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Severe Impairments of Social Interaction and Associated Abnormalities in Children: Epidemiology and Classification

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The prevalence, in children aged under 15, of severe impairments of social interaction, language abnormalities, and repetitive stereotyped behaviors was investigated in an area of London. A "socially impaired" group (more than half of whom were severely retarded) and a comparison group of "sociable severely mentally retarded" children were identified. Mutism or echolalia, and repetitive stereotyped behaviors were found in almost all the socially impaired children, but to a less marked extent in a minority of the sociable severely retarded. Certain organic conditions were found more often in the socially impaired group. A subgroup with a history of Kanner's early childhood autism could be identified reliably but shared many abnormalities with other socially impaired children. The relationships between mental retardation, typical autism, and other conditions involving social impairment were discussed, and a system of classification based on quality of social interaction was considered.

INTRODUCTION

Children with severe impairments of social interaction, abnormalities of language development involving both speech and gesture, and a behavioral repertoire consisting mainly of repetitive, stereotyped activities beginning from birth or within the first few years of life have been described by a number of writers. This pattern of impairments and behavior problems has been variously (and unfortunately) termed *childhood psychosis, childhood autism,* or *childhood schizophrenia.*

Some workers have attempted to identify subgroups among these children, suggesting that certain varieties of these behaviors cluster together

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often enough to form specific syndromes. Examples are the "dementia precocissima" and "dementia precosissima catatonica" of De Sanctis (1906, 1908), Earl's (1934) "primitive catatonic psychosis of idiocy," the "dementia" occurring between 3 and 5 years of age described by both Heller and Weygandt (see Hulse, 1954), Mahler's (1952) "symbiotic psychosis," the "autistic psychopathy" of Asperger (1944; Van Krevelen, 1971), and Kanner's (1943) "early infantile autism." These "syndromes," although thought by their proponents to be specific, have many features in common. Individual children may show mixtures of items from more than one syndrome, making diagnosis difficult. When discussing this subject, Anthony (1958a) wrote, "The cult of names added chaos to an already confused situation, since there did not seem to be a sufficiency of symptoms to share out among the various prospectors, without a good deal of overlap."

Some attempts have been made to subclassify the whole range of the clinical phenomenon being described here, rather than to select particular subgroups and ignore the rest. Anthony (1958a,b, 1962), Kolvin (1971), and Rutter (1972) divided on age of onset, suggesting that if the abnormal behavior began before age 3, the cause, course, and prognosis were different from those associated with onset between 3 and 5 years. They also made the important point that the conditions being discussed here should not be classified as forms of schizophrenia. An illness resembling adult schizophrenia can be seen rarely in childhood, but never before age 5 years.

Despite this work, classification remains in a most unsatisfactory state. There are problems not only in subdividing within the group as a whole but in relating it to other handicapping conditions of childhood. In particular, abnormalities of social interaction and language development, and stereotyped behavior can be found in some children administratively categorized as mentally retarded (Haracopos & Kelstrup, 1978), especially those with intelligence quotients below 50 (defined in the United Kingdom as in the severely retarded range). Conversely, the majority of children who show the abnormalities being considered perform as mildly or severely mentally retarded even on tests not involving language (DeMyer, 1976; Kolvin, Humphrey, & McNay, 1971; Lotter, 1967; Rutter & Lockyer, 1967; Rutter, Shaffer, & Sturge, 1975; Wing, Yeates, Brierley, & Gould, 1976), though there are some with normal intelligence on nonverbal or even verbal tests (Bartak & Rutter, 1976).

In order to investigate these problems of classification, the present authors decided to carry out an epidemiological survey, within a defined geographical area, of all children in a specified age range who showed one or more of the impairments and abnormal behaviors discussed above, whether or not there were associated organic conditions or additional handicaps, such as deafness or blindness, and regardless of level of intelligence or age of onset.

The aims of the study were to find (a) the prevalence and distribution of the three types of abnormalities, and whether they tended to occur together, (b) how the clinical pictures of which they formed a part could be subgrouped, and (c) how they were related to mental retardation.

No prior assumptions were made as to the specificity of any of the previously proposed syndromes that include these abnormalities.

METHOD

Selection of Subjects

The subjects were selected from children aged under 15 years on the chosen census day, December 31, 1970, who had parents living in the former southeast London borough of Camberwell. This mainly working-class area had a total population of 155,000, of whom 35,000 were under 15 years old.

All children, whether at home or in residential care, who were known to the local health, education, or social services for reasons of physical or mental handicap or behavior disturbance were identified through the Camberwell cumulative psychiatric and mental retardation register (Wing & Hailey, 1972) and the records kept by the local services. These 914 children were then screened, as described in Wing et al. (1976) and 132 of them were selected on one or both of the following criteria.

The first criterion was the presence of at least one of the following items, regardless of level of intelligence: (a) absence or impairment of social interaction, especially with peers; (b) absence or impairment of development of verbal and nonverbal language; (c) repetitive, stereotyped activities of any kind. (These are defined below, under "Behavioral Variables.")

