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SUMMARY

Communication problems form one of the key diagnostic criteria for autism, but there is a wide variety of manifestations. The theory that autistic individuals are unable to represent mental states can shed light on both the nature and range of communication impairments. This theory predicts that the specific communication deficit lies in the use of language to affect other minds. Language is not special in this respect, and is important only in so far as it may be used to give evidence of a speaker's thoughts and intentions. Thus, in autism, language level would be expected to relate strongly to performance on standard tests of theory of mind. Normal language acquisition appears to build upon the ability to recognize and orient towards ostensive behaviour. For this reason, it may not be necessary to postulate additional language impairments in order to explain the almost universal prevalence of language delay in children with autism. Autism, then, provides a model for studying the important distinction between language and communication, and demonstrates the vital part which mind-reading plays in normal human verbal and non-verbal interaction.

1. INTRODUCTION

Language and communication are separate and logically distinct things. Our focus in the present paper is primarily on communication and the cognitive capacities which underlie normal communicative functioning. Other contributors have discussed the development of language and its neurological and cognitive substrates. While we will not discuss the formal and structural aspects of language, we will have some remarks to make about the complicated relationships between language and communication at a number of levels.

2. LANGUAGE AND COMMUNICATION

We follow Sperber & Wilson (1986) in thinking of language and communication as distinct. A language is a grammar-governed representational system. By contrast, communication is a process in which one person alters the physical environment of another in such a way that the other constructs internal representations similar to those in the head of the first. Clearly, this process of altering internal states is independent from the means used. While we commonly use words in order to communicate, Sperber & Wilson claim that words and sentences are just one type of tool which can be employed. Communication is to do with conveying our intended meanings, and we can convey our intentions in any number of different ways. For example, on collecting me from the hospital you ask how I'm feeling. I can say 'Much better, thanks', or, I can do a back-flip. These two replies are roughly equivalent because they both serve to demonstrate my intention to let you know I'm OK. Clearly, communication can take place without a common language: we can use gestures, pantomime, gaze, and so forth to let another person 'read our mind'. The precedence of intended thought over spoken word is evident in our ability to understand non-literal language, indirect requests, and other 'loose usage'.

It seems that young children too are more interested in intentions than words. In fact, it may be this bias which leads preschoolers to make errors in message-evaluation tasks, apparently believing that they know the speaker's intended meaning even when the surface form of the utterance is in fact uninformative (Olson & Hildyard 1983). It appears to be particularly difficult for young children to pay attention to the literal form of a message when the intention is clear (e.g. Beal & Flavell 1984). This 'blindness' to literal meaning should, perhaps, be seen not as an immaturity, but as a normal feature of the precedence of communication over language. After all, this precedence remains in adults too; think of the case of asking 'Would you mind telling me what time you open?', to which a common answer begins, 'Yes, of course ...'.

What underlies the extraordinary flexibility of communication? We can find out more by thinking about the possible dissociations between language and communication: communication is possible without language, but communication can also fail in the

presence of apparently good language skills. This brings us to the case of autism.

3. AUTISTIC COMMUNICATION

Autism is a profound developmental disorder, with biological origin, which affects around one in a thousand children born, and lasts throughout the life-time (Gillberg & Coleman 1992). Recent years have brought the recognition that autism can have a range of manifestations, from mild to severe, with or without additional handicaps and mental retardation (Wing & Gould 1979). What is common, and definitional, across this spectrum of disorders is a constellation of impairments in socialization, communication and imagination, with a restricted repertoire of interests and activities (Rutter & Schopler 1987; 1992).

