangular shapes. Bridge building. Colour sorting.
11.36	In main playroom with Dawn. Slide. Dawn helping David jump off steps. Noises but no looking.
12.40	Floor puzzle until 13.55
13.55	David goes to the steps of the slide. Looks to Dawn at top. Doing puzzle on floor.
16.03	Repeats Dawn's 'Good boy'. Not looking at Dawn. To 16.47.
16.48	On the steps. Dawn crouching to receive him. No looking
18.00	Laughs as Dawn swings him. Can't tell whether David is looking at her
18.08	Ball sorting puzzle at table. Abacus. David puts balls in basket. No looking. Puts them back.
21.44	Possible Eye Contact.
22.28	On the steps. Keeps hold of Dawn's hands after one jump in order to obtain another.
22.50	Dawn tries to get David to look. He does so, briefly.
23.24	Trying again, blowing on his face. 23.41 Looks when she kisses his hand
23.55	To table. Shape puzzles - timed.

27.36 Looks towards Dawn who has copied his irritated hitting table movements.

29.58 David does not follow Dawn's pointing.

30.47 Offers piece to Dawn when she says 'Do you want some help?'. David replies 'Some help' No looking. Imitates movement - stirring with puzzle spoon.

31.34 David puts his fingers to his mouth in imitation of Dawn eating with a spoon. Dawn gives David the spoon. David acts as though eating from it.

32.00 David moves over to the slide. Looks to see what Dawn is doing?

32.56 David goes to the toy farm. 34.13 Dawn asks 'What's there?' David replies 'Pig'. To 34.34

34.34 Dawn takes David's hand and leads him past a doll in a pushchair towards the kitchen area of the room. David is very hesitant, he relinquishes Dawn's hand and moves back to the steps. Dawn collects him at bottom of steps, saying 'Fallen down'. David is now looking more in Dawn's direction. Dawn starts 'Row the boat'. David is looking towards Dawn; he appears apprehensive.

36.35 David says 'What you saying?' at the end of the song when Dawn has asked whether he's going off. Dawn asks whether he's ready before she'll start the song again. David only looks when she kisses his hand. David now smiling and looking towards Dawn. Dawn changes to 'Twinkle, twinkle'. David appears pleased and is looking towards her, mouthing words. Gaze near to Dawn's eyes 38.07. David joins in bits of song. Dawn tickles David at end, David smiles.

39.00 David pushes Dawn's hands apart and takes her hands in his request for 'Row the boat'. David looking towards Dawn. David imitates Dawn's tapping on floor with feet.. Also copies tapping on floor with hands. Dawn brings her feet forward when David moves his and looks at them. David copies tapping on floor with feet. Does not join in clapping.

40.17 To the steps. Glances up as Dawn swings him from steps.

40.55 To the kitchen. Commenting on items - not turning to Dawn.

41.42 Dawn introduces a doll who wants dinner. David lifts arm to fend doll off. Sits at table 42.08. David moves cutlery from one plate to another. Plays with sausage. 43.55 David pretends to eat from empty plate with fork. Dawn asks for something to eat. David ignores the request. Dawn asks for some sausage. David ignores this again and does not respond to a further request. Dawn offers some bread. David rests one piece on top of another. Dawn says that the doll wants some sausage. Dawn uses 'doll' voice. 45.28 David puts arm round doll and puts bread to her mouth, making eating movements with his own mouth. David bounces a plastic orange. Dawn blows on his neck to regain attention. David feels the doll which looks most like a baby. He offers this baby a sausage when Dawn asks, but does not put it to her mouth.

48.08 David looks at Dawn when she's using a baby voice saying 'Do you want a cake' Eye Contact? David touches the baby doll's head. David does not give the doll anything and moves away when she has been 'crying'.