The second criterion was a level of function on formal tests or on educational achievement in the severely retarded range, regardless of the pattern of behavior and impairments. The only exceptions were nonmobile children, 28 in all, who were excluded because their inability to walk unaided limited the possibility of their showing abnormal behavior.

At the time of assessment, 108 of the 132 children selected were known to the preschool or school-age services for children with severe retardation, 10 were in schools for children with mild educational subnormality and 6 in schools or classes for autistic children, 3 were attending schools for the deaf or partially hearing, 2 were in units for deaf/blind children, 1 was in a school for the partially sighted, 1 was at a school for delicate children, and 1 was in a day nursery. None was in a school for normal children, though 1 autistic child was later transferred to such a school.

The final step in the study was the intensive investigation of the children identified from the preliminary screening procedures. Their patterns of handicaps, behavior, and skills were examined in detail. Psychological and medical data were collected in order to provide independent criteria for evaluating possible methods of clinical classification.

At the time of the detailed interviews with parents and teachers, the ages of the children ranged from 2 years 2 months to 18 years. The investigators have remained in touch with the children since the interviews and tests were completed.

Examination of the Children

Behavioral Variables

Professional workers such as teachers, nurses, or child care staff, and, for children who lived at home, a parent (usually the mother) were interviewed by one of the present authors, using the MRC Children's Handicaps, Behaviour and Skills (HBS) structured schedule (Wing & Gould, 1978). The authors also observed the children in the classroom, nursery, or residential unit, or at home, and made their own ratings on selected parts of the same schedule.

The HBS schedule is used to structure an interview in order systematically to obtain clinical information concerning a child's level of development in different areas of function, practical or schoolwork skills required, and abnormalities of behavior present during the preceding month.

When there was disagreement between raters, the authors repeated their observations until they could establish the reasons for the variations, and make the final judgment of the score to be used in the analysis of results. If no reason for the discrepancy could be found—a rare occurrence—the authors' rating was used.

Although the whole schedule was completed for each child and the results were available for the classification exercise, only certain aspects relevant to the aims of the paper will be reported on in detail. The problems were rated as present if they were a marked feature of the child's behavior.

Quality of Social Interaction. Behavior rated in this section was grouped under 4 headings:

1. "Social aloofness" covered very severe impairment of social interaction. Some of the children with this behavior were aloof and indifferent in all situations. Others would make approaches to obtain things they wanted, but returned to aloofness once the need was gratified. Some liked simple

physical contact with adults, such as cuddling, tickling, or games of chasing, but had no interest in the purely social aspects of the contact. The social indifference was especially marked toward other children, as compared with adults.

2. "Passive interaction" described the behavior of children who did not make social contact spontaneously but who amiably accepted approaches and did not resist if other children dragged them into their games. Some of these children were liked by their classmates because they could be used as babies in a game of mothers and fathers or as patients for doctors and nurses. They would remain in their allotted role as long as the other children were playing, but they would wander off at the end of the game unless redirected by their peers.

3. "Active, but odd interaction" included children who did make spontaneous social approaches, mostly to adults but also to other children. Their behavior was inappropriate because it was undertaken mainly to indulge some repetitive, idiosyncratic preoccupation. They had no interest in and no feeling for the needs and ideas of others. They did not modify their speech or behavior to adapt to others but continued to pursue their own topics or favorite activities even in the face of active discouragement. They tended to pester other people and were sometimes rejected by their peers because of their peculiar behavior. For this reason they were less socially acceptable than the "passive" group.

4. "Appropriate interaction" covered those whose social interactions were appropriate for their mental age. They enjoyed social contact for its own sake with adults and with other children. There were a few children in the study with this behavior whose mental ages were very low, in some cases under 12 months, although most children of this kind were nonmobile. They showed the same kind of pleasure in, and response to, social approaches as a normal baby (Schaffer, 1974; Trevarthen, 1974). They used eye contact, facial expression, and gesture to indicate interest and to try to join in conversation as best they could. Such children contrasted markedly with the aloof and indifferent group in that they paid attention when someone entered the room, and anticipated a social approach before one was actually made.

Abnormalities of Use of Speech. Four types of abnormalities (described in Ricks & Wing, 1975) were rated: (a) absence of speech; (b) echolalia, immediate or delayed; (c) reversal of pronouns; and (d) idiosyncratic uses of words or phrases.

Because Kanner (1946) emphasized the diagnostic importance of the last two items, these were rated if there was evidence from case notes or informants' accounts that they had occurred in the past, as well as at the time of interview.

Abnormalities of Symbolic, Imaginative Activities. Two types of abnormalities were rated: (a) complete absence of symbolic, imaginative activities, including pretend play; (b) repetitive, stereotyped symbolic activities (Wing, Gould, Yeates, & Brierley, 1977).