In current practice (DSM-III-R, APA 1987; ICD-10, WHO 1992) impairments in verbal and non-verbal communication form an important part of the diagnostic criteria for autism. What do we know about autistic communication? Perhaps the most striking finding is the great variety of problems seen (Schopler & Mesibov 1985). Consider the clinical picture presented by three individuals with autism. At one extreme is the child with no language and, strikingly, no compensating gesture or sign-language. Such a child may be aloof in Wing's characterization (Wing & Attwood 1987) and, because of his/her failure to orient to speech, deafness may be suspected (though subsequently ruled out). The child may be mute, but need not be silent: odd vocalizations, which do not resemble speech sounds or babbling, may be voiced, and can sometimes be decoded by parents as signals of the child's mood or needs. These cries, however, are idiosyncratic: they are not understood by parents of other autistic children (Ricks & Wing 1976). The child may show evidence of good auditory memory: for example singing a complex melody heard only once. The child may lack gestures, but need not be motionless: odd stereotypical movements (hand flapping, toe walking) vie with surprisingly agile purposeful actions (spinning coins, climbing roofs).

A second type of child, particularly well described by Kanner (1943), has some language, while still showing a striking inability to communicate. Words or phrases are used in an idiosyncratic way, often repeating a heard phrase, for example 'Dinosaurs don't cry' (Kanner 1943). Echolalia, either immediate or delayed, may serve in some cases a self-stimulatory function, and in others may be used in a code-like way: for example, after receiving a gift, saying 'You say 'Thank you'!'. Well known is the example of saying 'Do you want a biscuit?' to mean 'I want a biscuit'. Such wholesale parroting is probably the source of much of the pronoun reversal ('you' for 'I'). It is remarkable that in these echoed phrases the speaker's original intonation is often well preserved, in stark contrast to the lack of normal modulation in spontaneous speech (Fay & Schuler 1980). The same child may use single words in a simple, associative

way, so that 'Apple' always means 'Give me apple'. The single words acquired are often esoteric (e.g. 'Beethoven') and not like the first words of a normally-developing preschooler. Neologisms (e.g. 'bawcet' for bossy; Volden & Lord 1991), or familiar words with special meanings ('yes' meaning 'carry me on your shoulders'; Kanner 1943), also reflect the very concrete association of word and object. The child may memorize complex verbal material, which commonly has little meaning for him/her (e.g. an encyclopaedia index page, a French lullaby). It is also common for such a child to start reading words, even apparently 'teaching himself to read'.

The third type of child may have very advanced, adult-like language skills. Several such children were described by Asperger (1944, trans. Frith 1991) as sounding 'like little professors'. Vocabulary in particular may be extensive, and syntax is more formally correct than is typical of everyday speech. However, content and use of language are often bizarre (Happé 1991). It is, typically, impossible to hold a conversation with such a child (Bruner & Feldman 1993); either yes/no answers are given, or the topic is hijacked to the child's own special interest: at which point a monologue on train times, pylons, or beetles ensues. Such a child usually shows over-literal understanding of communication: for example, asking earnestly for glue when told 'stick your coat over there'. No longer aloof, this child may seek social contact, even with strangers, for example with repetitive questioning. These questions often exasperate, and defy answer; for example, 'What would you do if a tall man with yellow hair came and swung you up onto his shoulders?' (Tantam 1991 p.160). Voice, prosody, intonation and timing all tend to be odd: monotone, sing-song, too soft, too fast, or stressing unimportant parts of the utterance (Paul 1987; Fine *et al.* 1991). Odd, wooden or overblown gestures may accompany speech, typically lacking coordination with verbal content. The eye gaze here may be staring, rather than averted as in the aloof child.

These three children may, in fact, be one and the same child at different ages (Wing 1981). The three types may also occur in different members of the same family (Burgoine & Wing 1983; Bowman 1988; Gillberg 1991). There is good reason, then, to think of the three pictures as different manifestations of a similar underlying handicap. What is that handicap?