49.49	Moves towards steps. David spots hoola hoops on the wall and makes excited noises.
50.54	David cuddles a different baby doll.
51.20	David tries to spin hoops on the floor. Glances up as Dawn raises him so that he can jump into the hoops.
52.31	David twice says 'Let's go outside'. He repeats Dawn's intonation. Brief conversation?? Repeats intonation again 'Stop'. David says 'More' and moves Dawn's hand to spin the hoop.
53.33	David looks at Dawn and at 53.47.
54.48	Dawn says "peep bo", and David repeats it. David emits 'peep bo' on request from Dawn
55.00	Looking towards Dawn as she catches him in the hoop several times. To 56.21
56.35	Dawn brings a ball. 57.20 Sitting on floor with ball between them. David throws ball away. Retrieves it and throws. Dawn catches. Dawn throws ball and David catches - but moving round, not waiting his turn. He crawls into the tunnel with ball.
59.12	At the table. Dawn is persuading David to try the sausage.
59.30	David takes the ball up the steps.
1.00.13	To table. Face puzzles. Dawn holds pieces of puzzle over her face in attempt to get David to look at her. He looks up the first time his name is called.
1.01.53	To steps
1.03.11	Table, drawing. Blocks into board, rectangles, circles. Shape posting. Not following Dawn's pointing. Won't point when Dawn asks - he gets angry. Pop-up toys, colour matching.

1.13.56 To steps. Dawn switches bird on. David listens and looks up.

1.15.16 Sitting on Dawn's lap. To steps.

1.16.23 Xylophone. David held by Dawn. Taps black keys when Dawn points - already within gaze.

1.19.56 Dawn brings puppets. David lays face on pig puppet on floor. David says something to dog puppet 'Hello dog'???

1.21.09 To steps. 1.21.57 Allows himself to be tickled. Makes noise which Dawn has repeated previously.

1.22.18 Dawn calls to David to look at the bird. He follows her pointing for a moment.

1.22.53 David to bean pit. Dawn brings puppet. David doesn't acknowledge its presence until 1.23.10. Showers it with beans.

Play in pit until 1.26.20. Dawn brings phone. David standing still. Not entering into game. Goes to table.

1.27.32 Fruit puzzle. Dawn asks for the orange and pretends to eat the fruit. Conversational interchange when Dawn asks for orange.

1.28.57 David takes Dawn's arm. To kitchen Pig puppet. David does not respond to Dawn asking for cup of tea, nor to her request for the 'baby' to have a cup of tea. Dawn takes David onto her lap and he does pretend to drink 1.30.53. David bends down and up again. Dawn snuggles and kisses him each time he leans back to her. No looking

1.32.17 To table. Dawn brings the cradle and a doll. David puts the doll on the mattress and covers it with the quilt.

1.33.33 To the steps of the slide.

1.34.05 David blows trumpets. Floor puzzles.

1.36.43 Kitchen.

1.37.45 Playing shop. David lays money on carpet. He climbs into the shopping trolley. Dawn attempts to play peep bo. No looking. He puts the money from the till in a pile. Wanders off. To mirror. 1.41.45 David goes out through the curtain and gets a ball.

1.42.35 Steps of slide

1.43.08 Dawn blows bubbles. David does not follow Dawn's pointing.

1.45.22. Does look at bubble pointed to 1.45.35 but this is delayed looking. Looks immediately 1.45.48. 1.46.14 - looks at bubbles again, and at 1.47.38.

1.47.56 Dawn switches on the mechanical bird which makes chirping noises. David goes to the steps. He does not follow Dawn's pointing but looks at her finger. Hoops. David playing on own 1.49.00 to 1.53.41 when assistant sits with him. Puzzle on floor.

1.55.09 With Betty. David says he wants to go up the steps. David wanders round. Goes to hoops. David lying on back on floor. Betty offers him a drink. Comment from David. To hoop, then spreads himself out on floor twiddling hands.

1.58.33 End of PBA.

Appendix VII Communication record sheet for Coding Active Sociability in Preschoolers with Autism (CASPA) - a separate sheet is used for each Episode of Social Engagement (ESE) and Control Period (CP).

Child Coding				
Child's Eye-to-Face Gaze	Present	Absent		
Form of child's communicative behaviour	Motoric Person/Object Manipulation	Body Language	Vocal	Verbal
Child Teasing	Present	Absent		
Adult Coding				
Discourse Role	Continuer	Redirecter	Silent Responsiveness	Ignore
Adult manifest positive affect	Present	Absent	Uncodable	
Extrinsic Reward	Present	Absent		
Patterning	Present	Absent		
Social Routine	Present	Absent		
Imitation	Present	Absent		
Self-repetition	Present	Absent		
Activity	Cognitive task	Pretend Play Equipment	Musical/ Motoric	Free play

For Episodes of Social Engagement, all relevant adult and child boxes are ticked. For Control Periods, only relevant adult boxes are ticked.