Elaborate Repetitive Routines. These were defined as stereotyped, repetitive activities involving the organization of materials or people (Wing et al., 1976).

Overall Pattern of Interests. The information obtained from the HBS schedule on repetitive, stereotyped behaviors of all kinds, varying from the most simple such as twisting the hands near the eyes or head banging, to the most complex routines or abstract preoccupations, together with details of the child's practical, academic, and play activities and interests were used in this rating. Two types of abnormalities were rated: (a) interest pattern consisting entirely of repetitive stereotyped pursuits except, possibly, when the child was closely supervised and directed by an adult; (b) interest pattern partly stereotyped and partly constructive, even without supervision. For example, a child might clear the table and wash the dishes on his own but would then choose to return to rocking and flapping while listening to the same record played over and over again.

Psychological tests were given to assess nonverbal skills, language development, and social maturity (see Gould, 1976, for details).

Medical Investigations

Physical examination and neurological, biochemical, and other special investigations were carried out in a parallel study of the same children by Corbett and his colleagues (Corbett, Harris, & Robinson, 1975), with the aim of establishing the cause of the mental handicaps and identifying any associated organic conditions.

Case Notes

Medical, educational and social case notes dating from the child's birth were, as far as possible, traced and inspected. Presumed etiology, reported age of onset, and behavior problems, especially impaired social contact and repetitive, stereotyped activities, were noted and recorded in particular detail.

Although it is not yet known if the underlying pathologies have any features in common, certain conditions have been reported in the literature as likely to have occurred in children with the pattern of impairments and abnormal behaviors being considered here. Some are etiological, others are sequelae of various causes, or of unknown origin. They are maternal

rubella (Chess, 1971; Wing, 1969, 1971), untreated phenylketonuria (Jervis, 1963), tuberose sclerosis (Critchley & Earl, 1932; Earl, 1934), encephalitis and encephalopathy (Asperger, 1960a,b; Greenebaum & Lurie, 1948), severe perinatal complications (Folstein & Rutter, 1977; Lotter, 1967), severe congenital visual impairments associated with brain damage (Freedman, 1971; Keeler, 1958), and infantile spasms (Taft & Cohen, 1971). On the other hand, the pattern of impairments appears to be uncommon in children with Down's syndrome (Wing, 1969).

In the present study, etiological or associated organic conditions were grouped as follows: those listed above, Down's syndrome, other identifiable conditions, dubious or none identified (see Table I).

Analysis of the Data

The analysis was done in two stages. First, different ways of subclassifying the children were considered and certain of them selected for the purposes of the present study. Second, the subgroups thus chosen were compared on behavioral, demographic, psychological, and medical variables.

RESULTS

Stage 1: Classification of the Children

Two independent approaches to classification of the children studied were used. The first was based on aspects of current behavior as elicited by the HBS schedule. The second was an attempt to identify the named syndromes mentioned in the introduction.

The items rated on the HBS schedule were considered in turn as possible bases for subgrouping. Complex statistical techniques, such as factor or cluster analyses, were not used, since the approach adopted at this stage of the study was primarily clinical.

The aim was to find a system that discriminated between groups with a reasonable degree of reliability, and would be of use clinically and in relation to education and management. The method finally chosen was based on the HBS schedule ratings of the quality of social interaction.

The 58 children whose social interaction was appropriate for their mental age, all of whom were in contact with the services for severe retardation, will be referred to as the "sociable, severely retarded" group. The other 74, described as impaired in their social interactions, will be called the

Table I. Quality of Social Contact × Type of Associated Organic Condition (Absolute numbers of children)

Organic condition[a]	Socially impaired				Sociable severely retarded
	Aloof		Passive + Odd		
	Autistic	Non-autistic	Autistic	Non-autistic	
Conditions reported to be associated with social impairment etc.					
Maternal rubella	1	3	–	–	1
Phenylketonuria	–	1	–	–	–
Tuberose sclerosis	–	–	–	1	–
Encephalitis/encephalopathy	2	2	–	–	2
Severe visual impairments	–	5[b]	–	1[c]	–
Infantile spasms	2[b,c]	4	–	1	–
Severe perinatal complications	3	–	–	4	5
Total	8	15	–	7	8
Down's syndrome					
Total	–	1	–	–	27
Other identifiable conditions					
Rubenstein-Taybi	–	–	–	–	2
Pierre Robin	–	–	–	–	1
Cri-du-chat	–	–	–	–	1
Sturge-Weber	–	–	–	–	1
Multiple congential abnormalities	–	1	1	1	2
Galactosaemia	–	–	–	–	1
Meningitis	–	–	–	–	2
Microcephaly (cause unknown)	–	2	–	–	1
Hydrocephaly or encephalocoele	–	1	–	1	–
Epilepsy (cause unknown)	1	–	–	4	3
Total	1	4	1	6	14
None identified or dubious significance					
Family history of retardation, but no known syndrome	–	1	–	2	3
Deafness	–	–	–	1	1
Gastroenteritis under 1 year	–	–	1	–	1
Unconfirmed virus illness under 1 year	2	–	–	–	–
Unconfirmed head injury under 1 year	–	–	1	–	–
Operation for cleft palate under 1 year	–	–	1	–	–
Not known	1	4	1	16	4
Total	3	5	4	19	9

[a] Listed in hierarchical order. Each child appears only once.
[b] One child in each of these subgroups also had severe perinatal complication.
[c] One child in each of these groups also had Down's syndrome.