4. THE THEORY-OF-MIND HYPOTHESIS

One recent and influential theory has proposed that children and adults with autism lack a theory of mind: that is, the ability to attribute independent mental states to self and others in order to explain and predict behaviour (Baron-Cohen *et al.* 1985). This hypothesis has been successful in predicting impairments in the ability to understand false beliefs, deception, ignorance and knowledge (work reviewed in Baron-Cohen *et al.* 1993; Happé 1994a). It also provides a good explanation for the observed lack of pretend play (Leslie 1987; 1988), social understanding and empathy (Frith *et al.* 1991). It fits the observed

range of manifestations: a child without theory of mind may be aloof, passive or socially active in odd ways. The theory makes sense of otherwise puzzling behavioural observations; for instance, children with autism, when playing a simple game, show pleasure at winning, but do not coordinate their smiling with eye contact to communicate their glee to others (Kasari *et al.* 1993).

The theory of mind deficit explanation of autism has, in particular, allowed the making of fine cuts between apparently similar surface behaviours which do and do not require the attribution of mental states ('mentalizing'): predicting that autistic subjects will be impaired in certain but not all areas of socialization, play and language (Happé & Frith 1994). Thus the theory-of-mind account allows for the existence of preserved skills in certain areas, such as spelling, reading, music and drawing.

Experimental work prompted by the theory-of-mind hypothesis has shown that autistic subjects are most clearly impaired where the listener's thoughts and feelings must be taken into account (Frith 1989*a*,*b*; Tager-Flusberg 1993): (i) they can comprehend and use pointing to direct behaviour, but not to direct and share attention (Baron-Cohen 1989*a*); (ii) they can use gestures to modulate behaviour but not to change thoughts and feelings (Attwood *et al.* 1988); (iii) they can supply information but do not take account of listeners' needs in supplying the relevant missing facts (Perner *et al.* 1989); (iv) they can conceal objects but fail to conceal informative clues in a penny-hiding game (Baron-Cohen 1992); (v) they often score well on the Information subtest but badly on the Comprehension subtest of the Wechsler scales (Lockyer & Rutter 1970); (vi) they spontaneously use terms for emotions and desires but not for cognitive states (Tager-Flusberg 1993); (vii) on vocabulary tests, lacunae are shown for words to do with feelings and mental states (Hobson & Lee 1989). These 'fine cuts' are shown only in individuals with autism.

Even those autistic individuals who do pass simple first-order theory-of-mind tasks seem to show impairments on higher-order theory-of-mind tasks, failing to attribute the correct mental states to speakers in short scenarios (Happé 1994*b*). Rather than disproving the mentalizing hypothesis, the existence of these individuals has important implications for refining this hypothesis. Level of theory of mind seems to relate closely to the ability to understand similes, metaphors, and irony. Happé (1993) showed that, in line with predictions from relevance theory, autistic subjects who failed theory-of-mind tasks were unable to understand metaphors, although they could make sense of the (literally-interpretable) similes. Subjects who passed first-order false-belief tasks succeeded on metaphor tasks, but only those who passed second-order theory-of-mind tasks (Perner & Wimmer 1985) could understand cases of irony. Irony, according to Sperber & Wilson (1981) involves quoting an attributed thought and expressing one's own (mocking) attitude to that thought. Thus, while according to Sperber & Wilson (1986) all utterances are understood by normal speakers as interpretations of the speaker's thought, ironic utterances are understood as expressions of a thought about a thought.

5. DEVELOPMENTAL EFFECTS

These experimental studies, like most to date, explore the moment-to-moment effects of theory of mind, and its impairment, on communication. That is, studies of protodeclarative pointing, gesture and so on, tap the individual's ability to understand the audience's mental state, and gear their communication to affect that state. Lack of ability to attribute mental states in moment-to-moment processing time, will thwart communicative interaction in both production and comprehension. Difficulties in understanding indirect requests, hints and so forth (in short, poor pragmatics) (Baltaxe 1977; Paul & Cohen 1985), may be explained as immediate effects of a lack of mentalizing. Such direct effects may be rather different from the long-term, or developmental effects of this cognitive deficit. For example, one can imagine an adult car-crash survivor with damage to the neurological system underlying mentalizing, who can no longer imagine the mental states of others on-line, but who has, nonetheless, all the accumulated routines for insightful social and communicative behaviour intact. In fact, it has been suggested that certain forms of schizophrenia might be characterized by a late and sudden loss of previously-intact mentalizing ability (Frith & Frith 1992).