Appendix VIII Anova Results for Phase Diffferences in Musical Interaction Therapy under Three Conditions

Phase	Description
A	Baseline
B	Passive exposure to audio-recorded Musical Interaction Therapy sessions
BC	Pre-recorded Music Exposure + Music Therapist Social Support
CD	Music Therapist Social Support + Musical Interaction Therapy training for child's mother with the child
CE	Music Therapist Social Support + Musical Interaction Therapy
A'C	Music Therapist Social Support (+ return to baseline)

Play with and play without toys totals

ANOVA Table for Total Episodes of Social Engagement (with and without toys)

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	6698.545	1339.709	5.096	.0030
Residual	22	5784.133	262.915		

Model II estimate of between component variance: 234.815

Means Table for Total Episodes of Social Engagement (with and without toys)
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	22.200	16.932	7.572
B	3	50.333	10.066	5.812
BC	3	18.333	9.292	5.364
CD	7	35.000	17.029	6.437
CE	5	65.400	22.109	9.887
A'C	5	41.200	11.904	5.324

ANOVA Table for Total Vocalisations (with and without toys)

	DF	Sum of Squares	Mean Squ...	F-Value	P-Value
Phase	5	957.086	191.417	4.311	.0069
Residual	22	976.914	44.405		

Model II estimate of between component variance: 32.059

Means Table for Total Vocalisations (with and without toys)
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	9.200	6.648	2.973
B	3	19.000	6.557	3.786
BC	3	8.000	3.000	1.732
CD	7	14.429	7.807	2.951
CE	5	25.600	5.595	2.502
A'C	5	18.400	7.162	3.203

ANOVA Table for Smiling Totals (with and without toys)

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	451.381	90.276	3.406	.0198
Residual	22	583.048	26.502		

Model II estimate of between component variance: 13.907

Means Table for Smiling Totals (with and without toys)
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	4.000	3.742	1.673
B	3	15.333	2.309	1.333
BC	3	2.667	3.786	2.186
CD	7	10.571	6.528	2.467
CE	5	12.600	5.771	2.581
A'C	5	10.200	4.970	2.223

ANOVA Table for Imitation Totals (with and without toys)

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	13.981	2.796	1.354	.2796
Residual	22	45.448	2.066		

Model II estimate of between component variance: .159

Means Table for Imitation Totals (with and without toys)
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	1.000	1.732	.775
B	3	.667	.577	.333
BC	3	.333	.577	.333
CD	7	1.429	2.149	.812
CE	5	2.400	.894	.400
A'C	5	.400	.548	.245

Play with toys

ANOVA Table for Episodes of Social Engagement with toys

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	147.429	29.486	3.389	.0202
Residual	22	191.429	8.701		

Model II estimate of between component variance: 4.532

Means Table for Episodes of Social Engagement with toys
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	1.000	1.225	.548
B	3	1.000	1.732	1.000
BC	3	2.000	1.732	1.000
CD	7	2.714	2.289	.865
CE	5	7.200	5.891	2.634
A'C	5	.600	.894	.400

ANOVA Table for Vocalisations with toys

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	6.905	1.381	1.556	.2138
Residual	22	19.524	.887		

Model II estimate of between component variance: .108

Means Table for Vocalisations with toys
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	0.000	0.000	0
B	3	0.000	0.000	0.000
BC	3	.667	1.155	.667
CD	7	1.143	1.069	.404
CE	5	1.200	1.304	.583
A'C	5	.400	.894	.400

ANOVA Table for Smiling with toys

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	12.069	2.414	1.719	.1721
Residual	22	30.895	1.404		

Model II estimate of between component variance: .22

Means Table for Smiling with toys
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	0.000	0.000	0.000
B	3	.667	1.155	.667
BC	3	0.000	0.000	0.000
CD	7	.286	.756	.286
CE	5	1.800	2.490	1.114
A'C	5	0.000	0.000	0.000

ANOVA Table for Imitation with toys

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	.200	.040	.531	.7504
Residual	22	1.657	.075		

Model II estimate of between component variance: •

Means Table for Imitation with toys
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	0.000	0.000	0.000
B	3	0.000	0.000	0.000
BC	3	0.000	0.000	0.000
CD	7	.143	.378	.143
CE	5	.200	.447	.200
A'C	5	0.000	0.000	0.000

Play without toys

ANOVA Table for Episodes of Social Engagement without toys

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	5447.402	1089.480	4.709	.0045
Residual	22	5089.562	231.344		