"socially impaired" group. They could be subdivided according to type of impairment in social contact as described previously, namely aloof, passive, and odd. (The numbers in each group and subgroup can be seen in Table II.)

Identification of Named Syndromes

The reported ages of onset varied from birth to 5 years but did not appear to be related to the clinical picture at the time of the detailed interviews. The only named syndrome that could be identified reliably, by 3 independent raters, was Kanner's early childhood autism (Wing *et al.,* 1976)

It was possible to select children who, currently or in the past, had shown both criteria said by Kanner and Eisenberg (1956) to be fundamental to early childhood autism, that is, social aloofness and indifference, especially to peers, and elaborate repetitive routines. The present study included many children aged 10 years or above. The clinical picture of autism is known to change with age (Kanner, 1973; Rutter, 1970). Therefore the diagnosis was made if these two criteria were reported retrospectively as present before 5 and up to at least 7 years of age (Wing *et al.,* 1976). Children under

Table II. Comparison of Socially Impaired with Sociable Severely Retarded Children: Behavioral Variables[a]

	Socially impaired	Sociable severely retarded
Number of children	74	58
Percentages showing following abnormalities	(100)	(100)
History of typical autism	23	0[b]
Speech		
None	55	33[b]
Echolalia	35	17
Idiosyncratic speech and/or reversal of pronouns (ever)	8	0
Symbolic activities		
None	55	10[b]
Repetitive	42	14
Overall interest pattern		
Repetitive only	72	7[b]
Repetitive and constructive	28	31
Elaborate repetitive routines	23	0[b]

[a]At time of interview, unless otherwise specified.
[b]$p < .001$ (chi-square test).

the age of 7 at the time of interview were followed until at least that age, and these features of their behavior pattern were noted.

The criteria for diagnosing autism were applied regardless of the child's intellectual level, associated organic conditions, additional handicaps, or reported age of onset. Seventeen children were identified as having this syndrome, all of them in the socially impaired group (see Table III).

To summarize, two main groups could be separated—the sociable severely retarded and the socially impaired. The latter could be subdivided by two independent methods, namely, on quality of social interaction, and on presence or absence of a history of classic early childhood autism.

Stage 2: Characteristics of the Groups and Subgroups

The correlates of the groups and subgroups obtained as above were examined.

Comparison of Socially Impaired and Sociable Severely Retarded Children

Table II shows that muteness or echolalia, absence or marked repetitiveness of symbolic activities, and an interest pattern consisting entirely or partly of repetitive activities occurred in virtually all of the socially impaired group, but these items could also been seen in a very significantly smaller proportion of the sociable severely retarded children. In the latter, absence of symbolic activities and an interest pattern dominated by repetitive behaviors were found only in children with language comprehension ages below 20 months.

The only items confined to the socially impaired group were a history of typical early childhood autism defined as above, idiosyncratic speech and/or reversal of pronouns shown currently or in the past, and elaborate repetitive routines at interview.

The age-specific rates per 10,000 and the demographic, psychological, and medical findings are given in Table III. The groups did not differ significantly on age, but the excess of males among the socially impaired just reached significance.

The groups differed very significantly on language comprehension age, the socially impaired children being more likely to score at a level below 20 months.

An onset after birth was reported more often in the socially impaired children. The distribution of the associated organic conditions was in agreement with the previous reports in the literature that certain conditions are

Table III. Comparison of Socially Impaired with Sociable Severely Retarded Children: Demographic, Psychological and Medical Variables

	Socially impaired	Sociable severely retarded
Number of children	74	58
Rates per 10,000 aged 0-14 years	21.2	16.6
Percentages in each group	(100)	(100)
Chronological age at interview		
< 10 years	43	59
10 + years	57	41
Sex		
Male	73	53[a]
Female	27	47
Language comprehension age		
< 20 m	58	14[b]
20 + m	42	86
Reported age of onset from:		
birth	70	95[b]
< 3 years	26	5
3-5 years	4	0
Associated organic conditions (hierarchical order)		
Reported to be associated with social, language, and behavioral impairment	41	14[b]
Down's syndrome	1	47
Other identifiable conditions	16	24
Dubious or none identified	42	16

[a] $p < .05$.
[b] $p < .001$.

likely to be found in children with abnormal social, language, and behavior patterns. It can also be seen that Down's syndrome occurred mostly in children who were sociable though severely retarded. There were more socially impaired children for whom no definite organic etiology or associated condition could be found, but some organic pathology could be identified in over half of this group, compared with more than four-fifths of the sociable severely retarded children (see Table I).