What might be the developmental effects on communication of deficits in mentalizing from birth? Through the dynamic process of development, any innate but specific deficit will have consequences, both good (compensatory) and bad (secondary deficiencies). From the enormously complex interaction of factors, we might pick out a few probable lines of effect. In particular, what functions does mentalizing serve in the normal development of language? While language acquisition could not even begin without the existence of innate, dedicated cognitive systems, it will be facilitated by other processes of development, including social development. Language acquisition appears to make great use of the young child's tendency to orient to ostensive behaviour and to follow and share others' attention. Recent work (Tomasello 1988, 1992; Baldwin 1993, 1994) has highlighted the role of joint attention in lexical acquisition. Baldwin (1994) has asked how it is that mapping errors are avoided in normal lexical acquisition. For example, what happens when infants hear a new word (spoken by an adult talking on the telephone, perhaps) while they just happen to be focused on an incorrect novel object? What happens when the baby's attention is momentarily distracted by another object, while the parent is labelling something on which the baby had previously been focused? Baldwin's work has shown that such unintended object-word pairings do not, typically, lead to incorrect lexical acquisition, precisely because infants appear to be sensitive to the speaker's focus of

attention. In such cases, children of 18 months typically look to the adult and follow his/her line of regard. Without this sensitivity to speaker's focus of attention, it is hard to see how ostention could serve as the useful aid to word learning which it, in fact, seems to be.

Autistic children do not appear to orient to ostention, or share attention (Mundy *et al.* 1993), and this may be one of the earliest indicators of the disorder (Baron-Cohen *et al.* 1992). It is fascinating to speculate, then, on the source of the idiosyncratic word use which is reported in many subjects with autism (Volden & Lord 1991). For example, Kanner (1943) reports the case of Paul, who: 'at the sight of a saucepan would invariably exclaim 'Peter eater' … the mother remembered that this particular association had begun when he was two years old and she happened to drop a saucepan while reciting to him the nursery rhyme about 'Peter Peter pumpkin eater'' (Kanner 1943, reprinted in Kanner 1973, p.15). This appears to be an example of a mapping error, of precisely the type which does not occur in normal language learning.

We propose, then, that the developmental effects of theory-of-mind impairment may account for the autistic child's problems in acquiring language. Perhaps a quarter of such children remain mute, and almost without exception language delays are reported (Frith 1989*a*). Severe mental handicap may explain some cases of muteness, and it is possible that additional, superimposed language problems may occur in some children, just as a few autistic children have additional sensory (e.g. deafness) or motor (e.g. stuttering) handicaps. However, it seems plausible that a lack of mentalizing, which would prevent normal communication, might have as one consequence a failure to latch on to and use human language. That is to say, communication may be necessary for normal language development (and perhaps for the evolution of natural languages; Sperber 1990). The autistic child's failure to orient preferentially to speech (Klin 1991), to share attention (Loveland & Landry 1986; Mundy *et al.* 1993), and to use eye-gaze to disambiguate an adult's intention (Phillips *et al.* 1992) would be a particularly damaging combination of factors for the acquisition of words.

At the other extreme, a particularly advantageous start for language acquisition might be given by a marked preference for orientation to faces, eyes and speech: as in Williams Syndrome, where language skills (and communication) are far in advance of general mental ability (Udwin & Yule 1991; Karmiloff-Smith 1993). In children with Down's Syndrome, and other non-autistic mentally-handicapped children, attention-sharing behaviours appear to be normal for mental age (Sigman *et al.* 1986). There is considerable evidence that lexical knowledge in children with Down's Syndrome is spared relative to structural linguistic knowledge (Fowler 1990). Studies also suggest that, in contrast with autism, functional communicative skills may exceed verbal abilities in Down's Syndrome (Leuder *et al.* 1981). Within the language domain, pragmatic

skills appear to be the area least delayed (Beeghly *et al.* 1990). Children with Down's Syndrome formed the original control group for the Baron-Cohen *et al.* (1985) study of theory of mind, in which they performed as well as young normal controls on the Sally-Ann false belief task.