Model II estimate of between component variance: 187.133

Means Table for Episodes of Social Engagement without toys
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	21.200	15.881	7.102
B	3	49.333	10.408	6.009
BC	3	16.333	10.408	6.009
CD	7	32.286	16.122	6.093
CE	5	58.200	19.703	8.811
A'C	5	40.600	11.567	5.173

ANOVA Table for Vocalisations without toys

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	896.333	179.267	4.596	.0051
Residual	22	858.095	39.004		

Model II estimate of between component variance: 30.587

Means Table for Vocalisations without toys
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	9.200	6.648	2.973
B	3	19.000	6.557	3.786
BC	3	7.333	3.215	1.856
CD	7	13.286	7.158	2.705
CE	5	24.400	4.393	1.965
A'C	5	18.000	6.892	3.082

ANOVA Table for Smiling without toys

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	376.317	75.263	2.987	.0331
Residual	22	554.362	25.198		

Model II estimate of between component variance: 10.918

Means Table for Smiling without toys
Effect: Phase

	Count	Mean	Std. D...	Std. Err.
A	5	4.000	3.742	1.673
B	3	14.667	3.055	1.764
BC	3	2.667	3.786	2.186
CD	7	10.286	6.130	2.317
CE	5	10.800	5.630	2.518
A'C	5	10.200	4.970	2.223

ANOVA Table for Imitation without toys

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Phase	5	14.524	2.905	1.766	.1617
Residual	22	36.190	1.645		

Model II estimate of between component variance: .275

Means Table for Imitation without toys
Effect: Phase

	Count	Mean	Std. Dev.	Std. Err.
A	5	1.000	1.732	.775
B	3	.667	.577	.333
BC	3	.333	.577	.333
CD	7	1.857	1.676	.634
CE	5	2.200	1.095	.490
A'C	5	.400	.548	.245

Appendix IX

(In press: Journal of Autism and Developmental Disorders)

Musical Interaction Therapy for Children with Autism:

An evaluative case study with two year follow-up.[1]

by

Dawn Wimpory

Lecturer, Department of Psychology,

University College of North Wales, Bangor and

Principal Clinical Psychologist, Gwynedd Health Authority

Paul Chadwick

(Research Assistant to the original study in UCNW)

Lecturer, School of Psychology, University of Birmingham and

Susan Nash

(Research Assistant to the follow-up study in UCNW)

Department of Psychology

University College of North Wales

Bangor

Gwynedd LL57 2DG

United Kingdom

Tel: (01248) 351151 ext. 2606 or 2211

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This case study explores the effects of a therapeutic approach on the social and symbolic development of a young autistic child. It adopts a social-interactionist perspective in recognising that autistic children have a core difficulty in achieving shared understanding with others (Hobson, 1994a; Mundy & Sigman, 1989b; Newson, E., 1984) .

Normal infants readily initiate social contact with others (Neel, Jenkins & Meadows, 1990). They frequently use eye-contact, accept and initiate turn-taking communicative exchanges and tease familiar others (Brazelton, Koslowski & Main, 1974; Trevarthen & Hubley, 1978; Reddy, 1991 respectively). Normal understanding of joint attention is thought to be rooted in early reciprocal infant/caregiver interactions (Ungerer, 1989) which are subject to mutual regulation (Cohn & Tronick, 1988).

Reciprocal interactions may be less well-coordinated between autistic infants and caregivers. Hobson conceptualises autism as "a failure to engage in patterned intersubjective co-ordination and exchange with other people" (Hobson, 1994b, p. 87). Newson proposes a "failure of the inbuilt 'social timing' mechanisms ... required for dialogue flow " in pre/verbal conversation (Newson, E., 1978; 1987, p. 36). This is conceptually similar to an impaired ability to shift attention in order to follow reciprocal social interactions, a consequence of neocerebellar maldevelopment suggested by Courchesne et al. (1994).

Children with autism fail to use the social and affective behaviour that typifies normal 7- to 9-month-olds (Lord, 1984). Their deficits include eye-contact and turn-taking (Mundy, Sigman, Ungerer & Sherman, 1986). Even when they initiate interaction this is typically brief (Lord & Magill, 1989). They also fail to show playful teasing

(Newson, 1984; Wimpory, 1994) and "coy, silly, or self-conscious behaviour" (cf. Ungerer, 1989, p.84). The study below is consistent with arguments that such early difficulties in social interaction may contribute to life-long problems with social cognition and symbolic play in autism (Fein, Pennington, Markowitz, Braverman & Waterhouse, 1986; Hobson, 1989; Newson, E., 1984; Wimpory, 1990).