Comparison of Methods of Classifying Socially Impaired Children

It can be seen from Table IV that the two methods of subgrouping the socially impaired children cut across each other. Children with and without a history of typical autism could be found in each of the three groups based on the severity of social impairment found at the time of interview. The

Table IV. Comparison of Methods of Subgrouping Socially Impaired Children: Behavioral Variables[a]

	Severity of social impairment			History of typical autism	
	(1) Aloof	(2) Passive	(3) Odd	(1) Present	(2) Absent
Number of children	37	20	17	17	57
Percentages showing following abnormalities	(100)	(100)	(100)	(100)	(100)
History of typical autism	32	15[b]	12[b]	100	0
Speech					
None	89	35	6[c]	59	54
Echolalia	11	50	71	35	35
Idiosyncratic speech and/or reversal of pronouns (ever)	5	15	6	29	2[d]
Symbolic activities					
None	100	15	6[c]	76	49
Repetitive	–	80	88	24	47
Overall interest pattern					
Repetitive only	100	50	35[c]	82	68
Repetitive & constructive	0	50	65	18	32
Elaborate repetitive routines	30	15	18	94[e]	2[c]

[a] At time of interview, unless otherwise specified.
[b] These five children had ceased to be aloof after age 7.
[c] $p < .001$ (Chi-square test).
[d] $p < .01$.
[e] One child had ceased to show his previously elaborate routines from age 10.

aloof group contained the largest proportion of autistic children, though the difference from the passive and the odd groups was not significant.

The features that separated those with a history of typical autism from the rest were the presence at interview of elaborate repetitive routines, and the occurrence at any time of idiosyncratic use of speech and reversal of pronouns, though only about one-third of the autistic group had ever shown these latter problems.

Mutism, echolalia, absence of or repetitive symbolic activities, and an interest pattern consisting entirely or partly of stereotyped activities did not differentiate those with and without a history of typical autism. On the other hand, they were very significantly associated with the degree of social impairment. Mutism and stereotyped repetitive activities characterized the aloof groups while the passive and the odd children were more likely to have repetitive speech and repetitive symbolic activities, but some constructive pursuits as well.

Table V compares the methods of subgrouping on the demographic, psychological, and medical variables. Age at interview and sex were not significantly associated with either system of subgroups, though the excess of boys with a history of typical autism almost reached significance.

Table V. Comparison of Methods of Subgrouping Socially Impaired Children: Demographic, Psychological and Medical Variables

	Severity of social impairment			History of typical autism	
	(1) Aloof	(2) Passive	(3) Odd	(1) Present	(2) Absent
Number of children	37	20	17	17	57
Rates per 10,000 aged 0-14 years	10.6	5.7	4.9	4.9	16.3
Percentages in each group	(100)	(100)	(100)	(100)	(100)
Chronological age at interview					
< 10 years	46	30	53	64	54
10 + years	54	70	47	36	46
Sex					
Male	70	80	71	94	67
Female	30	20	29	6	33
Language comprehension age					
< 20 m	92	40	6[a]	59	58
20 + m	8	60	94	41	42
Nonverbal IQ					
0-49	78	40	53[b]	35	70[b]
50-69	17	25	35	35	19
70 +	5	35	12	30	11
Reported age of onset					
birth	54	90	82[c]	47	77[b]
< 3 years	41	10	12	47	19
3-5 years	5	0	6	6	4
Associated organic conditions (hierarchical order)					
Reported to be associated with social, language, and behavioral impairment	61	25	12[a]	47	37
Down's syndrome	3	0	0	0	2
Other identifiable conditions	14	15	24	12	19
Dubious or none identified	22	60	65	41	42

[a] $p < .001$ (Chi-square test).
[b] $p < .05$.
[c] $p < .01$.

A reported age of onset after birth was significantly associated with the aloof subgroup, and was also just significantly associated with a history of typical autism.

A language comprehension age under 20 months occurred equally often in the autistic and nonautistic children but was very significantly associated with severity of social impairment. The aloof subgroup was most likely to have a low level of language comprehension.

The types of organic conditions detected from the history or the medical examinations were very significantly associated with severity of social impairment but not with a history of typical autism. The conditions reported in the literature as likely to give rise to social, language, and behavioral problems occurred most often in the aloof group. The passive and the

Table VI. Prevalence of Social Impairment at Different Levels of Intelligence

Intelligence[a] quotient	All mobile Camberwell children (Absolute numbers)	All socially impaired (%)	Aloof at interview (%)	History of typical autism (%)
0-19	22	95.5	90.9	4.5
20-34	34	52.9	29.4	14.7
35-49	49	40.8	12.2	14.3
50-69	700[b]	1.8	.1	.4
70+	34100[b]	.01	–	.003

[a]Based on verbal and nonverbal skills combined.
[b]Estimates.

odd subgroups contained the largest proportion of children (around two-thirds) for whom no definite identifiable organic pathology could be found.