We can assume that the underlying cognitive substrates for language (i.e. phonology and syntax; Tager-Flusberg 1981) are, as a rule, intact in subjects with autism. Therefore, alternative routes to word learning can be successful, if slow. Thus, some children with autism acquire a limited vocabulary used to achieve concrete ends, and others acquire extensive sight vocabularies of words not fully understood. Written language vocabulary, interestingly, is not normally acquired through ostention: and this may be why autistic children do not seem to suffer any delay in learning to read and spell. Reading is sometimes reported to precede speech (Arnold 1960; Aram *et al.* 1983), and reading accuracy exceeds comprehension (Frith & Snowling 1983). Hyperlexia is particularly common in children with autism (Goldberg 1987; Patti & Lupinetti 1993). It is intriguing to note that, in contrast, many individuals with Williams Syndrome, though hyper-verbal, do not learn to read (Karmiloff-Smith 1992).

The phonological and syntactic skills of the verbal autistic child which are demonstrated in reading (Snowling & Frith 1986), are also manifest in the delight often taken in puns and word games (Asperger 1944; Van Bourgondien & Mesibov 1987). One able autistic boy composed a whole 'joke' book, starting with an over-heard joke, 'Where does a sick wasp go? A Waspital'; followed by 'Where does a sick Alex go? An Alexpital' and so on, repetitively, through a long list of names.

So, while it used to be thought that autism was at heart a language disorder, a problem of symbolic abstract thought, we suggest that language may be delayed and peculiar due to a lack of insight into minds, and the resulting inability to enter into normal ostensive-inferential communication. This is a long-range developmental effect. In theory, then, the effects of a deficit in mentalizing ability early in development might remain (just like the effects of, for example, early visual deprivation), even if theory of mind was gained at some later stage and could then be used moment-to-moment.

6. RELATIONSHIP OF LANGUAGE TO THEORY OF MIND

To date, there is no evidence against the idea that all subjects with autism suffer at least a delay in developing the ability to represent mental states (Baron-Cohen 1989*b*). However, in some subjects, this ability does seem to emerge eventually, typically in adolescence. Bowler (1992), Ozonoff *et al.* (1991) and Happé (1993, 1994*b*) have all reported results from able autistic subjects who pass first- and even second-order false-belief tasks. That is, subjects can not only attribute a (mistaken) belief to a story character (as can normally-developing four-year-olds;

Wimmer & Perner 1983), they can also understand that one person may have a (mistaken) belief about what another person thinks (which normal seven-year-olds appreciate; Perner & Wimmer 1985). These autistic (or Asperger's Syndrome) subjects also show more insightful communication and socialization in their everyday lives (Frith *et al.* 1994).

Autistic subjects who pass theory-of-mind tasks also tend to be more verbally able than those who fail (on tests such as picture vocabulary, and the Wechsler verbal scales; Happé 1994*c*). Interestingly, autistic subjects appear to require a great deal more language competence in order to pass theory-of-mind tasks than do either normal or mentally-handicapped individuals. Happé (1994*c*) found that, in a sample of 70 autistic subjects, those who passed first-order tasks had a verbal mental age of at least 5 years 6 months. By contrast, from a group of 70 young normal children, subjects began to pass theory-of-mind tasks from the verbal mental age of 2 years 10 months. One interpretation of this data is that language plays a different role in theory-of-mind test performance for autistic and control subjects. Correlations from the study support this idea: in autistic subjects, verbal mental age and theory-of-mind performance correlated at 0.55 ($p < 0.01$), while in a group of 34 mentally-handicapped controls the correlation (0.33) was not significant.