Most established therapies fail to facilitate the social creativity and spontaneity of interaction shown by normally-developing children (Fein et al., 1986). This case study uses measures determined by the literature reviewed above, to assess development prior to, during and almost 2 years after completion of Musical Interaction Therapy (MIT, Christie, Newson, Newson & Prevezer, 1992; Christie & Wimpory, 1986, Wimpory, 1986). MIT uniquely synchronises live music to adult-child interactions. It aims to enable autistic children to anticipate their partner's actions on the basis of music synchronised to those actions.

MIT is based upon factors that facilitate normal preverbal interaction (Newson, J., 1974; Ratner & Bruner, 1978; Stern, 1977). It offers preverbal interaction as a means of fostering interpersonal contact, joint attention and understanding. MIT is compatible with social-interactive developmental models for facilitating sociability in autism (Dawson & Galpert, 1986; Prizant & Wetherby, 1989). It employs games of physical contact and social routines with imitation of child behaviour (Dawson & Adams, 1984; Sigman, Mundy, Sherman & Ungerer, 1986).

METHOD

Subject

The subject was 3 years 3 months when the study began. Her mother described her as "almost totally non-communicative". She met the DSM-III-R diagnostic criteria for autism (American Psychiatric Association, 1987) and manifested the clinical features of the sub-group with a history of Kanner's (1943) early childhood autism (Wing & Gould, 1979). An independent clinician scored her autism as severe (48) on The Childhood Autism Rating Scale (Schopler, Reichler & Renner, 1986). The child functioned at a learning-disabled level without verbal or gestural communication. Developmental Quotients on the Griffiths Mental Development Scales (Griffiths, 1984) prior to the study were: Locomotion and Eye-Hand Coordination, 75; Performance, 42 (cooperation lacking); Personal Social, 58; Hearing and Speech, 34.

The child is the third of four otherwise normal children. Their family has no history of autism or related disorders. Their mother, a trained foundry worker, was primary carer. By 4 months, the child could not tolerate the physical and social closeness of breastfeeding. Bottle-feeding was only tolerated when she was positioned facing away from her mother. Behaviour modification was successfully employed for obsessional behaviours six months prior to the study.

Treatment

A teaching film was used to introduce MIT (Wimpory, 1985). The musician and child's mother conducted twice-weekly 20-minute MIT sessions at home throughout the intervention phase. Sessions involved repetitive yet varied runs of mother-child games of swinging, patting, tickling, blowing, stroking, vocalising, action-rhymes and singing. The child's lead was followed and she was treated as though she were intentionally communicative. She was frequently imitated, thereby exploiting opportunities for turn-taking. Predictable yet varied formats comprised familiar lap games and spontaneously composed simple songs about her actions (eg. "we're walking around the room"). These aimed to give a focus for joint attention and enable the child's active participation.

The musician's role was similar to that of a pianist accompanying silent films. The music reflected and highlighted the mood, timing and meaning of the dyad's activities. For example, if the child happened to jump, the mother also jumped and, together with the musician, sang "jump, jump, jump away" with timing appropriate to the actions. As soon as the child stopped jumping, the music and singing paused in anticipation of her next move. The (harp) music became quieter if the child avoided her mother and more exciting if she approached her - gradually reaching a crescendo with the climax of dramatic games (such as "tickly under there!"). MIT was originally conceptualised in response to proposed social timing difficulties in autism (Newson, E., 1978). Support for the timing of interaction may enhance intrapersonal timing (for example, through action songs). It may also highlight maternal behaviour, making it more predictable and thereby facilitating, but not training, social participation. MIT's goal is to increase active social participation as indicated through social initiations and eye contact.

Design

Social and symbolic skills were videorecorded in semi-structured settings outside of MIT. Data were collected primarily from home visits: six over a 4-month baseline (A), seven over 7 months of MIT sessions

(B). Five months' unmonitored MIT followed. Follow-up measures were taken 20 months later (C). It is impossible to re-establish original contingencies post therapeutic changes to dyadic communication. The design is therefore ABC rather than ABA.