The authors had the impression that the autistic children tended to be more capable of single-minded concentration on a very limited range of activities than any of the other children in the study, but this aspect of behavior was not formally rated.

Prevalence of Social Impairment at Different Levels of Intelligence

Table VI shows that all but one of the mobile profoundly retarded children had the social impairments described in this paper. Twenty of the 21 socially impaired profoundly retarded children were in the aloof subgroup. Thirty-eight (just under half) of the children with intelligence quotients in the 20-49 range had impairments of social interaction, and 16 of them were in the aloof subgroup. With higher intelligence levels the percentages of socially impaired children diminished markedly. In the normal range, 70 and over, the proportion was negligible.

The table also corroborates the finding that of all socially impaired children, those with a history of typical autism tended to have somewhat higher intelligence levels than those without, even though the majority were in the severely retarded range.

DISCUSSION

Prevalence and Distribution

Impairments of reciprocal social interaction of the types described in this paper occurred in 21.2 of every 10,000 children aged under 15 in the area studied, of whom 4.9 had a history of typical autism. The latter rate

was of the same order as those found by Lotter (1966) in Middlesex, England, and Brask (1970) in Aarhus, Denmark. It is possible that the prevalence of social impairment, other than typical autism, was particularly high in Camberwell because of its demographic characteristics, but this remains to be investigated.

All the children with social impairments had repetitive stereotyped behavior and almost all had absence or abnormalities of language and symbolic activities. Thus the study showed a marked tendency for these problems to occur together.

However, repetitive activities and language impairments were also found in a minority of sociable severely retarded children. Most of these had symbolic pretend play, and the repetitive activities were only a part of a much wider behavioral repertoire. A small group of sociable children with a language comprehension age below 20 months—that is, before the age at which pretend play begins to develop—had a pattern of interests that was confined to repetitive activities. This clinical picture could cause problems of differential diagnosis unless such children's social interactions are evaluated in the light of their level of language development.

Classification

The clustering of the social, language, and behavioral abnormalities, and the evidence from the psychological and medical data provided support for the main division into the socially impaired and sociable though severely retarded groups.

Of the two independent methods of subclassifying the socially impaired children, the system based on severity of social impairment gave more statistically significant associations with behavioral, psychological, and medical variables than that based on the presence or absence of a history of typical autism.

The autistic children tended to have rather better nonverbal skills than the rest of the socially impaired group but, apart from this, were clearly, though not absolutely, separated from the others only on certain speech and behavioral items, namely, the use of idiosyncratic phrases, reversal of pronouns, and elaborate repetitive routines. The last item and social aloofness were the essential criteria for the diagnosis of a history of typical autism. Elaborate routines occurred in only one nonautistic child who had always been odd, but not aloof, in his social interactions, whereas social aloofness was present at the time of interview in 25 children who had never had elaborate routines.

The social impairment subgroups did not differ significantly on the three speech and behavioral abnormalities associated with typical autism,

but were significantly differentiated on all other cognitive and behavioral variables that were measured, and on types of associated organic conditions. However, the distribution of the variables among the subgroups suggested that they formed a continuum of severity rather than discrete entities.

Relationship with Mental Retardation

The results upheld the often reported finding that the majority of children with autism and similar conditions score in the mildly or severely retarded ranges on intelligence tests. They also showed that children with social impairments, and the associated language and behavioral problems, accounted for more than half of all children in the study with intelligence quotients below 50. Children with a history of typical autism made up just over one-tenth of that IQ range.

The most notable feature of the association between mental retardation and social impairment of the types described here was the positive correlation between severity of retardation and the proportion of children who were socially impaired. Furthermore, the lower the level of intelligence, the more likely it was that the social impairment would take the form of aloofness and indifference. This trend was also found by Haracopos and Kelstrup (1978) in their study of "psychotic" behavior in Danish children in institutions for the mentally retarded.

Theoretical Implications

It can be postulated that, in its most severe form, the cluster of abnormalities consisting of impairment of social interaction, repetitive activities in place of imaginative symbolic interests, and impairment of language development is due to organic brain damage of the kind that also produces severe generalized mental retardation. However, it is possible to find children who are severely, even profoundly, mentally retarded, whose social interactions are appropriate for their mental age.

The authors hypothesize that certain areas or functions of the brain are responsible for the development of social interaction and symbolic imaginative activities. Some conditions, such as encephalitis in the early years of life or untreated phenylketonuria, which produce widespread brain damage, are likely, though not certain, to affect these functions and other cognitive skills, producing a child who is severely or profoundly retarded and has marked social aloofness plus the accompanying abnormalities.

Some organic pathologies, notably Down's syndrome, usually appear to leave these functions intact but to produce other cognitive defects that result in a sociable mentally retarded child.