It is not, then, that autistic subjects who fail theory-of-mind tests do so due to lack of verbal comprehension (after all they pass control memory and reality questions). Rather, in order to pass theory-of-mind tests, autistic subjects may be relying on advanced language skills. Could it be that language somehow allows the autistic child to circumvent his/her theory-of-mind impairment: that language can become an artificial route to the representation of mental states? It is conceivable that 'thinking aloud' allows the person with autism to gain some insight into his/her own mental states. There may, of course, be several different routes to late-acquired theory of mind; for instance, some autistic subjects may use visual imagery, or the concept of pictures as representations, in order to gain some understanding of minds (Hurlburt *et al.* 1994).

7. ASPERGER'S SYNDROME

Exploration of the links between better language and better social understanding (theory of mind) brings us naturally to focus on Asperger's Syndrome. While this new label is still somewhat controversial and vague in its essential diagnostic criteria, what is generally agreed is that this term applies to those individuals in the autistic spectrum who have rather better social and communication skills. Recent research has suggested that subjects diagnosed as having Asperger's Syndrome do not show the striking failure on theory-of-mind tasks typical of other autistic subjects (Ozonoff *et al.* 1991; Bowler 1992). Subjects in these studies are typically adults, with near-normal IQ. Their good performance on laboratory tests suggests that theory of mind is working for them at that

moment, at least in these simple structured tasks. These subjects are still impaired, however, and show the characteristic restricted interests and odd stereotypies (Frith & Happé 1994). It remains to be seen whether the mentalizing mechanism was functioning earlier in development. It is possible that these subjects have deficits due to early impairments in theory of mind which have irreversibly affected the developmental course.

One way to find out whether subjects with Asperger's Syndrome have early deficits in theory of mind, is by exploring their acquisition of language. Language development, and specifically lexical acquisition, we have argued, is a barometer of early sensitivity to mental states (orientation to ostention, recognition of attentional focus, etc). Therefore, a strong prediction would be that children with deficits in these early theory-of-mind functions will have abnormal word learning. By contrast, a child with absolutely normal acquisition of words through ostention (pointing and naming), and an absence of mapping errors, would have to be credited with a normally-functioning theory-of-mind mechanism. Interestingly, among children with autistic disorders, the development of some communicative speech by the age of five years is a marker for a good prognosis (Rutter *et al.* 1967) and, apart from IQ, language features appear to provide the best predictors of psycho-social outcome (Lotter 1978).

What evidence is there of normal language acquisition in Asperger's Syndrome? Asperger's prototypical case Fritz V. was said to have 'learnt to talk very early, and spoke his first words at 10 months, long before he could walk. He quickly learnt to express himself in sentences, and soon talked 'like an adult'' (Asperger 1944, trans. Frith 1991, p. 39). It is perhaps this type of report which has led to the idea that Asperger's Syndrome cases do not have language delays (although in fact two of Asperger's four reported cases did show some delay).

The proposed new diagnostic criteria for Asperger's Syndrome in ICD-10, state that the subject must show 'a lack of any clinically-significant general delay in language ... single words should have developed by two years or earlier, and communicative phrases by three ...' (WHO 1992). However, what our argument predicts is not necessarily a problem in acquiring names for things, or stringing these together into grammatically-correct sentences; rather, we predict that words acquired will have not shared but idiosyncratic meanings. To date, there is little evidence to allow us to speculate on the early theory of mind status of the child with Asperger's Syndrome. Detailed questioning about developmental history should be a possible route to such information, but the presence of echolalia may mask the true extent of a child's lexical problems.

8. CONCLUSIONS

The case of autism reminds us vividly that language and communication are distinct domains. Communication appears to be intimately intertwined

with our human ability to attribute mental states to ourselves and others. In contrast, language (syntax and phonology) is a self-contained module that can be intact even though the ability to think about thoughts is impaired. Autism reminds us, also, that development is a complex process of interaction. Even a child with intact language abilities may have problems acquiring the agreed names for things in the normal socially-mediated manner. On the one hand, normal language acquisition appears to rely importantly upon the existence of communication, on the other, communication (including to the self) is well-served by an external, flexible, abstractly-mapped code such as speech.

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