Measures

The child was already familiar with being videorecorded at home, with her mother in both playfully active and passive roles. Subsequent naturalistic home assessments comprised play with toys (mother passive and then active) and without toys (mother active). Measures were taken from videorecordings of up to 30 minutes on each occasion. Pretend play (v) produced insufficient data so was also applied to an hour's free-play assessment with the same independent clinician's support, at the end of phases A, B, and C. Increased use of eye-contact and other skills to initiate and maintain interactions were expected to follow onset of MIT. A more sophisticated positive indicator was for the child actively to influence interaction (iii). Teasing and pretend play were predicted to be possible consequences of experiences of active sociability (iv, v., Wimpory, 1994). Following the model of MIT described above, the measures are presented in order of expected changes over time (i.e. onset of skills measured by i would coincide with or precede those in measure ii).

(i) Time passed without social acknowledgement. This comprised the child either a) looking towards the (passive) mother with an accompanying vocalisation, facial or gestural movement or b) establishing physical contact.

(ii) Number of eye-contacts per minute

(iii) Frequency of child-initiated 'interactive involvement', comprised two or more consecutive reciprocal exchanges of turns comprising appropriate communicative actions or vocalisations (Burford, personal communication, 1989).

(iv) Frequency of child-initiated positive changes to interaction. These included teasing by the child (i.e. playful violation of shared expectations) but excluded taught behaviours (eg. hand-clapping).

(v) Presence/absence of spontaneous symbolic play, following Baron-Cohen's (1987) criteria.

Reliability

Interrater reliabilities were calculated using minute by minute section agreements. At least 20% (mean 32%) of each videorecorded condition was randomly selected for independent blind-rating. Kappas for each condition were at or above 0.92.

RESULTS

Baseline raw data were used to predict developmental trend lines on the basis of Kazdin's (1982) split middle line method. The significance of phase B raw data points falling above or below each projected line was determined using the binomial test. The use of this one-tailed test was influenced by directional hypotheses that the child would improve or remain stable with maturation. An alpha level of 0.01 was employed in response to Crosbie's (1987) observation that any positive autocorrelations in the data for this test may inflate the probability of a Type 1 error. Baseline data were typically stable and began at or near zero.

Smoothed graphs are employed to avoid the eye-balling bias of outliers (although they may apparently scale down the size of recorded changes, Morley & Adams, 1991). Points on Figures 1 and 2 therefore show the medians of three occasions of testing (i.e. running medians) rather than raw data. The results that follow confirm the predicted order (i , ii and iii preceded iv which preceded v).

Measure i: Social acknowledgement
(See Figure 1)

Prior to therapy, a mean of six minutes elapsed without the child acknowledging her mother (sometimes she gave no acknowledgement). Following onset of MIT, she always gave a social acknowledgement. This most often occurred within a minute in phase B (mean = 1.9) and after only 9 seconds at follow-up. All data points post MIT-onset fell below the developmental trend line ($p = 0.008$).

Insert Figure 1 here:

Measure ii: Eye-contact
(See Figure 1)

Baseline eye-contact was stable and low (mean = 0.3 per minute). Frequency of eye-contact during phase B averaged twice per minute (mean = 1.9) and increased steadily through phase B with 6 per minute at follow up. Post-baseline, one phase B data point fell on the developmental trend line, all others fell above it ($p = 0.008$).

Measure iii: Child-initiated 'interactive involvement'.
(See Figure 2)

The child initiated 20% of interactive involvement during baseline and 75% during phase B. Raw data shows a ten-fold increase in

her initiations from baseline to phase B (averaging from 0.2 to 2.3 per session). Two phase B data points fell on the developmental trend line. The remaining five fell above it ($p = 0.008$). Maternal initiations were at a relatively stable rate (four pre- and five post-onset of therapy). At follow-up the child generally maintained her attentiveness over the 10 minutes of play without toys. Interactive involvement was initiated by her mother at the start of recording (and once again after withdrawing to blow her nose). This positive change rendered Measure iii no longer appropriate at follow-up since it depended on any parent-child interaction comprising short bursts rather than being sustained.
Insert Figure 2 here:

Measure iv: Child's positive changes to interaction
(See Figure 2)

A developmental trend line was unavailable because the child made no positive changes to the prevailing patterns of interaction during baseline. However, she did so in most phase B assessments (starting at the third of seven). On average, she changed the prevailing pattern of interaction once per session in phase B (mean =1.3), doing so three times at follow-up. This measure recorded teasing by the child once in phase B's final assessment and once at follow-up. For example, during a familiar hand-clapping song, she made eye-contact and smiled whilst spontaneously lifting her jumper and clapping her stomach (Wimpory, 1990).