The children with impairments, rather than an absence, of social interaction and symbolic activities in whom no organic condition can definitely be identified may have a very limited and specific problem affecting the relevant aspects of brain development but leaving other skills less damaged. The work of Folstein and Rutter (1977) suggested that in some cases the underlying pathology may be genetic, producing abnormal behavior either directly or by making the child vulnerable to such behavior if, for some reason, brain damage occurs.

It would be of considerable interest to establish the exact reasons why various organic conditions are more or less likely to be associated with social impairment.

Unlike the other named syndromes, the behavior pattern described by Kanner could be identified reliably, but the findings of the present study bring into question the usefulness of regarding childhood autism as a specific condition.

The patterns of impairments and behavioral abnormalities described could be classified in a variety of ways, the value of each depending on the purpose for which it was undertaken. Of the two methods used in this paper, the grouping on severity of social impairment was related to gross etiology, while that based on a history of typical autism was not. Further investigation is necessary to show which, if either, of the systems enables predictions to be made concerning prognosis, educational needs, or specific abnormalities of physiological, biochemical, or psychological function. More work on the children studied, including follow-up, is being undertaken.

To be of maximum use, any system of classification in this field must be based on the full range of conditions involving impairment of social interaction. Studying only Kanner's syndrome or some other subgroup, such as children who are socially aloof, will lead to conclusions of limited generalizability.

The authors suggest that in studies of these conditions descriptions of the subjects should include details of the quality of the children's social contact, level of nonverbal intelligence, language comprehension age, development of symbolic activity, and presence or absence of a history of typical early childhood autism, as well as the usual clinical and demographic data. They also express the hope that some name more suitable than "autism" or "psychosis" will eventually be coined for the behavioral patterns discussed here.

REFERENCES

Anthony, E. J. An experimental approach to the psychopathology of childhood autism. *British Journal of Medical Psychology,* 1958, *21,* 211-225. (a)

Anthony, E. J. An etiological approach to the diagnosis of psychosis in childhood. *Revue de Psychiatrie Infantile,* 1958, *25,* 89-96. (b)

Anthony, E. J. Low grade psychosis in childhood. *Proceedings of the London Conference Scientific Study of Mental Deficiency* (Vol. 2). London: May & Baker, 1962.

Asperger, H. Die autistischen psychopathen im kindersalter. *Archiv für Psychiatrie und Nervenkrankheiten,* 1944, *117,* 76-136.

Asperger, H. Infections and mental retardation. In P. Bowman & H. Mautner (Eds.), *Mental Retardation: Proceedings of the First International Medical Conference, Portland, Maine.* New York: Grune and Stratton, 1960. (a)

Asperger, H. Behavior problems and mental retardation. In P. Bowman & H. Mautner (Eds.), *Mental Retardation: Proceedings of the First International Medical Conference, Portland, Maine.* New York: Grune & Stratton, 1960. (b)

Bartak, L., & Rutter, M. Differences between mentally retarded and normally intelligent autistic children. *Journal of Autism and Childhood Schizophrenia,* 1976, *6,* 109-120.

Brask, B. H. A prevalence investigation of childhood psychosis. In *The 16th Scandinavian Congress of Psychiatry,* 1970.

Chess, S. Autism in children with congenital rubella. *Journal of Autism and Childhood Schizophrenia,* 1971, *1,* 33-47.

Chess, S. Follow-up report on autism in congenital rubella. *Journal of Autism and Childhood Schizophrenia,* 1977, *7,* 69-81.

Corbett, J. A., Harris, R., & Robinson, R. G. Epilepsy. In J. Wortis (Ed.), *Mental retardation and developmental disabilities* (Vol. 7). New York: Brunner/Mazel, 1975.

Critchley, M., & Earl, C. J. C. Tuberose sclerosis and allied conditions. *Brain,* 1932, *55,* 311-346.

DeMyer, M. Motor, perceptual-motor and intellectual disabilities of autistic children. In L. Wing (Ed.), *Early childhood autism.* (2nd ed.). Oxford: Pergamon, 1976.

De Sanctis, S. Sopra alcune varietà della demenza precoce. *Rivista Sperimentale de Freniatria e di Medicina Legale,* 1906, *32,* 141-165.

De Sanctis, S. Dementia praecocissima catatonica oder katatonie des früheren kindesalters? *Folia Neurobiologica,* 1908, *2,* 9-12.

Earl, C. J. C. The primitive catatonic psychosis of idiocy. *British Journal of Medical Psychology,* 1934, *14,* 230-253.

Folstein, S., & Rutter, M. Infantile autism: A genetic study of 21 twin pairs. *Journal of Child Psychology and Psychiatry,* 1977, *18,* 297-322.

Freedman, D. A. Congenital and perinatal sensory deprivation: Some studies in early development. *American Journal of Psychiatry,* 1971, *127,* 1539-1545.

Gould, J. Language development and non-verbal skills in severely retarded children: An epidemiological study. *Journal of Mental Deficiency Research,* 1976, *20,* 129-146.

Greenebaum, J. V., & Lurie, L. A. Encephalitis as a causative factor in behavior disorders in children: Analysis of 78 cases. *Journal of the American Medical Association,* 1948, *136,* 923-930.

Haracopos, D., & Kelstrup, A. Psychotic behavior in children under the institutions for the mentally retarded in Denmark. *Journal of Autism and Childhood Schizophrenia,* 1978, *8,* 1-12.

Hulse, W. C. Dementia infantilis. *Journal of Nervous and Mental Diseases,* 1954, *119,* 471-477.

Jervis, G. A. The clinical picture. In F. L. Lyman (Ed.), *Phenylketonuria.* Springfield, Illinois: Charles C Thomas, 1963.

Kanner, L. Autistic disturbances of affective contact. *Nervous Child,* 1943, *2,* 217-250.

Kanner, L. Irrelevant and metaphorical language in early infantile autism. *American Journal of Psychiatry,* 1946, *103,* 242-246.

Kanner, L. *Childhood psychosis: Initial studies and new insights.* Washington: Winston, 1973.

Kanner, L., & Eisenberg, L. Early infantile autism: 1943-1955. *American Journal of Orthopsychiatry,* 1956, *26,* 55-65.

Keeler, W. R. Autistic patterns and defective communication in blind children with retrolental fibroplasia. In P. H. Hoch & J. Zubin (Eds.), *Psychopathology of communication.* New York: Grune and Stratton, 1958.

Kolvin, I. Studies in the childhood psychoses. I. Diagnostic criteria and classification. *British Journal of Psychiatry,* 1971, *118,* 381-384.

Kolvin, I., Humphrey, M., & McNay, A. Cognitive factors in childhood psychoses. *British Journal of Psychiatry,* 1971, *118,* 415-421.

Lotter, V. Epidemiology of autistic conditions in young children. I. Prevalence. *Social Psychiatry,* 1966, *1,* 124-137.

Lotter, V. Epidemiology of autistic conditions in young children. II. Some characteristics of the parents and children. *Social Psychiatry,* 1967, *1,* 163-173.

Mahler, M. S. On child psychoses and schizophrenia: Autistic and symbiotic infantile psychoses. *Psychoanalytic Study of the Child,* 1952, *7,* 286-305.

Ricks, D. M., & Wing, L. Language, communication and the use of symbols in normal and autistic children. *Journal of Autism and Childhood Schizophrenia,* 1975, *3,* 191-221.

Rutter, M. Autistic children: Infancy to adulthood. *Seminars in Psychiatry,* 1970, *2,* 435-450.

Rutter, M. Childhood schizophrenia reconsidered. *Journal of Autism and Childhood Schizophrenia,* 1972, *2,* 315-337.

Rutter, M., & Lockyer, L. A five to fifteen year follow-up study of infantile psychosis. I. Description of the sample. *British Journal of Psychiatry,* 1967, *113,* 1169-1182.

Rutter, M., Shaffer, D., & Sturge, C. *A guide to a multi-axial classification scheme for psychiatric disorders in childhood and adolescence.* London: Institute of Psychiatry, 1975.

Schaffer, H. R. Early social behaviour and the study of reciprocity. *Bulletin of the British Psychological Society,* 1974, *27,* 209-216.

Taft, L. T., & Cohen, H. J. Hypsarrhythmia and childhood autism: A clinical report. *Journal of Autism and Childhood Schizophrenia,* 1971, *1,* 327-336.

Trevarthen, C. Conversations with a two-month old. *New Scientist,* 1974, *62,* 230-235.

Van Krevelen, D. A. Early infantile autism and autistic psychopathy. *Journal of Autism and Childhood Schizophrenia,* 1971, *1,* 82-86.

Wing, J. K., & Hailey, A. (Eds.). *Evaluating a community psychiatric service: The Camberwell Register 1964-77.* London: Oxford University Press, 1972.

Wing, L. The handicaps of autistic children—a comparative study. *Journal of Child Psychology and Psychiatry,* 1969, *10,* 1-40.

Wing, L. Perceptual and language development in autistic children: A comparative study. In M. Rutter (Ed.), *Infantile autism: Concepts, characteristics and treatment.* London: Churchill, 1971.

Wing, L., & Gould, J. Systematic recording of behaviors and skills of retarded and psychotic children. *Journal of Autism and Childhood Schizophrenia.* 1978, *8,* 79-97.

Wing, L., Gould, J., Yeates, S. R., & Brierley, L. M. Symbolic play in severely mentally retarded and in autistic children. *Journal of Child Psychology and Psychiatry,* 1977, *18,* 167-178.

Wing, L., Yeates, S. R., Brierley, L. M., & Gould, J. The prevalence of early childhood autism: Comparison of administrative and epidemiological studies. *Psychological Medicine,* 1976, *6,* 89-100.