Measure v: Symbolic play

A developmental trend line was unavailable because pretend play only appeared in the final home assessment in phase B and at the follow-up clinic assessment. In the former, the child spontaneously 'fed' her toy fluffy penguin a biscuit three times. Appropriately-timed vocalisations and glances towards the toy indicated genuine involvement. At follow-up, she spontaneously 'washed' dolls' clothes in a dry wendy-house sink.

DISCUSSION

The overall pattern of recorded changes confirmed developmental predictions. Onset of MIT was followed by improvements in the child's use of social acknowledgement, eye-contact and initiations of interactive involvement. Creative child-contributions to interaction (including teasing) and symbolic play emerged later as predicted. Two year follow-up confirmed that these positive changes were sustained. The child no longer showed frequent social withdrawal.

Quantitative changes in social communication should be understood within the context of other more qualitatively-rich measures which reveal the emergence of more sophisticated behaviours atypical of autism. For example, eye-contact frequency is much less problematic than quality (Mirenda, Donnellan & Yoder, 1983), but it correlates significantly with communicative level in autistic preschoolers during free play with mothers (Dawson, Hill, Spencer, Galpert & Watson, 1990). Increase in eye-contact frequency reflected more appropriate usage in this study. The child initially looked "through people" (maternal quote pre MIT) but later combined eye-contact with other skills to convey teasing. Her playful attitude at follow-up appeared to enable sustained interaction in contrast to previous 'bursts'.

Alternative accounts of the child's positive developments following onset of therapy include un/related changes in her social world. For example, they may have been due to changes in the mother's behaviour in response to participation in her child's therapy. This was analysed with respect to the mother's initiations of interactive involvement. However, these were found to be stable in contrast to comparable measures of the child which showed improvement following onset of therapy.

The child began attending a one room unit for pre-school assessment eight months prior to the four-month stable baseline. Additional mainstream school afternoon sessions occurred with the same unit teacher following completion of MIT. It is possible that this influenced results, but unlikely given the baseline's stability.

Comparable measures of development in preschool autistic children without intervention are unavailable. Specialist education gives highly stable Personal-Social scores (Griffiths, 1984) over periods longer than the present study's phase A plus B in autistic preschoolers (Snow, Hertzig & Shapiro, 1987). However, it has influenced some social skills in older children (in mostly residential provision, Bartak & Rutter 1973). It is impossible to be certain how much development in this study was prompted by MIT, but stable baselines followed by changes around the time of intervention do suggest it had an effect. The timing of observed changes argues against familiarisation-effects since all occurred following the establishment of MIT rather than during the six baseline measures.

Important limitations of any child case studies include generalisation, effects of unpredictable events and maturation. There are also inherent difficulties in selecting appropriate statistical methods.

However, the findings have high reliability ratings and are consistent with previous accounts (Christie & Wimpory, 1986; Christie et al., 1992; Wimpory, 1985). MIT appeared to facilitate fundamental and lasting changes in the child's developmental pattern. Some of these changes may have been relevant for further, perhaps qualitatively different, developments such as teasing and symbolic play (Newson, 1984; Wimpory, 1994). In this respect, MIT may approach Frith's recommendation that a successful remedy "would have to be applied at the beginning of the chain of causal events that leads to autism" (1989, p. 184). The findings are compatible with the interaction-based theoretical perspectives of Hobson (1993, 1994a and b), Newson, E., (1984) and Fein et al. (1986). The latter suggest that minimum levels of reciprocity may be necessary as a basis for a shared meaning and communicative intent. "Social disinterest in autistic children may thus contribute to delays and failures in language and symbolic play" (Fein et al., 1986, p. 208).

A complementary study recorded the onset of protodeclarative and protoimperative pointing between phase B and follow-up (Carlile, 1990). Pointing and teasing games are identified as 'protosymbolic' (Bates, 1976; Trevarthen & Logotheti, 1987). MIT may facilitate social games, playfulness and more sophisticated developments by stressing certain aspects of interactive patterns. These include: calling the child's attention to the mother, making interaction more predictable and controllable through imitation and ritualised games (Dawson & Adams, 1984; Dawson & Galpert, 1986; Prizant & Wetherby, 1989), highlighting the feeling aspect (thereby facilitating "affective attunement", Stern, Hofer, Haft, & Dore, 1985) and/or supporting those aspects of timing that may underlie interactive reciprocity.

This study cannot offer confirmation of any autistic deficit in social timing (Newson, E., 1978). Only corroborative evidence is available for this; autistic children have inappropriately timed speech (Feldstein, Konstantareas, Oxman & Webster, 1982) and their body-motion patterns apparently differ from normal children's immediate synchrony with sound (Condon, 1979). However, this study offers preliminary evidence that MIT facilitates playful joint action formats which generalise beyond therapy. The child studied departed from the usual autistic pattern by developing social communication and symbolic play. Further studies employ multiple baselines of varying periods and/or staggered cumulative introduction of MIT components. Current observations are consistent with the theoretical framework described above.

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Legends

Page 6. Fig. 1: Play with Toys: Time passed without social acknowledgement and frequency of eye-contact.

Page 7. Fig. 2: Play without Toys: Frequencies of changes to patterns of interaction and of initiations of interactive involvement.

Fig. 1: Play with toys: Time passed without social acknowledgement and frequency of eye-contact

Points represent 3 occasions of testing

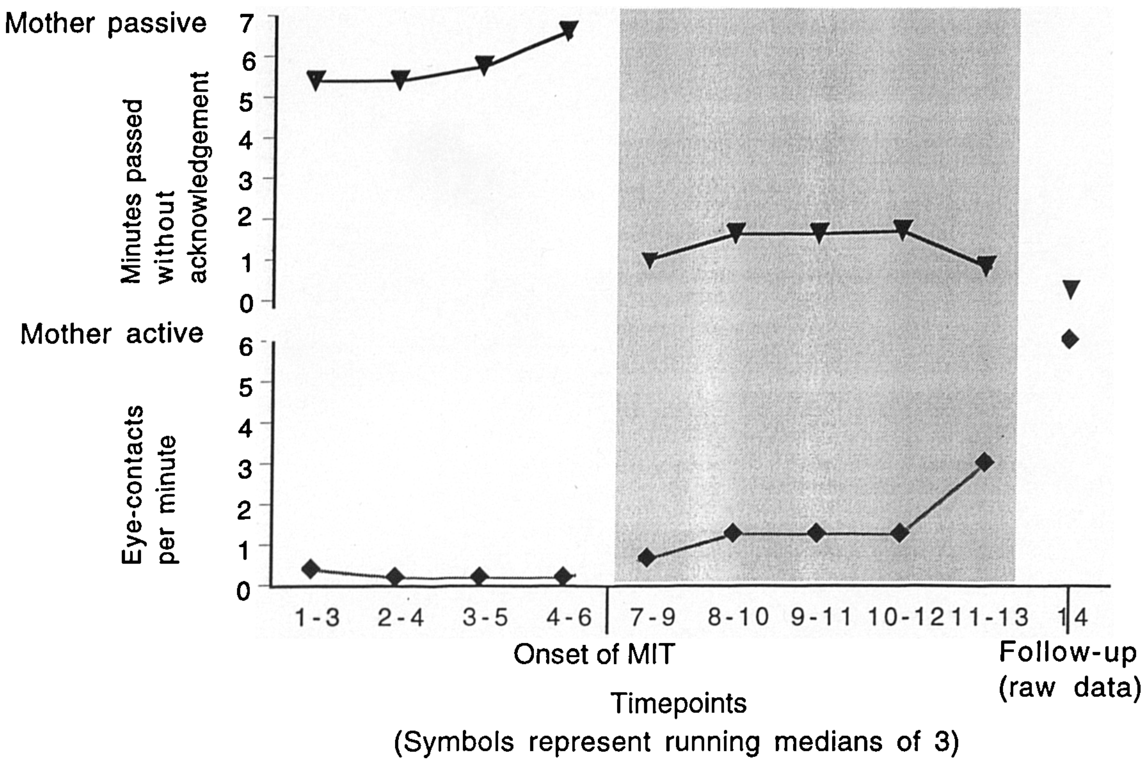

Fig. 2: Play without toys: Frequencies of changes to patterns of interaction and initiations of interactive involvement

Points represent 3 occasions of testing